
STATUTORY INSTRUMENTS

1989 No. 2376

CUSTOMS AND EXCISE

The Export of Goods (Control) Order 1989

Made - - - - 15th December 1989

Coming into force - - 14th February 1990

The Secretary of State, in exercise of powers conferred by section 1 of the Import, Export and Customs Powers (Defence) Act 1939⁽¹⁾ and now vested in him⁽²⁾, and all other powers enabling him in that behalf, hereby makes the following Order:

Citation, commencement and interpretation

1.—(1) This Order may be cited as the Export of Goods (Control) Order 1989 and shall come into force on 14th February 1990.

(2) In this Order, unless the context otherwise requires—

“aircraft” does not include helicopters;

“Commissioners” means the Commissioners of Customs and Excise;

“country” includes territory;

“document” includes any record or device by means of which information is recorded or stored;

“goods”, unless otherwise specified, means both used and unused goods;

“hovercraft” has the same meaning as in section 4(1) of the Hovercraft Act 1968⁽³⁾;

“importation” and “exportation” in relation to a vessel, submersible vehicle, aircraft or helicopter includes the taking into or out of the United Kingdom of the vessel, submersible vehicle, aircraft or helicopter notwithstanding that the vessel, submersible vehicle, aircraft or helicopter is conveying goods or passengers, and whether or not it is moving under its own power; and cognate expressions shall be construed accordingly;

“Member State” means a Member State of the European Communities;

“microprogramme” means a sequence of elementary instructions, maintained in a special storage, the execution of which is initiated by the introduction of its reference instruction into an instruction register;

(1) 1939 c. 69.

(2) See S.I. 1970/1537.

(3) 1968 c. 59.

“normal commercial journey” means a journey providing transport services in the ordinary course of business;

“ODMA software” means operating software, diagnostic software, maintenance software or application software; and in each case includes only the minimum software necessary to enable the equipment to perform the function for which it was designed;

“programme” means a sequence of instructions to carry out a process in, or convertible into, a form executable by an electronic computer and includes a microprogramme;

“scheduled goods” means goods of a description specified in Schedule 1 hereto;

“scheduled journey” means one of a series of journeys which are undertaken between the same two places and which together amount to a systematic service operated in such a manner that the benefits thereof are available to members of the public from time to time seeking to take advantage of it;

“ship” includes the hull or part of the hull of a ship;

“software” means one or more programmes fixed in any tangible medium of expression;

“surface effect vehicle” means any air cushion vehicle (whether side wall or skirted) and any vehicle using the wing-in-ground effect for positive lift;

“SWATH vessel” means any small waterplane area twin-hull vessel;

“technological document” means any document containing information relating to the design, production, testing or use of goods or to technologies or processes, excluding:

- (i) document which is generally available to the public;
- (ii) application for the grant of a patent (or any other form of protection for an invention) or for the registration of a design, or a semi conductor topography, in each case under the law of the United Kingdom or of any other country or under any treaty or international convention;
- (iii) document necessary to enable any such application to be filed, made or pursued;

“vessel” includes any ship, surface effect vehicle, SWATH vessel and hydrofoil, and the hull or part of the hull of a vessel;

a prohibition on exportation means a prohibition on exportation from the United Kingdom and shall include a prohibition on shipment as ships' stores;

any reference to scheduled goods or any other item being indicated by a letter shall be taken as a reference to such goods or items being so indicated in Schedule 1 hereto;

numerical references in Schedule 1 hereto to British Standards are references to the standards so numbered published by the British Standards Institution in the year indicated after such references with such amendments (if any) thereto as may have been made before the making of this Order;

references in Schedule 1 hereto to percentages of the contents of any goods are references to percentages by weight;

any description of goods specified in Group A of Part I of Schedule 1 hereto in relation to a Combined Nomenclature heading or sub-heading, other than one covering a whole heading, shall be taken to comprise all goods which would be classified under an entry in the same terms constituting a subheading in the relevant heading in the Combined Nomenclature of the European Economic Community⁽⁴⁾.

(4) See Council Regulation (EEC) No.2658/87 O.J.No.L256, 7.9.87, p. 1, amended by Commission Regulation (EEC) No.3985/87 O.J.No.L376 31.12.87, p. 1, Council Regulation (EEC) No.1045/88 O.J.No.L103 22.04.88 p. 1, Council Regulation (EEC) No.1058/88 O.J.No.L104 23.04.88 p. 1, Council Regulation (EEC) No.1315/88 O.J.No.L123 17.05.88 p. 2, Council Regulation (EEC) No.1471/88 O.J.No.L134 31.05.88 p. 1, Commission Regulation (EEC) No.1858/88 O.J.No.L166 01.07.88 p. 10, Commission Regulation (EEC) No.3174/88 O.J.No.L298 31.10.88 p. 1, Council Regulation (EEC) No.3468/88

Prohibitions and restrictions on exportation

2. Subject to the provisions of this Order—

- (i) where scheduled goods are indicated by the letter “C”, those goods are prohibited to be exported to any destination, and (whether or not express provision is made in relation to technology) technological documents the information in which relates to those goods are prohibited to be exported to any destination in a country listed in Schedule 2 to this Order;
- (ii) where technology is specified in Schedule 1 to this Order and indicated by the “D”, technological documents the information in which includes that technology are prohibited to be exported to any destination in a country listed in Schedule 2 to this Order;
- (iii) scheduled goods indicated by the letter “E” are prohibited to be exported to any destination except a destination in another Member State;
- (iv) where scheduled goods are indicated by the letter “I”, those goods and (whether or not express provision is made in relation to technology) technological documents the information in which relates to those goods are prohibited to be exported to any destination in Iran or Iraq;
- (v) where scheduled goods are indicated by the letter “L”, those goods and (whether or not express provision is made in relation to technology) technological documents the information in which relates to those goods are prohibited to be exported to any destination in Libya;
- (vi) where scheduled goods are indicated by the letter “S”, those goods and (whether or not express provision is made in relation to technology) technological documents the information in which relates to those goods are prohibited to be exported to any destination after delivery or for the purpose of delivery, directly or indirectly, to a person in any country listed in Schedule 2 to this Order;
- (vii) scheduled goods indicated by the letter “T” are prohibited to be exported to any destination except that when in relation to such goods the provisions of Commission Regulation (EEC) 1062/87, as amended⁽⁵⁾, relating to the use of Community transit documents requiring anything to be done at or before the time of exportation have been complied with, the goods may be exported to a destination in another Member State;
- (viii) scheduled goods indicated by the letter “W” are prohibited to be exported to any destination;
- (ix) scheduled goods indicated by the letter “X” are prohibited to be exported to any destination in India or Pakistan;
- (x) where scheduled goods are indicated by the letter “Y”, those goods and (whether or not express provision is made in relation to technology) technological documents the information in which relates to those goods are prohibited to be exported to any destination in Syria;
- (xi) where scheduled goods are indicated by the letter “Z”, those goods and (whether or not express provision is made in relation to technology) technological documents

O.J.No.L305 10.11.88 p. 1, Council Regulation (EEC) No.4107/88 O.J.No.L361 29.12.88 p. 1, Commission Regulation (EEC) No.0020/89 O.J.No.L004 06.01.89 p. 19, Council Regulation (EEC) No.1495/89 O.J.No.L148 01.06.89 p. 1, Council Regulation (EEC) No.1672/89 O.J.No.L169 19.06.89 p. 1, Commission Regulation (EEC) No.2886/89 O.J.No.L282 02.10.89 p. 1, and Commission Regulation (EEC) No.3469/89 O.J.No.L337 21.11.89 p. 5.

(5) O.J.No.L107, 22.4.87, p. 1, amended by Commission Regulations (EEC) No.2823/87, O.J.No.L270, 23.9.87, p. 1, No.1469/88, O.J.No.L132, 28.5.88, p. 67 and No.1159/88, O.J.No.L119, 24.4.89, p. 100.

the information in which relates to those goods are prohibited to be exported to any destination in South Africa or Namibia;

- (xii) specialised components of any goods of a description specified in Group 1 of Part II of Schedule 1 hereto, whether or not such components are specified in the description, are prohibited to be exported to any destination in South Africa or Namibia;
- (xiii) goods of a description specified in Group C of Part I of Schedule 1 hereto are prohibited to be exported to any destination in the United States of America or the Commonwealth of Puerto Rico.

Community steel products

3. The prohibition in article 2(xiii) of this Order shall not apply to any exportation to any destination in the United States of America or the Commonwealth of Puerto Rico in accordance with a European Community export licence issued by the competent authority of a Member State in conformity with the provisions of Commission Decision [2873/82/ECSC](#)(6) or Commission Regulation (EEC) No.2874/82(7) or Commission Regulation (EEC) No.61/85(8).

Exceptions

4. Nothing in article 2 of this Order shall be taken to prohibit the exportation of—

Licensed exports and permitted ships' stores

- (a) any goods under the authority of a licence granted by the Secretary of State, or the shipment of any goods as ships' stores with the permission of the proper officer of Customs and Excise at the port of departure for use on board the ship, provided that all conditions attaching to the said licence or the said permission are complied with;

Channel Islands

- (b) any goods other than goods of a description specified in Group B of Part I of Schedule 1 hereto or in Group 1 of Part II of the said Schedule, to any destination in the Channel Islands;

Samples

- (c) trade samples of any goods of a description specified in Group A of Part 1 of Schedule 1 hereto, if the samples have no saleable value;

Aircraft and helicopters

- (d) (i) any aircraft or helicopter which is being exported after temporary importation into the United Kingdom, provided that there has been no change of ownership or registration since such importation;
- (ii) any aircraft or helicopter engaged on a scheduled journey;

Cocoa

- (e) cocoa beans, whole or broken, raw or roasted, and the following cocoa products namely cocoa paste (in bulk or block) whether or not defatted, cocoa butter (fat and oil) and

(6) O.J.No.L307, 1.11.1982, p. 36, amended by Commission Decisions [2149/84/ECSC](#) O.J.No.L202, 31.7.84, p. 1 and [978/86/ECSC](#) O.J.No.L91, 7.4.86, p.49.

(7) O.J.No.L307, 1.11.1982, p. 56, amended by Commission Regulations ([EEC](#)) [2150/84](#) O.J.No.L202, 31.7.84, p. 23 and 977/86 O.J.No.L91, 7.4.86, p. 1.

(8) O.J.No.L9, 10.1.1985, p. 19, amended by Commission Regulation (EEC) No.979/86 O.J.No.L91, 7.4.86, p. 96.

cocoa powder not containing added sugar or other sweetening matter to any destination if there is produced to the proper officer of Customs and Excise at the place of export the appropriate certificate prescribed for this purpose by the economic and control rules of the International Cocoa Agreement 1986⁽⁹⁾ which were adopted by the International Cocoa Council on 23rd January 1987

Firearms and ammunition

- (f) (i) firearms (not being goods of a description specified in Group B of Part 1 of Schedule 1 hereto) authorized to be held by a valid firearm certificate or shotgun certificate granted or having effect as if granted under the Firearms Act 1968⁽¹⁰⁾ or by a valid firearm certificate granted under the Firearms (Northern Ireland) Order 1981⁽¹¹⁾ or granted in the Isle of Man under the Firearms Act 1947 (an Act of Tynwald)⁽¹²⁾; and
- (ii) related ammunition for use therewith;
to any destination other than a destination in South Africa or in Namibia, provided that the firearms and ammunition form part of the personal effects of the holder of the certificate and the certificate is produced by the holder, or his duly authorized agent, with the firearms and ammunition, to the proper officer of Customs & Excise at the place of export;

Live animals

- (g) (i) any live animal if the place of export is Great Britain;
- (ii) live bovine animals, live swine and live sheep from Northern Ireland to the Republic of Ireland;

Vessels

- (h) (i) any vessel registered or constructed outside the United Kingdom which is being exported after temporary importation into the United Kingdom;
- (ii) any vessel which is departing from the United Kingdom on trials;
- (iii) any vessel proceeding on a normal commercial journey.

Customs powers to demand evidence of destination which goods reach

5. Any exporter or any shipper of goods which have been exported from the United Kingdom shall, if so required by the Commissioners, furnish within such time as they may allow proof to their satisfaction that the goods have reached either—

- (i) a destination to which they were authorised to be exported by a licence granted for the purposes of this Order, or
- (ii) a destination to which their exportation was not prohibited by this Order;

and, if he fails to do so, he shall be liable to a customs penalty not exceeding two thousand pounds unless he proves that he did not consent to or connive at the goods reaching any destination other than such a destination as aforesaid.

⁽⁹⁾ Cmnd 9905.

⁽¹⁰⁾ 1968 c. 27, as amended by the Firearms (Amendment) Act 1988 (c. 45).

⁽¹¹⁾ S.I.1981/155 (N.I.2).

⁽¹²⁾ Acts of Tynwald 1947, p. 586.

Offences in connection with applications for licences, conditions attaching to licences, etc.

6.—(1) If for the purpose of obtaining any licence or permission under this Order for the exportation or shipment as ships' stores of any goods or of obtaining from the Secretary of State a European Community export licence as referred to in article 3 of this Order any person makes any statement or furnishes any document or information which to his knowledge is false in a material particular or recklessly makes any statement or furnishes any document or information which is false in a material particular he shall be guilty of an offence and liable on summary conviction to a fine not exceeding two thousand pounds and on conviction on indictment to a fine or imprisonment for a term not exceeding 2 years, or to both; and any licence or permission or European Community export licence which may have been granted for the exportation or shipment as ships' stores of any goods, in connection with the application for which the false statement was made or the false document or information furnished, shall be void as from the time it was granted.

(2) Any person who has exported goods from the United Kingdom under the authority of a licence granted by the Secretary of State in pursuance of Article 4(a) and who fails to comply with any condition attaching to that licence shall be guilty of an offence and liable on summary conviction to a fine not exceeding two thousand pounds and on conviction on indictment to a fine or imprisonment for a term not exceeding 2 years, or to both:

Provided that no person shall be guilty of an offence under this paragraph where he proves that the condition with which he failed to comply was modified, otherwise than with his consent, by the Secretary of State and that the goods in relation to which he failed to comply with the condition had, at the time when the condition was modified, been exported from the United Kingdom.

Declaration as to goods: powers of search

7.—(1) Any person who, on any occasion, is about to leave the United Kingdom shall, if on that occasion he is required to do so by an officer of Customs and Excise—

- (a) declare whether or not he has with him any goods the export of which from the United Kingdom is subject to any prohibition or restriction under this Order; and
- (b) produce any such goods as aforesaid which he has with him;

and such officer, and any person acting under his directions, may search that person for the purpose of ascertaining whether he has with him any such goods as aforesaid:

Provided that no person shall be searched in pursuance of this paragraph except by a person of the same sex.

(2) Any person who without reasonable excuse refuses to make a declaration, fails to produce any goods or refuses to allow himself to be searched in accordance with the foregoing provisions of this article shall be guilty of an offence and liable to a customs penalty not exceeding one thousand pounds.

(3) Any person who under the provisions of this article makes a declaration which to his knowledge is false in a material particular or recklessly makes any declaration which is false in a material particular shall be guilty of an offence and liable on summary conviction to a customs penalty not exceeding two thousand pounds and on conviction on indictment to a customs penalty of any amount or imprisonment for a term not exceeding two years, or to both.

Modification and revocation of licences, etc

8.—(1) A licence granted by the Secretary of State in pursuance of article 4(a) or having effect as if so granted may be modified or revoked by him at any time.

(2) Any permission granted by the proper officer of Customs and Excise for the shipment of any goods as ships' stores may be modified or revoked by such officer at any time.

Revocations

9. The Orders specified in Schedule 3 hereto are hereby revoked.

15th December 1989.

Trefgarne
Minister for Trade,
Department of Trade and Industry

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SCHEDULE 1

Article 1(2)

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PART I

GROUP A

GOODS SPECIFIED BY REFERENCE TO HEADINGS AND SUB-
HEADINGS OF THE COMBINED NOMENCLATURE (“CN”)

<i>CN Heading and Sub-Heading No.</i>	<i>Description of Goods</i>	
1002	Live bovine animals	W
0103	Live swine	W
010410	Sheep	W
1801	Cocoa beans, whole or broken raw or roasted	E
ex1803	Cocoa paste (in bulk or block), whether or not defatted	E
1804	Cocoa butter, fat and oil	E

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<i>CN Heading and Sub-Heading No.</i>	<i>Description of Goods</i>	
ex1805	Cocoa powder, not containing added sugar or other sweetening matter, otherwise than in retail packs each of less than 3.5 kg	E
262030	Ash and residues, (other than from the manufacture of iron or steel), containing metals or metallic compounds—containing mainly copper	E
ex7118	Coin of silver alloy of the United Kingdom minted before 1947, but not more than 100 years old at the date of exportation, exported in a quantity exceeding 10 in number	W
720410	Waste and scrap metal of cast iron (ECSC)	E
	Waste and scrap of alloy steel	E
720421	Waste and scrap of stainless steel (ECSC)	E
720429	Other (ECSC)	E
720430	Waste and scrap of tinned iron or steel	E
720441	Turnings, shavings, chips, milling waste, sawdust, filings, trimmings and stampings, whether or not in bundles (ECSC)	E
720449	Other (ECSC)	E
720450.10	Remelting scrap ingots: Of alloy steel (ECSC)	E
7404	Copper waste and scrap	E
7602	Aluminium waste and scrap	T
7802	Lead waste and scrap	T
790200	Zinc waste and scrap	T

GROUP B

ANTIQUES

Any goods manufactured or produced more than 50 years before the date of exportation except

W

(1) postage stamps and other articles of philatelic interest:

(2) birth, marriage or death certificates or other documents relating to the personal affairs of the exporter or the spouse of the exporter;

(3) letters or other writings written by or to the exporter or the spouse of the exporter; and

(4) any goods exported by, and being the personal property of, the manufacturer or producer thereof, or the spouse, widow or widower of that person.

GROUP C

STEEL PRODUCTS PROHIBITED TO BE EXPORTED TO THE UNITED STATES OF AMERICA OR THE COMMONWEALTH OF PUERTO RICO

The products specified in Annex I to the following Community instruments on the restriction of exports of certain steel products to the United States of America,

Commission Decision No. [2872/82/ECSC](#)(13)

Council Decision No. 3713/85 ECSC(14) and Commission Decision No. [2827/86/ECSC](#)(15)

PART II

Note: The goods in this Part are for convenience specified by reference to the classification system used by the Department of Trade and Industry for export control purposes.

GROUP 1

Note: Goods specified in the heads of this Group may also be specified in Groups 3E, 3F and 3G of this Part of this Schedule.

**Military aircraft and
helicopters, Arms
and related material,
Ammunition, Military
Stores and Appliances, and**

(13) O.J.No.L307, 1.11.82, p. 27, amended by Commission Decisions No.[2192/83/ECSC](#), O.J.No.L215, 05.08.83, O.J.No.L260, 21.09.83, p. 9 and No.[2827/86/ECSC](#), O.J. No.L262, 13.09.86, p. 12.

(14) O.J.No.L355, 31.12.85, p. 155.

(15) O.J.No.L262, 13.9.1986, p. 12.

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Security and Para-Military Equipment

ML1	<p>Small arms and machine guns, the following—</p> <ul style="list-style-type: none"> (a) (a) Rifles, C carbines, revolvers, pistols, machine pistols and machine guns (b) (b) Smooth-bore C weapons specially designed for military use (c) (c) Specially C designed components therefore, such as barrels, cylinders and breeches <p>except air weapons (other than those declared by the Firearms (Dangerous Air Weapons) Rules 1969(16) to be specially danagerous).</p>	
PL5003	Mounting for machine guns	C
ML2	<p>Large calibre armament or weapons and projectors the following: and specially designed components and specially designed ODMA software therefor—</p> <ul style="list-style-type: none"> (a) (a) Guns, C howitzers, cannon, mortars, tank destroyers, projectile and rocket launchers, military flame throwers, recoilless rifles (b) (b) Military C smoke, gas and pyrotechnic projectors 	
PL5004	Military smoke producing appliances and specially	C

	designed components and specially designed ODMA software therefor	
ML3	Ammunition including projectiles and specially designed components and specially designed ODMA software therefor, for the equipment mentioned in the entries ML1, ML2, PL5003 and PL5004 above	C
ML4	Bombs, torpedoes, rockets and missiles guided and unguided the following and specially designed ODMA software therefor— <ul style="list-style-type: none">(a) (a) Bombs, torpedoes, grenades (including smoke grenades), smoke canisters, rockets, mines, missiles guided or unguided, depth charges, fire bombs, incendiary bombs and military demolition charges, devices and kits; and pyrotechnic flare signals for military use; cartridges and simulators; and specially designed components therefor(b) (b) Apparatus and devices specially designed for the handling, control, activation, launching, laying, sweeping, discharging detonation or detection of items enumerated in head (a); and specially designed components therefor(c) (c) Military fuel thickeners, including but not limited	C

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	to compounds such as octal or mixtures of such compounds such as napalm, specifically formulated for the purpose of producing materials which, when added to petroleum products, provide a gel-type incendiary material for use in bombs, projectiles, flamethrowers or other implements of war	
PL5005	Apparatus and devices specially designed for the refuelling or disruption of items specified in head (a) of entry ML4 in this Group and specially designed components therefor	C
PL5006	Apparatus and devices specially designed for dealing with improvised explosive devices In this entry “improvised explosive devices” means devices placed or fabricated in an improvised manner incorporating destructive, lethal, noxious, pyrotechnic or incendiary chemicals, designed to destroy, disfigure or harass. They may incorporate military stores, but are normally devised from non-military components.	C
ML5	Fire control equipment and range finders the following: and specially designed components, accessories and specially designed software therefor— (a) (a) Fire control, C gun laying,night sighting, missile	

tracking and
guidance equipment

(b) (b) Range, C
position and height
finders, and spotting
instruments,
specially designed for
military purposes

(c) (c) Aiming C
devices, electronic,
gyroscopic, acoustic
and optical, specially
designed for military
purposes

(d) (d) Bomb sights, C
bombing computers,
gun sights and
periscopes, specially
designed for military
purposes

(e) (e) Television C
sighting units
specially designed for
military use

ML6

Tanks and vehicles specially
designed for military purposes,
the following: and specially
designed components and
specially designed ODMA
software therefor—

(a) (a) Tanks and self- C
propelled guns

(b) (b) Military type C
armed or armoured
vehicles, and vehicles
fitted with mounting
for arms

(c) (c) Armoured C
railway trains

(d) (d) Military half- C
tracks

(e) (e) Military type C
recovery vehicles

(f) (f) Gun-carriers C
and tractors specially
designed for towing
artillery

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	<ul style="list-style-type: none"> (g) (g) Trailers C specially designed to carry ammunition (h) (h) Amphibious C and deep water fording military vehicles (i) (i) Military C mobile repair shops specially designed to service military equipment (j) (j) All other C specially designed military vehicles
PL5007	Engines specially designed C or modified for military use for the propulsion of vehicles specified in entry ML6 in this Group
PL5008	Pneumatic tyre casings, other C than tractor or farm implement types, of a kind specially constructed to be bullet proof or to run when deflated
ML7	<p>Toxicological agents and tear gas, related equipment, components and materials the following: and specially designed ODMA software therefor—</p> <ul style="list-style-type: none"> (a) (a) Biological, C chemical and radioactive materials adapted for use in war to produce casualties in men or animals, or to damage crops (b) (b) Noxious C chemicals, the following— <ul style="list-style-type: none"> (1) Bromobenzyl cyanide C (2) oChlorobenzylidenemalononitrile C (oChlorobenzalmalononitrile) (3) monoChloromethyl C chloroformate

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- (4) 2-Chlorotriethylamine C
- (5) Dibenzoxazepine C
- (6) Dibromodimethyl ether C
- (7) Dichlorodimethyl ether C
- (8) 2:2'-
Dichlorotriethylamine C
- (9) Diphenylaminochloroarsine C
- (10) Diphenylchloroarsine C
- (11) Diphenylcyanoarsine C
- (12) Ethyl NN-
dimethylphosphoramidocyanidate C
- (13) Ethyldibromoarsine C
- (14) Ethyldichloroarsine C
- (15) Lewisite C
(chlorovinylchloroarsine
and
dichlorodivinyldichloroarsine)
- (16) Methyldichloroarsine C
- (17) Mustard gas C
(dichlorodiethyl
sulphide)
- (18) Phenylcarbylamine C
chloride
(phenylaminocarbonyl
chloride)
- (19) Phenylacetyl chloride (w-
Chloroacetophenone) C
- (20) Phenyldibromoarsine C
- (21) Phenyldichloroarsine C
- (22) Pinacolyl C
methylphosphofluoridate
- (23) isoPropyl C
methylphosphonofluoridate
- (24) 2:2':2" C
Trichlorotriethylamine
- (c) (c) Equipment C
specifically designed
and intended for the
dissemination of the
materials described in
heads (a) and (b)
above

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- (d) (d) Equipment C
and materials
specially designed
and intended for
defence against the
materials described
in heads (a) and
(b) above and for
their detection and
identification
- (e) (e) Components C
specially designed for
the items listed in
heads (c) and (d)
above
- (f) (f) Bipolymers C
specially designed
or processed for
detection and
identification of
chemical warfare
materials described
in head (a) above
and the cultures of
specific cells used to
produce them

PL5009

Explosives, propellants
and related substances the
following—

- (a) (a) Explosives as C
defined in section 3
of the Explosives
Act 1875(17) except
those specially
designed for toys,
novelty goods and
display fireworks
- (b) (b) Military C
propellants and
fuels not elsewhere
specified in this
Schedule
- (c) (c) Military C
pyrotechnics
- (d) (d) Additives, C
precursors and
stabilisers, and

(17) 1875 c. 17.

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- ML9
- specialty designed
ODMA software,
for the materials
specified in heads
(a) to (c) above
(inclusive)
- Vessels (including ships)
of war and special naval
equipment, the following: and
specialty designed ODMA
software therefor—
- (a) (a) Combatant C
vessels or vessels
designed for
offensive or
defensive action
(surface or
underwater) whether
or not converted to
non-military use and
regardless of current
state of repair or
operating condition
- (b) (b) Engines, the
following—
- (1) diesel engines of 1,500 C
b.h.p. and over with
rotary speed of 700
r.p.m. or over, specialty
designed for submarines
- (2) electric motors specialty C
designed for submarines,
namely those over 1,000
b.h.p. quick reversing
type, liquid cooled and
totally enclosed
- (3) non-magnetic diesel C
engines, 50 b.h.p. and
over, specialty designed
for military purposes
- (d) (d) Submarine and C
torpedo nets
- (e) (e) Compasses C
and equipment
therefor and ship's
course indicators,
specialty designed for
submarines

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- (f) (f) Specially C
designed
components,
accessories and
attachments to the
foregoing, such as
turrets, naval gun
mounts, submarine
batteries and
catapults
- (g) (g) Hull C
penetrators and
connectors specially
designed for military
purposes that enable
interaction with
equipment external to
a vessel
- (h) (h) Silent bearings C
for military purposes
and equipment
containing these
bearings
- PL5010 Underwater detection devices C
specially designed for military
purposes; controls and
components thereof
- ML10 Aircraft and helicopters, of
the piloted or pilotless types,
and aero-engines and aircraft
or helicopter equipment,
associated equipment and
components, specially
designed for military purposes,
the following: and specially
designed ODMA software
therefor—
 - (a) (a) Combat C
aircraft and
helicopters and other
aircraft and
helicopters specially
designed for military
purposes, including
military
reconnaissance,
assault, military
training and logistic
support, and all
aircraft and

helicopters having special structural features such as multiple hatches, special doors, ramps, reinforced floors and the like, for transporting and airdropping troops, military equipment and supplies; aero-engines specially designed or adapted for use with such aircraft and helicopters, but not including those aero-engines not falling within head IL1460(d) in Group 3E, in this Schedule; and specially designed components therefor

- (b) (b) Airborne C equipment, including airborne refuelling equipment specially designed for use with the aircraft and helicopters and the engines for the types of aircraft and helicopters specified in head (a) of this entry and specially designed components therefor
- (c) (c) Pressure C refuellers, pressure fuelling equipment, equipment specially designed to facilitate operations in confined areas and ground equipment, not elsewhere specified, developed specially for aircraft and helicopters, and aircraft and helicopter engines

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	specified in head (a) of this entry	
PL5011	Remotely piloted air vehicles specially designed for reconnaissance, surveillance electronic warfare and other military purposes and their launchers ground stations and associated equipment for command and control	C
PL5012	Apparatus and appliances specially designed for use with aircraft and helicopters, associated equipment and components, the following: and specially designed ODMA software therefor—	
	(a) (a) Pressurised breathing equipment and partial pressure suits	C
	(b) (b) Anti-g suits	C
	(c) (c) Military crash helmets	C
	(d) (d) Military parachutes	C
	(e) (e) Liquid oxygen converters used for aircraft, helicopters and missiles	C
	(f) (f) Catapults and cartridge actuated devices used in emergency escape of personnel from aircraft and helicopters	C
PL5013	Supply dropping apparatus for use with aircraft and helicopters specified in entry ML10 in this Group and associated equipment and specially designed components and specially designed ODMA software therefor	C
ML11	Electronic equipment specially designed for military use and specially designed components	C

- ML12
- and specially designed ODMA software therefor—
- Photographic and electro-optical imaging equipment, the following: and specially designed components and specially designed ODMA software therefor—
- (a) (a) Air C
reconnaissance
cameras and
associated equipment
designed for military
purposes
 - (b) (b) Other cameras C
and electro-optical
imaging devices,
including infrared
and imaging radar
sensors, whether
recording, or
transmitting via data
link, designed for
military including
reconnaissance
purposes
 - (c) (c) Specialized C
equipment for the
cameras and electro-
optical imaging
devices specified in
head (d) above
designed to make
the recorded or
transmitted
information militarily
useful
 - (d) (d) Film C
processing and
printing machines
designed for military
purposes
- ML13
- Special armoured equipment,
the following—
- (a) (a) Armoured C
plate
 - (b) (b) Combinations C
and constructions of
metallic or non-

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	metallic materials specially designed to provide ballistic protection for military systems	
	(c) (c) Military helmets	C
	(d) (d) Body armour, bullet-proof or bullet-resistant clothing, flack suits and specially designed components therefor	C
PL5014	Specially designed components for the equipment specified in entry ML13 heads (a), (b) and (c), in this Group	C
ML14	Specialised military training equipment and specially designed components and accessories and specially designed ODMA software therefor	C
ML15	Military infrared, thermal imaging and image intensifier equipment, and specially designed components and specially designed ODMA software therefor	C
ML16	Forgings, castings and semi-finished products specially designed for the products specified in by entries ML1, 2, 3, 4 and 6 and PL5003, 5004, 5005, 5006 5007 and 5008 above	C
ML17	Miscellaneous equipment and materials, the following and specially designed ODMA software therefor—	
	(a) (a) Self contained diving and underwater swimming apparatus, the following—	
	(1) closed and semi-closed circuit (rebreathing) apparatus	C

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	(2) specially designed components for use in the conversion of open-circuit apparatus to military use	C
	(3) articles exclusively designed for military use with self-contained diving and underwater swimming apparatus	C
	(b) (b) Silencers or mufflers for armaments	C
	(c) (c) Power-controlled searchlights and control units therefor, designed for military use and specially designed ODMA softward therefor	C
	(d) (d) Construction equipment built to military specifications, specially designed for airborne transport and specially designed components therefor	C
PL5002	Telescopic sights for firearms	C
PL5016	Material or devices specially designed to reduce, distort or eliminate the signature (ie thermal, electronic, acoustic or magnetic) of a vehicle or military installation In this entry “vehicle” means a self-propelled, boosted or towed conveyance for transporting a burden or load on land, sea, through air or space.	C
ML18	Equipment and technology for the production, namely design, examination, manufacture, testing and checking, of goods specified in this Group, the following: and specially	

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designed ODMA software
therefor—

- (a) (a) Specially C
designed production
equipment
- (b) (b) Components C
specially designed for
equipment specified
in head (a) above
- (c) (c) Production C
equipment for goods
specified elsewhere
in this Schedule
- (d) (d) Production D
technology even
if the equipment
with which such
technology is to be
used is not specified
in this Group
- (e) (e) Technology D
specific to the design
of, the assembly
of components into,
and the operation,
maintenance and
repair of complete
production
installations even if
the components are
not specified in this
Group

PL5017 Equipment and technology for C
the development of the goods
specified in this Group and
specially designed ODMA
software therefor

ML19 Environmental chambers C
capable of pressures below
0.133 microbar (10^{-4} Torr) and
specially designed components
therefor

except equipment fitted with
industrial machinery not
specified elsewhere in this
Schedule

ML20 Cryogenic and
superconductive equipment

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and components, the following
and specially designated
ODMA software therefor

- (a) (a) Equipment C
specially designed or
configured to be
installed in a vehicle
for military ground,
marine, airborne or
space application and
capable of operating
while in motion
and of producing or
maintaining
temperatures below
103 K (-170°C) and
specially designed
accessories and
components and
specially designed
ODMA software
therefor
- (b) (b) Superconductive C
electrical equipment
(rotating machinery
and transformers)
designed for
operation at
temperatures below
103 K (-170°C)
and that are
specially designed
or configured to
be installed in a
vehicle for military
ground, marine,
airborne or space
applications and
capable of operating
while in motion,
except direct-current
hybrid homopolar
generators that have
single-pole normal
metal armatures
which rotate in
a magnetic field
produced by
superconducting
windings, provided
those windings are
the only

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- superconducting
component in the
generator, and
specially designed
accessories and
components and
specially designed
ODMA software
therefor
- ML22 Electrically triggered shutters C
of the carbon injection or
photochromic function type
having a shutter speed of less
than 100 microseconds, and
specially designed ODMA
software therefor; except
shutters specially designed for
high-speed cameras
- ML23 Directed energy weapons
(DEW) systems, the following
and specially designed ODMA
software therefor—
- (a) (a) Laser systems C
specially designed
for destruction or
effecting mission-
abort of a target
 - (b) (b) Particle beam C
systems capable
of destruction or
effecting mission-
abort of a target
 - (c) (c) High power C
radio-frequency (RF)
systems capable
of destruction or
effecting mission-
abort of a target
 - (d) (d) Specially C
designed components
for systems specified
in heads (a), (b) or (c)
above, including
- (1) prime power generation, C
energy storage,
switching, power
conditioning and fuel
handling equipment

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- (2) target acquisition and tracking sub-systems C
- (3) sub-systems capable of assessing target damage, destruction or mission-abort C
- (4) beam-handling, propagation and pointing equipment C
- (5) equipment with rapid beam slew capability for rapid multiple target operations C
- (6) adaptive optics C
- (7) current injectors for negative hydrogen ion beams which provide average injection currents over 50 mA with beam brightness (defined as current divided by the product of orthogonal transverse, normalised RMS emittances) greater than 40 A(cm² mrad) at kinetic energies greater than 20keV; or C
- (8) specially designed components for the equipment specified in sub-heads (1) to (7) above C
- (e) (e) Equipment, and components thereof, specially designed and intended for defence against systems specified in heads (a), (b) and (c) above and for their detection and identification C
- (f) (f) Physical test models and related documentation for the systems, equipment and components specified C

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in heads (a) to (e)
above

ML24

Software not elsewhere
specified, the following—

- (a) (a) Software C
specially designed
for the modelling,
simulation or
evaluation of military
weapons systems
- (b) (b) Software C
for determining
the effects of
conventional,
nuclear, chemical or
biological warfare
weapons

ML25

Biocatalysts for
decontamination and
degradation of chemical
warfare (CW) agents,
technology, and biological
systems therefor, the
following—

- (a) (a) Biocatalysts, C
specially designed for
decontamination and
degradation of CW
agents specified in
head (a) of entry
ML7 resulting from
directed laboratory
selection or genetic
manipulation of
biological systems
- (b) (b) Technology D
designed, produced
and used exclusively
for the incorporation
of biocatalysts,
specified in head (a)
above, into military
carrier substances or
military material
- (c) (c) Biological
systems, the
following—

Expression vectors, C
viruses or cultures of

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cells containing the genetic information specific to the production of biocatalysts specified in head (a) above

except technology and biological systems specified in heads (b) and (c) above designed, produced and used exclusively for civil purposes, such as agricultural, pharmaceutical, medical, veterinary, environmental and waste management uses, and in the food industry.

In this entry

- (a) “biocatalysts” means enzymes or other biological compounds which bind to and accelerate the degradation of CW agents.
- (b) “expression vectors” are carriers (eg plasmid or virus) which are used to introduce genetic material into host cells.

PL5001

Security and para-military police equipment, the following—

- (a) (a) Acoustic C devices represented by the manufacturers or suppliers thereof as suitable for riot control purposes, and specialised components therefor
- (b) (b) Anti- C riot shields and components therefor
- (c) (c) Leg-irons, C shackles (excluding handcuffs) and gangchains, specially

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designed for
restraining human
beings

(d) (d) Portable C
anti-riot devices for
administering an
electric shock or
an incapacitating
substance, and
specialised
components therefor

(e) (e) Water cannon C
and components
therefor

(f) (f) Riot C
control vehicles
which have been
specially designed
or modified to be
electrified to repel
boarders

GROUP 2

ATOMIC ENERGY MINERALS AND MATERIALS AND NUCLEAR FACILITIES, EQUIPMENT AND APPLIANCES

Note 1: For the purposes of this Group “crude forms” and “semi-fabricated forms” have the same meanings as in Group 3H.

Note 2: Goods specified in this Group may also be specified in Group 3 of this Part of this Schedule.

GROUP 2A

Atomic Energy Minerals and Materials

A1	<p>Special and other fissile C materials</p> <p>except</p> <p>three effective grammes or less when contained in a sensing component in instruments. special or other fissile materials contained in heart pacemakers.</p>
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In this entry—

1. “special fissile materials”
means plutonium-239,
uranium-233, uranium enriched
in the isotopes 235 or 233,

and any material containing the foregoing.

2. “uranium enriched in the isotopes 235 or 233” means uranium containing the isotopes 235 or 233, or both, in an amount such that the abundance ratio of the sum of these isotopes to the isotope 238 is more than the ratio of the isotope 235 to the isotope 238 occurring in nature (isotope ratio 0.72 per cent);

3. “other fissile material” means previously separated americium-242m, curium-245 and -247, californium-249 and -251 isotopes of plutonium other than -239, and any material containing the foregoing;

4. “effective gramme” of special or other fissile material is defined as follows:

- (a) for plutonium isotopes and uranium-233, the isotope weight in grammes;
- (b) for uranium enriched 1 per cent or greater in the isotope U-235, the element weight in grammes multiplied by the square or its enrichment expressed as a decimal weight fraction;
- (c) for uranium enriched below 1 per cent in the isotope U-235, the element weight in grammes multiplied by 0.0001;
- (d) for americium-242m, curium-245 and -247, and

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	californium-249 and -251, the isotope weight to grammes multiplied by 10.	
	5. For the purposes of this item the term “previously separated” means the application of any process intended to increase the concentration of the controlled isotope.	
A2	Source material, the following— Natural and depleted uranium, in any form, or incorporated in any substance in which the concentration of uranium exceeds 0.05%	C
	In this entry— “natural uranium” means uranium containing the mixtures of isotopes occurring in nature; “depleted uranium” means uranium depleted in the isotope 235 below that occurring in nature.	
PL6001	Source material, the following— Thorium, in any form, or incorporated in any substance in which the concentration of thorium exceeds 0.05%	C
	except alloys containing less than 5% thorium.	
A3	Deuterium, heavy water, deuterated paraffins, and simple or complex lithium deuterides, and mixtures and solutions containing deuterium, in which the isotopic ratio of deuterium to hydrogen exceeds 1:5,000	C
PL6012	Compounds of deuterium	C
A4	Zirconium in which the ratio of hafnium content to zirconium content is less than one part to	

five hundred parts by weight,
the following—

- (a) (a) Zirconium C
and alloys containing
more than 50%
zirconium, in crude
or semi-fabricated
forms
- (b) (b) Zirconium C
compounds, except
zirconium oxide
thermally stabilised
with calcium oxide or
magnesium oxide or
both
- (c) (c) Manufactures C
wholly of any of the
foregoing

A5

Nickel powder and porous
nickel metal, the following—

- (a) (a) Powder with C
a nickel content
of 99% or more
tha a mean particle
size of less than
100 micrometres,
whether compacted
or not
- (b) (b) Porous C
nickel metal material
produced from
materials specified
in head (a) above
except single porous
nickel metal sheets
not exceeding 930
cm² intended for use
in batteries for civil
applications

PL6011

Graphite, nuclear-grade, C
having a purity level of less
than 5 parts per million boron
equivalent and with a density
greater than 1.5 g/cm³

A7

Lithium, the following—

- (a) (a) Lithium and C
alloys containing 50
per cent or more

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of lithium, in crude or semi-fabricated forms

- (b) (b) Lithium C and alloys, mixtures, concentrates and compounds, containing lithium enriched in the lithium-6 isotope
- (c) (c) Hydrides C in which lithium, whether normal, depleted or enriched in the lithium-6 isotope, is compounded with hydrogen or its isotopes or complexed with other metals or aluminium hydride
- (d) (d) Substances C not specified above containing lithium enriched in the lithium-6 isotope

A8

Hafnium, the following—

- (a) (a) Hafnium C and alloys containing more than 60 per cent of hafnium, in crude or semi-fabricated forms
- (b) (b) Hafnium C compounds containing more than 60 per cent of hafnium
- (c) (c) Manufacturues C of any of the foregoing

A9

Beryllium, the following—

- (a) (a) Beryllium C and alloys containing more than 50 per cent of beryllium,

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	in crude or semi-fabricated forms	
	(b) (b) Beryllium C compounds	
	(c) (c) Manufacturers C of any of the foregoing except metal windows for medical X-ray machines and oxide shapes in fabricated or semi-fabricated forms specially designed for electronic component parts or as substrates for electronic circuits	
PL6002	Fluorine	C
PL6003	Chlorine trifluoride	C
A12	Tritium, compounds and mixtures containing tritium in which the ratio of tritium to hydrogen by atoms exceeds 1 part in 1,000, and products containing one or more of the foregoing	C
	except	
	(i) labelled compounds not exceeding 100 curies per shipment (in this entry "labelled compounds" means compounds in which one of the atoms is a different isotope from that found normally);	
	(ii) tritium contained in luminous paint, self-luminous products, gas and aerosol detectors, electron tubes, lightning or static elimination devices, ion generating tubes, detector cells of gas chromatography devices, and calibration standards, provided that each product or device contains not more than 40 curies of tritium in	

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- any chemical or physical form;
- (iii) compounds and mixtures of tritium, where the separation of the constituents cannot result in the evolution of an isotopic mixture of hydrogen in which the ratio of tritium to hydrogen by atoms exceeds 1 part in 1,000
- A13 Materials for nuclear heat sources, the following—
- (a) (a) Plutonium C in any form with a plutonium isotopic assay of plutonium 238
- except
- (i) three effective grammes or less when contained in a sensing component in instruments;
- (ii) plutonium-238 contained in heart pacemakers.
- Note: for plutonium-238 not for nuclear heat sources see entry A1 in this Group.
- (b) (b) Previously C separated neptunium-237 in any form
- In this entry—
“previously separated” means the application of any process intended to increase the concentration of the controlled isotope.
- A14 Specially designed or prepared C materials for the separation of isotopes of natural uranium, depleted uranium and special and other fissile materials, including specially designed chemical exchange resins

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Note 1: see entries A1 and A2 in this Group for the special and other fissile materials to which this entry refers.

Note 2: for isotopic separation plants, see the entry in Group 2B relating thereto.

PL6005	Calcium containing less than 100 parts per million by weight of impurities other than magnesium and less than 10 parts per million by weight of boron	C
PL6006	Alloys containing a higher percentage of magnesium than of any other element and 10% or more of lithium	C

GROUP 2B

Nuclear Facilities, Equipment and Appliances

B1	Plants for the separation of isotopes of natural and depleted uranium and special and other fissile materials, and specially designed or prepared equipment and components therefor, including <ul style="list-style-type: none"> (a) (a) Units capable of separating isotopes of natural uranium, depleted uranium, and special or other fissile materials, such as— <ul style="list-style-type: none"> (1) Gas centrifuges (2) Jet nozzle separation units (3) Vortex separation units (4) Laser isotopic separation units (5) Chemical exchange separation units (6) Electromagnetic separation units 	C
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- (7) Plasma separation units C
- (8) Gaseous diffusion separation units C
 - (b) (b) Specially designed components for the above including—
- (1) Valves wholly made of or lined with nickel, nickel alloy, phosphor bronze, stainless steel, aluminium or aluminium alloy, corrosion resistant to uranium hexafluoride (UF_6) or hydrogen fluoride (HF), 0.5 cm or greater in diameter with bellows seal C
- (2) Blowers and compressors (turbo, centrifugal and axial flow types) wholly made of or lined with nickel, nickel alloy, phosphor bronze, stainless steel, aluminium or aluminium alloy, corrosion resistant to uranium hexafluoride (UF_6) or hydrogen fluoride (HF) and having a capacity of 1,700 litres (1.7m^3) per minute or greater, including compressor seals C
- (3) Gaseous diffusion barriers C
- (4) Gaseous diffusion housings C
- (5) Heat exchangers made of aluminium, copper, nickel or nickel alloys, separately or together, and heat exchangers incorporating tubing clad with aluminium copper, nickel or nickel alloys, separately or together, and in which the other parts are made wholly C

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of the foregoing metals,
separately or together,
designed to operate
at sub-atmospheric
pressure with a leak
rate of less than 10
pascal (0.1 millibar) per
hour under a pressure
differential of 10^5 pascal
(a bar)

(For specially designed or
prepared materials for the
separation of isotopes, see the
entry A14 in Group 2A.)

B2

Plants for the reprocessing C
of irradiated nuclear reactor
fuel and equipment and
components specially designed
or prepared therefor, or capable
of being adapted for use
therein, including—

- (a) (a) Fuel C
element chopping or
shredding machines
- (b) (b) Criticality C
safe tanks (eg small
diameter, annular or
slab tanks)
- (c) (c) Counter- C
current solvent
extractors and ion-
exchange processing
equipment
- (d) (d) Process C
control or
instrumentation
specially designed
or prepared for
monitoring or
controlling the
reprocessing of
irradiated source and
special and other
fissile materials

In this entry “plant for the
reprocessing of irradiated
nuclear reactor fuel” includes
equipment and components
which normally come into

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direct contact with and directly control the irradiated fuel and the major nuclear material and fission product processing streams.

Note: For process control equipment for lithium, see entry PL6010 in this Group.

B3

Nuclear reactors, ie reactors capable of operation so as to maintain a controlled, self-sustaining fission chain reaction, and equipment and components specially designed or prepared for use in connection with a nuclear reactor, including— C

- (a) (a) Pressure vessels, ie metal vessels as complete units or as major shop-fabricated parts therefor C
- (b) (b) Fuel element handling equipment, including reactor fuel charging and discharging equipment C
- (c) (c) Control rods, including the neutron absorbing part and the support or suspension structures therefor, and control rod guide tubes C
- (d) (d) Electronic controls for controlling the power levels in nuclear reactors, including reactor control rod drive mechanisms and radiation detection and measuring instruments to determine neutron flux levels C

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(e) (e) Pressure tubes C

(f) (f) Coolant pumps C

(g) (g) Internals C
specially designed or
prepared for the
operation of a nuclear
reactor, including
but not limited
to core support
structures, thermal
shields, baffles, core
grid plates and
diffuser plates

(h) (h) Heat C
exchangers

In this entry “nuclear reactor” includes the items within or attached directly to the reactor vessel, the equipment which controls the level of power in the core, and the components which normally contain or come into direct contact with or control the primary coolant of the reactor core.

B4

Plants specially designed for C
the fabrication of nuclear
reactor fuel elements and
specially designed equipment
therefor

Note: A plant for the
fabrication of nuclear reactor
fuel elements includes
equipment which (1) normally
comes into direct contact
with or directly processes or
controls the production flow
of nuclear materials, (2) seals
the nuclear material within
the cladding, (3) checks the
integrity of the cladding or the
seal, and (4) checks the finish
treatment of the solid fuel.

B5

Plants for the production C
or concentration of heavy
water, deuterium, or deuterium
compounds, and specially
designed or prepared

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	equipment and compounds therefor	
B6	Plants for the production of uranium hexafluoride (UF ₆) and specially designed or prepared equipment (including UF ₆ purification equipment) and components therefor	C
C1	Neutron generator systems, including tubes, designed for operation without an external vacuum system and utilizing electrostatic acceleration to induce a tritium-deuterium nuclear reaction	C
C2	Power generating or propulsion equipment specially designed or adapted for use with military, space, marine or mobile nuclear reactors	C
C3	Electrolytic cells for the production of fluorine with a production capacity greater than 250 g of fluorine per hour	C
C4	Equipment specially designed for the separation of isotopes of lithium (For plants for the separation of isotopes other than lithium, see the entry for such plants in this Group.)	C
C5	Equipment specially designed for the production or recovery of tritium	C
C6	Frequency changers (converters or inverters) capable of a multi-phase electrical output of between 600-2,000 Hz, and specially designed components therefor, for use in gas centrifuge plants	C
PL6007	Equipment specially designed for the manufacture or assembly of gas centrifuges capable of the enrichment or separation of isotopes and specially designed parts,	C

	components and equipment therefor	
	(For gas centrifuge plants, see entry B1, plants for separation of isotopes, in this Group.)	
PL6008	Mass spectrometers and mass spectrometer sources designed for measuring the isotopic composition of uranium hexafluoride (UF ₆) gas, uranium and uranyl compounds	C
PL6009	Pressure gauges capable of measuring pressures to 100 Torr (1332.2 newtons per square metre) or less having sensing elements of nickel, nickel alloy, phosphor bronze, stainless steel, aluminium or aluminium alloy, corrosion resistant to uranium hexafluoride (UF ₆) or hydrogen fluoride (HF); and such sensing elements	C
PL6010	Process control equipment or instrumentation specially designed or prepared for monitoring or controlling the reprocessing of irradiated lithium	C

GROUP 3

STRATEGIC GOODS AND TECHNOLOGIES NOT SPECIFIED IN GROUPS 1 AND 2

GROUP 3A

Metal Working Machinery and Associated Equipment

IL1001	Technology for metal-working manufacturing processes and specially designed software, the following—	
	(a) (a) Technology D for the design of tools, dies and fixtures specially designed for the following processes—	

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- (1) hot die forging;
 - (2) superplastic forming;
 - (3) diffusion bonding;
 - (4) metal powder compaction using—
 - (i) vacuum hot pressing;
 - (ii) high pressure extrusion; or
 - (iii) isostatic pressing.
 - (5) direct-acting hydraulic pressing.
- (b) (b) Technology D consisting of the physical process parameters listed below in relation to each subhead, using to control—
- (1) hot die forging—
 - (i) temperature;
 - (ii) strain rate;
 - (2) superplastic forming of aluminium alloys, titanium alloys and superalloys—
 - (i) surface preparation;
 - (ii) strain rate;
 - (iii) temperature;
 - (iv) pressure;
 - (3) diffusion bonding of superalloys and titanium alloys—
 - (i) surface preparation;
 - (ii) temperature;
 - (iii) pressure;
 - (4) metal powder compaction using—
 - (i) vacuum hot processing:
 - (a) temperature;

- (b) pressure;
 - (c) cycle time;
 - (ii) high pressure extrusion:
 - (a) temperature;
 - (b) pressure;
 - (c) cycle time;
 - (iii) isostatic pressing:
 - (a) temperature;
 - (b) pressure;
 - (c) cycle time;
- (5) direct-acting hydraulic pressing of aluminium alloys, and titanium alloys—
 - (i) pressure;
 - (ii) cycle time;
- (6) hot isostatic densification of titanium alloys, aluminium alloys and superalloys—
 - (i) temperature;
 - (ii) pressure;
 - (iii) cycle time.
 - In this entry—
 - (a) “hot die forcing” means a deformation process where die temperatures are at the same nominal temperature as the workpiece and exceed 850 K (577°C);
 - (b) “superplastic forming” means a deformation process using heat for metals that are normally characterised by low values of

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elongation (less than 20%) at the breaking point as determined at room temperature by conventional tensile strength-testing, in order to achieve elongations during processing which are at least 2 times those values;

(c) “diffusion bonding” means a solid-state molecular joining of at least two separate metals into a single piece with a joint strength equivalent to that of the weakest material;

(d) “metal powder compaction” means a process capable of yielding parts having a density of 98% or more of the theoretical maximum density;

(e) “direct-acting hydraulic pressing” means a deformation process which uses a fluid-filled flexible bladder in direct contact with the workpiece;

- (f) “hot isostatic densification” means a process of pressurizing a casting at temperatures exceeding 375 K (102°C) in a closed cavity through various media (gas, liquid, solid particles, etc) to create equal force in all directions to reduce or eliminate internal voids in the casting;
- (g) “vacuum hot pressing” means a process which uses a press with heated dies to consolidate metal powder under reduced atmospheric pressure into a part;
- (h) “high pressure extrusion” means a process yielding a single-pass reduction ratio of 4 to 1 or greater in a cross-sectional area of the resulting part;
- (i) “isostatic pressing” means a process which uses a pressurizing medium (gas, liquid, solid particles, etc) in a closed cavity

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- to create equal force in all direction upon a metal powder-filled container for consolidating the powder into a part.
- IL1075 Spin-forming and flow-forming machines specially designed or adapted for use with numerical or computer controls and specially designed components and software therefor C
- IL1080 Specially designed equipment, tooling and fixtures and technology for the manufacture or measuring of gas turbine blades or vanes, the following and specially designed components and accessories therefor and specially designed ODMA software for the equipment, components and accessories—
- Specially designed equipment, tooling, fixtures, component and accessories, the following—
- (a) (a) Blade or vane aerofoil or root automatic measuring equipment C
 - (b) (b) Precision vacuum investment casting equipment, including core-making equipment C
 - (c) (c) Small-hole drilling equipment for producing holes having depth more than four times their diameter and less than 0.76 mm (0.03 inch) in diameter C
 - (d) (d) Directional solidification casting C

- equipment and
directional
recrystallization
equipment
- (e) (e) Segmented C
cast blade or vane
bonding equipment
- (f) (f) Integral blade- C
and-disc casting
equipment
- (g) (g) Blade C
or vane coating
equipment, except
furnaces, molten-
metal baths and ion
plating baths
- (h) (h) Ceramic blade C
or vane moulding and
finishing machines
- (i) (i) Moulds, cores
and tooling for
the manufacture and
finishing of—
- (1) cast hollow turbine C
blades or vanes
- (2) turbine blades or vanes C
produced by powder
compaction
- (j) (j) Composite C
metal turbine blade
or vane moulding and
finishing machines
- (k) (k) Inertial blade C
or vane welding
machines
- (l) (l) Machinery C
and equipment for
the manufacture of
blades or vanes
in the compressor
section of aircraft
or aircraft-derived
gas turbine engines
where the technology
is the same as for
the manufacture of
blades or vanes in the
turbine section

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(2) Technology (except installation, operation and maintenance technology) for use of the following equipment

- (a) (a) Blade or D
vane belt grinding
machines
- (b) (b) Blade or D
vane edge radiusing
machines
- (c) (c) Blade or vane D
aerofoil milling or
grinding machines
- (d) (d) Blade or vane D
blank performing
machines
- (e) (e) Blade or vane D
rolling machines
- (f) (f) Blade or D
vane aerofoil shaping
machines except
metal removing types
- (g) (g) Blade or D
vane root grinding
machines
- (h) (h) Blade or D
vane aerofoil scribing
equipment
- (i) (i) Machinery D
and equipment for
the manufacture of
blades or vanes
in the compressor
section of aircraft
or aircraft-derived
gas turbine engines
where the technology
is the same as for
the manufacture of
blades or vanes in the
turbine section

In this entry—

“manufacture” or
“making” includes
refurbishing.

IL1081

Specially designed or modified
equipment, tools, dies,

moulds and fixtures for the manufacture or inspection of aircraft, airframe structures or aircraft fasteners, the following and specially designed components and accessories therefor and specially designed ODMA software for the equipment, components and accessories—

- (a) Equipment, tools, dies, moulds or fixtures for:
 - (1) hydraulic stretch forming—
 - (i) whose machine motions or forces are digitally controlled or controlled by electrical analogue devices or C
 - (ii) which are capable of thermal-conditioning the workpiece C
 - (2) the milling of aircraft skins or spars except those which do not present an improvement on machinery in production ten years preceding the year of export C
- (b) (b) Tools, dies, moulds in fixtures for—
 - (1) diffusion bonding C
 - (2) superplastic forming C
 - (3) hot-die forging C
 - (4) metal powder compaction by vacuum hot pressing, high-pressure extrusion or isostatic pressing C
 - (5) direct-acting hydraulic pressing of aluminium alloys and titanium alloys C
 - (6) the manufacture, inspection, inserting or securing of specially C

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designed high-strength
aircraft fasteners

The definitions in entry
IL1001 of the processes and
control of the metal working
manufacturing technologies
mentioned above, apply also
for the purposes of this entry.

IL1086

Specially designed or modified
equipment, tools, dies, moulds,
fixtures and gauges for the
manufacture or inspection of
aircraft and aircraft derived gas
turbine engines, the following:
and especially designed
components and accessories
and specially designed ODMA
software for the equipment,
components and accessories—

- (a) Equipment, tools, dies,
moulds or fixtures and
gauges—
 - (1) for automated production C
inspection
 - (2) for automated welding C
 - (b) (b) Tools, dies,
fixtures and gauges—
 - (1) for solid-state joining C
by inertial welding or
thermal bonding
 - (2) for manufacture and C
inspection of high-
performance gas turbine
bearings
 - (3) for rolling specially C
configured rings such as
nacelle rings
 - (4) for forming and finishing C
turbine discs
 - (c) (c) Compressor C
or turbine disc
broaching machines

this head includes only
broaching machines specially
designed for the manufacture
of aircraft or aircraft derived
gas turbine engines and not

- IL1088
- general purpose broaching machines specially adapted for that purpose.
- Gear making or finishing machinery, the following—
- (a) (a) Bevel gear making machinery, the following—
 - (1) gear grinding machinery (non-generating type) C
 - (2) other machinery capable of the production of bevel gears of module finer than 0.5 mm (diametrical pitch finer than 48) and meeting a quality standard better than DIN 58405 Class 6 C
 - (b) (b) Machinery capable of producing gears in excess of AGMA quality level 13 or equivalent C
- For the purposes of this entry DIN 3963 Class 4 shall be considered equivalent to AGMA quality level 13.
- IL1091
- Numerical control units, numerically controlled machine-tools, dimensional inspection machines, direct numerical control systems, specially designed sub-assemblies, and specially designed software, the following—
- (a) (a) Units for numerically controlling simultaneously co-ordinated (contouring and continuous path) movements of machine-tools and dimensional inspection machines in two or more axes C

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except those having
all of the following
characteristics—

- (i) no more than
three contouring
interpolating (any
mathematical
function including
linear and circular)
axes can be
simultaneously co-
ordinated

Notwithstanding
paragraph (i) Units
may have—

- (1) one or more
additional
axes for
which rate of
movement
is not
coordinated,
varied or
modulated
with that of
another axis,
 - (2) one additional
set of up
to three
contouring
axes provided
a separate
feed rate
number,
standard or
optional, does
not control
more than
any three
contouring
axes; or
 - (3) up to three
contouring
axes
switchable
out of any
number of
axes.
- (ii) minimum
programmable
increment equal
to or greater than
0.001 mm;

- (iii) interfaces limited as follows—
 - (1) no integral interface designed to meet ANSI/IEEE standard 488-1978, IEC publication 625-I; or any equivalent standard; and
 - (2) no more than two interfaces meeting EIA standard RS-232-C or any equivalent standard;
- (iv) on-line (real-time) modification of the tool path, feed rate and spindle data limited to the following—
 - (1) cutter diameter compensation normal to the centreline path;
 - (2) automatic acceleration and deceleration for starting, cornering and stopping;
 - (3) axis transducer compensation including lead screw pitch compensation (measurements on one axis may not compensate another axis);

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- (4) constant surface speed with or without limits;
- (5) spindle growth compensation;
- (6) manual feed rate and spindle speed override;
- (7) fixed and repetitive cycles (does not include automatic cut vector generation);
- (8) tool and fixture offset;
- (9) part programme tape editing, excluding source programme language and centre-line location data (CLDATA);
- (10) tool length compensation;
- (11) part programme storage;
- (12) variable pitch threading;
- (13) inch/metric conversion;
- (14) feed rate override based on spark voltage for electrical discharge machines;
- (iv) word size equal to or less than 16 bits (excluding parity bits);
- (vi) software or microprogrammes,

including
software or
microprogrammes
of any
programmable
unit or device
furnished shall
not exceed control
unit functions as
provided in (i)
to (v) above, and
is restricted as
follows—

- (1) only the
following
application
programmes
can be
furnished
which shall
be executable
without
further
compilation,
assembly,
interpretation,
or processing,
other than
control unit
parameter
initialization,
and memory
storage
loading, and
each shall
be supplied
as an entity
rather than
in modular
form:
 - (a) an operating
programme to
allow the unit
to perform
its normal
functions;
 - (b) one or more
diagnostic
programmes
to verify
control or
machine
performance

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- and permit
localization
of hardware
malfunctions;
- (c) a translator
programme
with which
the end-
user can
programme
the control-
to-machine
interface;
- (5) programme
documentation
for
application
programmes
shall not
contain any of
the following:
 - (a) listing of
programme
instructions
(except that
necessary for
diagnostics
for routine
hardware
maintenance);
 - (b) description
of programme
organization
or function
beyond that
required for
programme
use and for
maintenance
of hardware
with which
these
programmes
operate;
 - (c) flow
charts, logic
diagrams or
the algorithms
employed
(except those
necessary
for use of
diagnostics

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- for routine hardware maintenance);
- (d) any reference to specific memory storage locations (except those necessary for use of diagnostics for routine hardware maintenance);
- (e) any other information about the design or function of the software which would assist in the analysis or modification of all or part of it.

Note: For digital computers either incorporated in or associated with but not embedded in, controllers see, entry IL 1565 in Group 3G.

- (aa) (aa) Technology D for the design and production except assembly and testing) of two-axis numerical control units with an embedded computer
- (b) (b) Machine-tools C and dimensional-inspection machines which, according to the manufacturer's technical specifications, can be equipped with numerical control units specified in by head (a) above

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except—

- (i) boring mills,
milling machines,
and machining
centres having all
of the following
characteristics—
 - (1)
 - (a) not more
than three
axes
capable of
simultaneously
co-ordinated
contouring
motion, ie the
total number
of linear
plus rotary
contouring
axes cannot
exceed three.
(A secondary
parallel
contouring
axis, is not
counted in the
total of three
contouring
axes. A
secondary
rotary table,
the centreline
of which is
parallel to
the primary
rotary table,
is also not
counted in the
total of three
contouring
axes.
Machines
may have
non-
contouring
parallel
or non-
contouring,
non-parallel
rotary axes
in addition to
the three axes

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capable of
simultaneously
co-ordinated
contouring
motion.

Machines
having the
capability
of being
simultaneously
co-ordinated
in more than
three axes are
not within
this exception
even if the
numerical
control unit
attached to
the machine
limits it
to three
simultaneously
co-ordinated
contouring
axes. A
machine with
a control unit
switchable
between
any three
out of four
contouring
axes is not
within this
exception;) or

- (b) not more
than three
linear axes
plus one
rotary axis,
but no
tilting axis,
capable of
simultaneously
co-ordinated
contouring
motion, ie the
total number
of linear
plus rotary
contouring
axes cannot

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exceed four.
(A secondary
parallel
contouring
axis, is not
counted as
an additional
contouring
axis. A
secondary
rotary table,
the centreline
of which is
parallel to
the primary
rotary table,
is also not
counted as an
additiopnal
contouring
axis.
Machines
may have
non-
contouring
parallel
or non-
contouring
non-parallel
rotary axes
in addition to
the four axes
capable of
simultaneously
co-ordinated
contouring
motion.
Machines
having the
capability
of being
simultaneously
co-ordinated
in more than
four axes are
not within
this exception
even if the
numerical
control unit
attached to
the machine
linmits it

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- to three
simultaneously
co-ordinated
contouring
axes. A
machine with
a control unit
switchable
between
any three
out of five
contouring
axes is not
within this
exception);
- (4) maximum
slide travel in
any axis equal
to or less than
3,000 mm;
- (5) spindle drive
motor power
equal to or
less than
35kW;
- (6) single
working
spindle (the
machine may
have multiple
tool heads
or turrets
as standard
or optional,
but only one
working
spindle may
be operative
at a time).
a spindle
capable of
driving a
multiple
drill head is
considered
as a single
spindle;
- (7) axial and
radial motion
measured at
the spindle
axis in one
revolution of

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- the spindle
equal to
or greater
than $D \times 2$
 $\times 10^{-5}$ mm
TIR (peak-
to-peak)
where D is
the spindle
diameter in
mm;
- (8) an
incremental
positioning
accuracy
equal to
or greater
(coarser) than
 ± 0.002 mm in
any 200 mm
of travel;
- (9) overall
positioning
accuracy in
any axis equal
to or greater
(coarser)
than:
- (a) ± 0.01 mm
for machines
with total
length of axis
travel equal
to or less than
300 mm;
- (b) $\pm(0.01 +$
 $(0.0025/300)$
 $\times (L - 300))$
mm for
machines
with a total
length of
axis travel
L, greater
than 300 mm
and equal to
or less than
3,300 mm;
- (c) ± 0.035 mm
for machines
with a total
length of axis
travel greater

- than 3,300 mm.
- (ii) jig-grinders having both of the following characteristics—
 - (1) overall positioning accuracy in any axis equal to or greater (coarser) than:
 - (a) ± 0.005 mm for machines with total length of axis travel equal to or less than 300 mm;
 - (b) $\pm(0.003 + (0.002/300)(L - 300))$ mm for machines with total length of axis travel L , greater than 300 mm;
 - (4) not more than two axes capable of simultaneously co-ordinated contouring motion;
- (iii) machine-tools (other than those meeting the requirements of exceptions (i) and (ii) above to this head) and dimensional inspection machines meeting the requirements of exception (iv) below to this head having both of the following characteristics—

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- (1) radial-axis motion measured at the spindle axis equal to or greater than 0.0008 mm TIR (peak-to-peak) in one revolution of the spindle (for lathes, turning machines, contour grinding machines, etc);
 - (2) meeting the requirements of paragraphs (1)(a), (6) and (7) of exception (i) to this head above;
- (iv) dimensional inspection machines, having all of the following characteristics—
 - (1) a linear positioning accuracy equal to or worse than:
 - (a) $\pm(3 + L/300)$ micrometre for L shorter than or equal to 3,300 mm;
 - (b) ± 14 micrometre for L longer than 3,300 mm;
 - (4) a rotary accuracy of equal to or worse than 5 seconds

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- in every 90 degrees; and
 - (5) meeting the requirements of paragraph (1) of exception (i) to this head above;
 - (v) floor-type horizontal boring mills having all the following characteristics—
 - (a) maximum transverse (X-axis) travel equal to or less than 15,000 mm;
 - (b) maximum vertical (Y-axis) travel equal to or less than 5,000 mm;
 - (c) maximum Z axis travel equal to or less than 3,000 mm;
 - (d) spindle-drive motor power equal to or less than 75 kW;
 - (e) meeting the requirements of paragraphs (1) and (4) to (7) of exception (i) to this head.

(For high precision turning machinery, see entry IL1370 in Group 3D of this Schedule.)

- (c) (c) Direct C numerical control systems (DNC) consisting of a dedicated stored

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programme computer acting as a host computer and controlling, on-line or off-line one or more numerically controlled machine-tools or inspection machines, specified in head (b) above, related software, and interface and communication equipment for data transfer between the host computer memory, the interpolation functions, and the numerically controlled machine-tools

- (d) (d) Specially C designed sub-assemblies and software which can upgrade the capabilities of numerical control units and machine-tools specified by head (a), (b) or (c) above, including specially designed printed circuit board sub-assemblies

In this entry—

“Numerical control” means the automatic control of a process performed by a device that makes use of numeric data usually introduced as the operation is in progress.
 “Contouring control” means two or more numerically controlled machines operating in accordance with instructions that specify the next required position

and the required feed rates to that position. These feed rates are varied in relation to each other so that a desired contour is generated. Any term defined in IL1566 shall have the same meaning when used in this entry as it has in that entry.

A “direct numerical control system” (DNC) means a system connecting a set of numerically controlled machines to a common memory for part programme or machine programme storage with provision for on-demand distribution of data to the machines.

Axis nomenclature shall be in accordance with international standard ISO 841, “Numerical Control Machines —Axis and Motion Nomenclature”.

“Positioning accuracy” is that accuracy which would be obtained in a temperature-controlled environment of $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ with any mechanical compensation techniques exported with the machine or any electronic compensation meeting the requirements in exception (iv) to head (a) above. “Positioning accuracy” of machines exported without numerical control units is that attained with a control unit used during checkout of the machine and with feedback systems identical to those that will be used with the machine, or by accuracy

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and feed back system
and control unit which
will be connected to the
machine.

The value of the
positioning accuracy
does not include the
width of backlash. The
value is determined
by the usual statistical
methods (random tests);
ie by approaching from
only one direction
a minimum of 5
measuremen points up
to a maximum of 25
measurement points as
random tests along one
axis. National standards
may be used for this
measuring method; eg
the German standard
VDI “Statistical testing
of the operational and
positioning accuracy
of machine-tools VDI-
DGQ3442, March,
1977”.

A tilting axis defined as
an axis which alters the
angular position of the
rotary table centreline
with respect to the
spindle centreline during
the machining process.

PL7005	Machines, internal grinding, (except hand-held drills) of the kind incorporating, or specially designed for the utilisation of, grinding heads designed or rated for operation at speeds in excess of 120,000 revolutions per minute	W
IL1093	Components and specially- designed parts for machine tools and dimensional inspection machines in entry IL1091, the following—	
	(a) (a) Spindle C assemblies, consisting of spindles	

and bearings as a
minimal assembly

except those assemblies
with axial and radial
axis motion measured
along the spindle axis
is one revolution of
the spindle equal to or
greater (coarser) than the
following—

- (i) 0.0008 mm TIR
(peak-to-peak) for
lathes and turning
machines; or
 - (ii) $D \times 10^{-5}$ mm TIR
(peak-to-peak)
where D is the
spindle diameter
in millimetres, for
milling machines,
boring mills, jig
grinders, and
machining centres
- (b) (b) Lead screws, C
including ball nut
screws

except those having
all of the following
characteristics—

- (i) accuracy equal to
or greater (coarser)
than 0.004/300 mm
- (ii) overall accuracy
equal to or greater
(coarser) than
 $(0.0025 + 5 \times 10^{-6} \times L)$ mm,
where L is the
effective length in
millimetres of the
screw;
- (iii) concentricity of
the centre line of
the journal bearing
surface and the
centre line of the
major diameter of
the screw equal to
or greater (coarser)
than 0.005 mm TIR
(peak-to-peak) at

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a distance of three times the diameter of the screw or less from the journal bearing surface.

- (c) (c) Linear C and rotary position feedback units including inductive type devices, graduated scales, and laser systems

except—

- (i) linear types having an accuracy equal to or greater (coarser) than $(0.0004 + 13 \times 10^{-6} \times L)$ mm, for L equal to or less than 100 mm and $(0.0015 + 2 \times 10^{-6} \times L)$ mm, for L greater than 100 mm, where L is the effective length in millimetres of the linear measurement; and
- (ii) rotary types having an accuracy equal to or greater (coarser) than two seconds of arc.

- (d) (d) Linear C induction motors used as drives for slides, having all the following characteristics

- (1) stroke greater than 200 mm;
- (2) nominal force rating greater than 45 N;
- (3) minimum controlled incremental movement less than 0.001 mm.

GROUP 3B

Chemical and Petroleum Equipment

IL1110	Equipment for the production of liquid fluorine, and specially designed components therefor	C
IL1129	Vacuum pump systems, the following and specially designed components, controls and accessories therefor— <ul style="list-style-type: none"> (a) (a) Cryopump systems (ie systems in which the circulation of cooled or liquefied gas is used to achieve a vacuum, static or dynamic, by lowering the temperature of the environment) designed to operate at temperatures of less than -200°C (-328°F) measured at atmospheric pressure (b) (b) Vacuum pump systems capable of evacuating a chamber of volume greater than one litre to pressures below 19^{-8} torr (1.3×10^{-6} pascals) while the temperature ;in the chamber is maintained abover 800°C 	C
IL1131	Pumps (except vacuum pumps) designed to move molten metals by electromagnetic forces	C
IL1142	Reinforced tubing (including connectors and fittings for use with such tubing) incorporating coagulated dispersion grades of polytetrafluroethylene, cocopolymers of	C

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IL1145	tetrafluoroethylene and hexafluoropropylene, or any of the fluoro-carbon materials specified in entry IL1754 sub-head (a)(2), and designed for operating (working) pressures of 210.9 kg/cm ² (3,000 psi) or greater, whether or not specially processed to make the flow surfaces electrically conductive	C
	Containers, jacketed only, specially designed for the storage or transportation of liquid fluorine	

GROUP 3C

Electrical and Power-Generating Equipment

IL1203	Electric furnaces, the following and specially designed components and controls therefor, and specially designed ODMA software for such furnaces, components and controls—	
	(a) (a) Consumable electrode vacuum arc furnaces with a capacity in excess of 20,000 kg	C
	(b) (b) Skull type vacuum arc furnaces	C
	(c) (c) Vacuum induction furnaces allowing the molten metal to be poured into a mould within the same vacuum chamber without breaking the vacuum and having all of the following characteristics	C
	(1) a capacity in excess of 2,275 kg;	
	(2) designed to operate at pressures lower than 6.67 Pa (0.0667 mbar); and	

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(3) designed to operate at temperatures in excess of 1,373K (1,100°C).

(d) (d) Induction C
furnaces having both
of the following
characteristics—

(1) a diameter inside the induction coil of 155 mm or more (6.1 inches or more); and

(2) designed to heat a workpiece with a diameter of 130 mm or more (5.1 inches or more) to a temperature in excess of 2,273K (2,000°C);

There shall be excluded from this entry susceptors made of graphite not specified elsewhere in this Schedule.

Note: this entry includes vacuum furnaces capable of operating with protective atmospheres.

IL1205

Electro-chemical, semiconductor and radioactive devices for the direct conversion of chemical, solar or nuclear energy to electrical energy, the following—

(a) Electro-chemical devices, the following: and specially designed components therefor—

(1) fuel cells operating C
at temperatures of 523K (250°C) or less, including regenerative cells, ie cells for generating electric power, to which all the consumable components are supplied from outside the cell

Note: the temperature of 523K or less refers

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to the fuel cell and not to the fuel conditioning equipment, which may be either an ancillary or an integral part of the fuel cell battery and which may operate at over 523K.

- (2) primary cells and batteries having any of the following characteristics—
- (i) reserve (water, electrolyte or thermally activated) batteries possessing a means of activation and having a rated unactivated storage life of three years or more at an ambient temperature of 297K (24°C) C
 - (ii) utilizing lithium or calcium (including alloys in which lithium or calcium are constituents) as electrodes and having an energy density at a discharge current equal to C/24 hours (C being the nominal capacity at 297K (24°C) in ampere-hours of more than 250 watt-hours per kilogramme at 297K (24°C) and more than 80 watt-hours per kilogramme at 244K (−29°C) C

Note: Energy density is obtained by multiplying the average power in watts (average voltage in volts times average current in amperes) by the duration of the discharge in hours to 80% of the open-circuit

voltage and dividing
by the total mass of
the cell (or battery) in
kilogrammes;

- (iii) using an air electrode C
together with either
lithium or aluminium
counter-electrodes and
having a power output
of 5 kilowatt or more
or an energy output
of 5 kilowatt-hours or
more

- (3) secondary (rechargeable)
cells and batteries having
any of the following
characteristics after
more than 20 charge/
discharge cycles at a
discharge current equal
to C/5 hours (C being
the nominal capacity in
ampere-hours)—

- (i) utilizing nickel and C
hydrogen as the active
constituents and
having an energy
density of 55 watt-
hours per kilogramme
or more at 297K
(24°C)

- (ii) utilizing lithium or C
sodium as electrodes
or reactants and
having an energy
density of 55 watt-
hours per kilogramme
or more at the
rated operational
temperature

Note: Energy density is
obtained by multiplying
the average power in
watts (average voltage
in volts times average
current in amperes)
by the duration of the
discharge in hours to
75% of the open-circuit
voltage and divided

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by the total mass of
the cell (or battery) in
kilogrammes;

- (4) molten salt electrolyte cells and batteries which normally operate at temperatures of 773K (300°C) or below C

(b) (b) Photo-voltaic cells and specially designed components therefor, the following—

- (1) with a power output of 14mW or more per sq cm under 100mW per sq cm tungsten 2,800°K (2,527°C) illumination C

- (2) all gallium arsenide photo-voltaic cells excluding those having a power output of less than 4mW measured by the above technique C

- (3) with a power output of 450mW or more per sq cm under 10 watts per sq cm silicon carbide at 1,750K (1,477°C) illumination C

- (4) electromagnetic (including laser) and ionized particle radiation resistant C

(c) (c) Power source based on radio-active materials systems other than nuclear reactors C

except—

- (i) those having an output power of less than 0.5 W and a total weight (force) more than 890 N (90.7 kg)
- (ii) those specially designed and developed for

medical use within
the human body.

There are excluded from heads
(a) (b) and (c) cells and power
source devices, the following
and specially designed
components therefor—

- (a) fuel cells specified in
sub-head (a)(1) above,
provided they are not
space qualified, with a
maximum output power
more than 10 kilowatts
and which use gaseous
pure hydrogen and
oxygen/air reactants,
alkaline electrolyte and
a catalyst supported by
carbon either pressed on
a metal mesh electrode or
attached to a conducting
porous plastic;
- (b) lithium primary cells or
batteries specified in sub-
head (a)(2)(ii) which:
 - (1) are specially
designed for
consumer
applications and
used in watches,
pacemakers,
calculators or
hearing aids, or
 - (2) are specially
designed for
consumer or
civil industrial
applications and
have a nominal
capacity less than
or equal to 35
ampere-hours and
a discharge current
of less than $C/10$
hours (C as defined
for the purpose of
subhead (a)(2)(ii)).
- (c) lithium secondary
(rechargeable) cells and
batteries specified in sub-
head (a)(3)(ii) above
which:

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- (1) are specially designed for consumer applications;
- (2) have a nominal capacity less than or equal to 0.5 ampere-hour and an energy density of less than 40 watt-hours per kilogramme at 273K (0°C) and a discharge current of less than C/10 hours (C as defined for the purpose of subhead (a)(3));
- (d) sodium secondary (rechargeable) cells and batteries specified in subhead (a)(3)(ii) above which are specially designed for consumer or civil industrial applications which are not space qualified.

In this entry “space qualified” refers to products which are stated by the manufacturer as designed and tested to meet the special electrical, mechanical or environmental requirements for use in rockets, satellites or high-altitude flight systems operating at altitudes of 100 km or more.

IL1206

Electric arc devices (or plasma torches) and equipment, the following: and specially designed components, accessories and controls and specially designed ODMA software therefor—

- (a) (a) Electric C arc devices for generating a flow of ionized gas in which the arc column is constricted

except—

- (i) devices using less than 100 kW arc power for welding, melting, plating or spraying; or
 - (ii) devices with less than 235 kW arc power for cutting.
- (b) (b) Equipment C incorporating electric arc devices with a constricted arc column and capable of having a programmable increment (for the continuous movement of the device) less (finer) than 0.01 mm
- (c) (c) Test C equipment incorporating electric arc devices specified in head (a) above

There shall be excluded from this entry plasma torches for industrial gas heating which are a non-constricted arc column with an operating pressure of 1 to 15 bar inclusive.

GROUP 3D

General Industrial Equipment

IL1301

Equipment and technology for the production of superalloys, the following—

- (a) (a) Equipment C specially designed for the production of superalloys including vacuum induction furnaces used in the production of superalloy powders

except

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- (i) electric arc and induction furnaces, basic oxygen furnaces and remelting equipment using other techniques for the production of carbon steels, low-alloy steels and stainless steels;
 - (ii) degassing equipment used for the production of carbon steels, low-alloy steels and stainless steels
 - (iii) hot and cold rolling mills, extrusion presses, and swaging and forging machines;
 - (iv) decarburizing and annealing and pickling equipment;
 - (v) surface finishing equipment;
 - (vi) slitting and cutting equipment.
- (b) (b) Technology D specific to the production of superalloys, regardless of the type of equipment with which it may be intended to use such technology

except technology on the equipment specifically excluded from head (a) above, other than melting, remelting and degassing technology specific to the production of superalloys.

In this entry “superalloys” means nickel-, cobalt-, or iron-base alloys having strengths superior to the AISI 300 series (as of the 1 May

- 1982) at temperatures over 922 K (649°C) under severe environmental and operating conditions. Excluded are carbon steels, low-alloy steels and stainless steels having strengths inferior to the AISI 300 series (as of 1 May 1982).
- IL1305 Metal rolling mills, in the following: and specially designed components accessories and controls and specially designed ODMA software therefor—
- (a) (a) Isothermal C rolling mills, except those capable of operating only at ambient temperatures
- In this heading “isothermal rolling mill” means an isothermal rolling mill in which a constant instantaneous temperature profile is maintained in the contact area between the workpiece and the rolls.
- (b) (b) Other mills C specially designed or re-designed for the rolling of metals and alloys with a melting point exceeding 1,900°C
- IL1312 Isostatic presses the following: and specially designed dies and moulds (except those used in isostatic presses operating at ambient temperatures), components, accessories and controls and specially designed ODMA software therefor—
- (a) (a) Those capable C of achieving a maximum working pressure of 138MPa (20,000 psi) or more and possessing a chamber cavity with

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an inside diameter in excess of 406 mm (16 inches) or

- (b) (b) Those having C a controlled thermal environment within the closed cavity and possessing a chamber cavity with an inside diameter of 127 mm or more

In this entry “isostatic presses” are equipment capable of pressurizing a closed cavity through various media (gas, liquid, solid particles, etc) to create equal pressure in all directions within the cavity upon a workpiece or material.

IL1352 Nozzles, dies and extruder barrels specially designed for the processing of the fluorocarbon materials specified in subhead (a)(2) of the entry IL1754 in Group 31 C

IL1353 Manufacturing and testing equipment for optical fibre, optical cable and other cables, the following: and specially designed components and specially designed ODMA software therefor—

- (a) (a) Equipment C specially designed to manufacture cable specified in heads (a) and (d) of entry IL1526 in Group 3F
- (b) (b) Equipment C specially designed to manufacture optical fibre or optical cable specified in entry IL1526 in Group 3F
- (c) (c) Equipment C specially designed to manufacture optical preforms specified

in entry IL1767 in
Group 3I

- (d) (d) Optical C
fibre and preform
characterisation
equipment using
semi-conductor
lasers for the testing
of optical fibres or
optical preforms at
operating wavelengths
exceeding 850 nm

IL1354

Equipment designed for the
manufacture or testing of
printed circuit boards, the
following: and specially
designed components and
accessories and specially
designed ODMA software
therefor—

- (a) (a) Equipment C
specially designed for
removal of resists
or printed circuit
board materials by
dry (plasma) methods
- (b) (b) Computer-
aided design (CAD)
equipment for printed
circuit boards, having
any of the following
functions—
- (1) generation of artwork C
design with an interactive
capability
- (2) generation of test string C
lists for multi-layer
boards
- (3) generation of data or C
programmes for stored-
programme controlled
printed circuit board
drilling equipment
- (4) generation of data or C
programmes for stored-
programme controlled
printed circuit board
shaping and profiling
equipment or

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(5) generation of data for control of the sequencing of processes of the equipment for printed circuit board manufacture specified in head (c) below C

(c) (c) High-speed automated continuous panel processors for plating capable of delivering more than or equal to 860 A/m² of plate current, (This does not include processors specially designed for, and restricted to, plating tab (edge) connectors) C

(d) (d) Stored-programme controlled inspection equipment for the detection of defects in printed circuit boards using optical pattern comparison or other machine scanning techniques C

(e) (e) Stored-programme controlled electrical test equipment for the identification of open and short circuits on bare printed circuit boards, capable of—

(1) continuity testing (less than or equal to 4 ohm) at a rate of 2,500 or more measurements per second C

(2) high voltage testing (greater than or equal to 50 volts) at a rate of 10,000 or more measurements per minute C

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(f) (f) Stored-programme controlled multi-spindle drills and routers having any of the following characteristics—

(1) absolute positioning accuracy of ± 10 micrometres or better C

(2) minimum time needed for drill bit changes less than or equal to 5 seconds C

or

(3) X and Y positioning speeds higher than or equal to 0.125 m/sec for drilling or for routing C

(g) (g) Stored-programme controlled cyclic voltametric stripping equipment specially designed for printed circuit board plating bath monitoring and analysis C

For the purpose of this entry “stored programme controlled” means controlled using instructions stored in an electronic storage which a processor can execute in order to direct the performance of predetermined functions.

IL1355

Equipment for the manufacture of testing of electronic components and materials, the following: and specially designed components, accessories and specially designed ODMA software therefor—

(a) (a) Equipment specially designed for the manufacture or testing of electron tubes and optical C

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elements specified in entries IL1541, 1542, 1555, 1556, 1558 and 1559 in Group 3F, and specially designed components therefor

- (b) (b) Equipment specially designed for the manufacture or testing of semiconductor devices, integrated circuits and assemblies, and systems incorporating or having the characteristics of such equipment, the following—

- (1) equipment for the processing of materials for the manufacture of devices and components, the following—

- (a) equipment C
for producing polycrystalline silicon specified in head (f) of entry IL1757 in Group 3I having a purity more than 99.99% in the form of rods (ingots, boules), pellets, sheets, tubes or small particles
- (b) equipment specically C
designed for purifying or processing III-V and II-VI semiconductor materials specified in the entry IL1757 in Group 3I, except crystal pullers
- (c) crystal pullers, furnaces, and gas systems, the following:

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- (1) types with specially designed stored programme controlled temperature, power input or gas, liquid or vapour flow C
- (2) diffusion, oxidation and annealing furnaces for operation at pressures above 1 atmosphere (nominal) C
- (3) annealing or re-crystallizing equipment other than constant temperature furnaces employing high rates of energy transfer capable of processing wafers at a rate greater than 50 cm² per minute C
- (4) plasma enhanced or photo-enhanced chemical reactor equipment C
- (5) equipment for automatic control of crystal taper and diameter, except taper and diameter control mechanisms using any of the following equipment techniques C
 - (i) radiation pyrometers;
 - (ii) thermocouples;
 - (iii) RF power sensors; or
 - (iv) mass weighing (without digital or anomaly control permitting the growth of semiconductors).
- (6) crystal pullers having any of the following characteristics:
 - (i) rechargeable without replacing the crucible container C

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- (ii) capable of operation C
at pressures above
 2.5×10^5 pascal (2.5
atmospheres absolute)
or below 1×10^5
pascal (1 atmosphere
absolute)
- (iii) capable of pulling C
crystals of a diameter
greater than 76.2 mm
- (iv) specially designed to C
minimize convection
currents in the melt by
the use of magnetic
fields or multiple
crucibles
- or
- (v) capable of pulling C
sheet or ribbon
crystals
- (7) vacuum induction- C
heated zone-refining
equipment for
operation at a pressure
of 0.01 pascal or less
- (d) equipment for
epitaxial growth
having any of
the following
characteristics:
 - (1) operation at pressures C
below 10^5 pascal (1
atmosphere absolute)
 - (2) stored programme C
controlled
 - (3) rotating vertical- C
support, radiant-
heated reactors
 - (4) specially designed C
for processing bubble
memories
 - (5) metal-organic C
chemical vapour
deposition reactors; or
 - (6) for liquid phase C
epitaxy

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(e) molecular beam C
epitaxial growth
equipment

(f) magnetically-enhanced C
sputtering equipment

(g) equipment designed C
for ion implantation,
or for ion-enhanced
or photo-enhanced
diffusion

(h) equipment for C
selective or non-
selective removal
by dry methods
of passivation
layers, dielectrics,
semiconductor
materials, resists or
metals

except
horizontal, cylindrical
plasma etchers without
stored programme
controlled end-point
detection, automatic
loading or rotating
mechanisms and not
having the capability for
parallel plate etching as
used in semiconductor
device manufacture
and vacuum sputtering
equipment designed to
operate in the sputter etch
mode.

(i) equipment for C
semiconductor device
fabrication operating
below 10^5 pascal (1
atmosphere absolute)
for the chemical
vapour deposition
of oxides, nitrides,
metals and polysilicon
except reactive
sputtering equipment

(j) electron beam
systems (including
scanning electron

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microscopes), capable of mask making or semiconductor device processing and having any of the following characteristics:

- (1) electrostatic beam deflection C
- (2) shaped, non-Gaussian beam profile C
- (3) beam blanking capability C

except scanning electron microscopes equipped for Auger analysis;

- (4) digital-to-analogue conversion rate greater than 3MHz C
- (5) digital-to-analogue conversion accuracy greater than 12 bits, or C
- (6) target to beam position feedback control precision of 1 micrometre or finer C

except electron beam deposition systems.

- (k) surface finishing equipment, specially designed for the processing of semiconductor wafers and having any of the following characteristics:

- (1) waxless or non-adhesive mounting C
- (2) double-sided simultaneous polishing or lapping C
- (3) capable of polishing and lapping wafers exceeding 76.2 mm in diameter, or C

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- (4) lapping or polishing C
in two stages on the
same machine
- (1) interconnection C
equipment which,
may include common
single or multiple
vacuum chambers,
specially designed to
permit the integration
of equipment specified
in this entry into a
complete system
- (2) masks, mask substrates,
mask-making equipment
and image-transfer
equipment for the
manufacture of devices
and components, the
following—
 - (a) finished masks, and C
reticles and designs
therefor
 - (b) hard surface (eg C
chromium, silicon,
iron oxide) coated
substrates (eg glass,
quartz, sapphire)
for the preparation
of masks having
dimensions exceeding
 76.2×76.2 mm
 - (c) computer-aided design
(CAD) equipment,
for transforming
schematic or logic
diagrams into designs
for producing
semiconductor devices
or integrated circuits,
having any of the
following functions:
 - (1) storage of pattern C
cells for subdivision
of integrated circuits
 - (2) scaling, positioning, C
or rotation of pattern
cells

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- (3) interactive graphic capabilities C
- (4) design rule and circuit checking; or C
- (5) circuit layout modification of the arrangement of the elements C

(Note: Software which performs any of the functions in subhead (b)(2)(c), or which can be used for transient analysis, for logic analysis or logic checking, for automatic routing or cell placement, for the generation of test vectors or for process simulation is specially designed ODMA software specified in the heading of this entry.)

- (d) mask fabrication machines using photo-optical methods, the following:
 - (1) step and repeat cameras capable of producing arrays larger than 63.5×63.5 mm, or capable of producing a single exposure larger than 3.75×3.75 mm, in the focal plane, or capable of producing useful line widths of 3.5 micrometres or less C
 - (2) pattern generators specially designed for the generation or manufacture of masks or the creation of patterns in photosensitive layers and with placement C

precision finer than 10 micrometres

- (3) mask fabrication equipment containing automatic adjustment of focus or adjustment of the mask material into the focal plane C

- (4) equipment and holders for altering masks or reticles or adding pellicles to remove defects C

- (e) mask reticle or pellicle inspection equipment, the following:

- (1) equipment for comparison with a precision of 0.75 micrometre or finer over an area of 63.5×63.5 mm or more C

- (2) stored programme controlled equipment with a resolution of 0.25 micrometres or finer and with a precision of 0.75 micrometre or finer over a distance in one or two coordinates of 63.5 mm or more C

- (3) stored programme controlled defect inspection equipment C

except
conventional scanning electron microscopes, other than types specially designed and instrumented for automatic pattern inspection.

- (f) align and expose equipment using photo-optical methods, including projection image transfer equipment,

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capable of performing
any of the following
functions:

- (1) production of useful pattern size of less than 5 micrometres C
- (2) alignment with a precision finer than 1 micrometre C
- (3) field coverage exceeding 76.2×76.2 mm C
- (4) wafer backside alignment C
- (5) automatic alignment by the sensing of patterns or index marks on the substrate C
- (6) projection image transfer for processing slices (wafers) of 50.8 mm or larger in diameter C

except non-contacting (proximity) image transfer equipment which does not perform any of the functions specified in subsheads (f)(1) to (f)(5) above.

- (g) electron beam, ion beam, or X-ray equipment for projection image transfer C
- (h) photo-optical or non-photo-optical step and repeat or partial field equipment for the transfer of the image on to the wafer C
- (i) mask contact transfer equipment for imaging a field larger than 76.2×76.2 mm C
- (3) stored programme controlled inspection C

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equipment for the detection of defects in processed wafers, substrates or chips using optical pattern comparison or other machine scanning techniques

except conventional scanning electron microscopes, other than when specially designed and instrumented for automatic pattern inspection.

- (4) specially designed stored programme controlled measuring and analysis equipment, the following—
- (a) equipment specially designed for the measurement of oxygen or carbon content in semiconductor materials C
 - (b) equipment for concurrent etching and doping profile analysis (employing capacitance-voltage or current-voltage analysis techniques) C
 - (c) equipment for linewidth measurement with a resolution of 1.0 micrometre or finer C
 - (d) specially designed flatness measurement instruments capable of measuring deviations from flatness of 10 micrometres or less with a resolution of 1 micrometre or finer C

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- (5) equipment for the assembly of integrated circuits, the following—
 - (a) stored programme controlled die (chip) mounters and bonders with a positioning accuracy finer than 50 micrometres or incremental steps finer than 6.4 micrometres C
 - (b) stored programme controlled wire bonders and welders for performing consecutive bonding operations C
 - (c) equipment for producing multiple bonds in a single operation (eg beam lead bonders, chip carrier bonders, tape bonders) C
 - (d) semi-automatic or automatic hot cap sealers, in which the cap is heated locally to a higher temperature than the body of the package, specially designed for ceramic microcircuit packages specified in head (b) of entry IL1564 in Group 3F and which have a throughput equal to or greater than one package per minute except general purpose resistance type spot welders C
 - (e) thermal compression bonders, also known as nailhead bonders C
- (6) stored programme controlled wafer probing equipment, the following—

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- (a) equipment having positioning accuracy finer than 50 micrometres, or incremental steps finer than 6.4 micrometres C
- (b) equipment having individual die location read-out (X-Y position information) during testing C
- (c) equipment capable of testing devices having more than a total of 24 terminals C
- (d) equipment having automatic slice (wafer) alignment C
- (7) test equipment, the following—
 - (i) stored programme controlled equipment specially designed for testing discrete semiconductor devices and unencapsulated dice, capable of performing any of the following functions C
 - (a) measurement of time intervals of less than 10 ns;
 - (b) measurement of parameters (eg f_T , S-parameters, noise figure) at frequencies greater than 250 MHz;
 - (c) resolution of currents of less than 100 picoamperes; or
 - (d) measurements of spectral response at wavelengths outside the range from 450 to 950 nm;

Note: discrete semiconductor devices include, for example,

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diodes, transistors,
thyristors, photocells and
solar cells.

- (ii) stored programme controlled equipment specially designed for testing integrated circuits, and assemblies thereof, capable of performing any of the following functions
 - (a) functional (truth table) testing at a pattern rate greater than 2 MHz;
 - (b) resolution of currents of less than 1 nanoampere;
 - (c) testing of integrated circuits (not mounted on circuit boards) in packages having more than a total of 24 terminals, except equipment specially designed for and dedicated to the testing of integrated circuits not specified in entry IL1564 in Group 3G; or
 - (d) measurement of rise times, fall times and edge placement times with a resolution of less than 20 ns;
 except—
 - (1) test equipment which is not of a general-purpose nature and which is specially designed for, and dedicated to, testing assemblies or a class of assemblies for home and entertainment applications and

- (2) test equipment which is not of a general-purpose nature and which is specially designed for, and dedicated to, testing electronic components, assemblies and integrated circuits the subject of a specific exception to IL1564 in Group 3G provided that such test equipment does not incorporate computing facilities with user-accessible programming capabilities;
- (iii) equipment specially designed for determining the performance of focal-plane arrays at wavelengths more than 1,200 nm, using stored programme controlled measurements or computer aided evaluation and having any of the following characteristics
 - (a) using scanning light spot diameters of less than 0.12 mm;
 - (b) designed for measuring photosensitive performance parameters and for evaluating frequency response, modulation transfer function, uniformity of responsivity or noise; or
 - (c) designed for evaluating arrays capable of creating

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images of greater than
32 × 32 line elements;

(iv) specially designed for C
bubble memories

(8) Class 10 filters capable C
of providing an
environment of 10 or
less particles of 0.3
micrometre or more per
0.02832/m³ and filter
materials therefor

(9) Electron-beam test C
systems (capable
of operating at or
below 3,000 eV),
for non-contactive
probing of powered-
up semiconductor
devices having any of the
following—

(a) Stroboscopic
capability with either
beam blanking or
detector strobing;

(b) An electron
spectrometer for
voltage measurements
with a resolution of less
than one-half (0.5)
volt; or

(c) Electrical tests fixtures
for performance
analysis of integrated
circuits.

except—
Scanning electron
microscopes, other than
those specially designed
and instrumented
for non-contactive
probing of a powered up
semiconductor device,
are not excluded from
head (b).

In this entry—

“masks” means those
used in electron beam
lithography, X-ray
lithography, and ultra-

violet lithography, as well as ultra-violet and visible photolithography; “magnetically-enhanced” means equipment incorporating a cathode assembly having an integral magnetic structure for enhancing the plasma intensity; “stored programme controlled” means controlled by using instructions stored in an electronic storage which a processor can execute in order to direct the performance of predetermined functions.

IL1356 Equipment specially designed or incorporating modifications for the continuous coating of polyester-base magnetic tape specified in entry IL1572 in Group 3G, and specially designed components therefor except general purpose continuous coating equipment.

L1357 Equipment for the production of fibres specified in the entry IL1763 in Group 3I or their composites, the following and specially designed components and accessories and specially designed ODMA software therefor—

- (a) (a) Filament C winding machines of which the motions for positioning wrapping and winding fibres are coordinated and programmed in three or more axes, specially designed to fabricate composite structures or laminates from fibrous and filamentary materials; and

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coordinating and
programming
controls therefor

- (b) (b) Tape- C
laying machines of
which the motions
for positioning and
laying tape and sheets
are coordinated and
programmed in two
or more axes,
specially designed for
the manufacture of
composite airframes
and missile structures

- (c) (c) Multidirectional, C
multidimensional
weaving machines
and interlacing
machines, including
adapters and
modification kits, for
weaving, interlacing
or braiding fibres to
manufacture
composite structures,
except textile
machinery which has
not been modified for
the above end-uses

- (d) (d) Specially
designed or adapted
equipment for the
production of fibrous
and filamentary
materials specified in
head (a) or (b) in
the entry IL1763
in Group 3I, the
following—

- (1) equipment for converting C
polymeric fibres, (such as
polyacrylonitrile, rayon,
or polycarbosilane)
including special
provision to strain the
fibre during heating
- (2) equipment for the vapour C
deposition of elements

or compounds on heated
filamentary substrates

and

(3) equipment for the wet- C
spinning of refractory
ceramics (such as
aluminium oxide)

(e) (e) Specially C
designed or adapted
equipment for special
fibre surface
treatment or for
producing prepregs
and preforms
specified in head (c)
in the entry IL1763 in
Group 3I

NOTE

Specially designed or
adapted components
and accessories for the
machines specified in
this entry include, but are
not limited to, moulds,
mandrels, dies, fixtures
and tooling for pressing,
curing, carbonising,
graphitising, casting,
sintering or bonding of
preforms, composite
structures, laminates and
manufactures therefore
specified in head (d)
to the entry IL1763 in
Group 3I.

IL1358

Equipment specially designed
for the manufacture or testing
of devices and assemblies
thereof specified in the entry
IL1588 in Group 3G or
magnetic recording media
specified in the entry IL1572
in Group 3G the following:
and specially designed
components and specially
designed ODMA software
therefor—

(a) Equipment for the
manufacture of single
and multi-aperture forms

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specified in heads (b),
(c) and (d) mentioned in
entry IL1588 in Group
3G, the following—

- (1) automatic presses to produce specified types C
- (2) press dies to produce specified types C
- (3) automatic equipment for monitoring, grading, sorting, exercising or testing of specified types C
- (b) (b) Equipment for the manufacture of thin film memory storage or switching devices having square hysteresis loops and automatic equipment for monitoring, grading, sorting, exercising or testing of devices specified in head (e) of entry IL1588 in Group 3G C
- (c) (c) Automatic equipment for monitoring, exercising or testing assemblies of devices specified in heads (b), (c), (d) or (e) of the entry IL1588 in Group 3G C
- (d) (d) Equipment which incorporates specially designed modifications for the application of magnetic coating to flexible disk recording media with a packing density exceeding 2,460 bit per cm C

except general purpose
coating equipment.

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- (e) (e) Equipment C
specially designed for
the application of
magnetic coating to
non-flexible (rigid)
disk type recording
media not excepted
in paragraph (vi) of
head (d) of entry
IL1572 in Group 3G
- (f) (f) Stored C
programme
controlled equipment
for monitoring,
grading, exercising
or testing recording
media, other than
tape, specified in
head (d) of entry
IL1572 in Group 3G

Note: For the purpose of this entry “single aperture forms” means single aperture forms having either of the following characteristics:

- (i) switching rate of 0.3
microsecond or faster
at the minimum field
strength required for
switching at 40°C or
- (ii) a maximum dimension
less than 0.45 mm except
single aperture forms
which have:
 - (a) a switching
time equal to or
more than 0.24
microsecond; and
 - (b) a maximum
dimension of 0.30
mm or more.

In this entry—
“automatic” means
machinery not requiring
the assistance of a human
operator to complete
its function(s) during
each complete cycle of
operations;
“function” does not
include the initial loading

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	or final unloading of material from the machine.	
IL1359	Specially designed tooling and fixtures for the manufacture of fibre-optic connectors and couplers specified in head (e) of the entry IL1526 in Group 3F	C
IL1360	Stored programme controlled equipment capable of automatic X-ray orientation and angle correction of double- rotated stress-compensated (SC) quartz crystals specified in entry IL1587 in Group 3G, with a tolerance of 10 seconds of arc maintained simultaneously in both angles of rotation In this entry “stored programme controlled” means controlled by using instructions stored in an electronic storage which a processor can execute in order to direct the performance of predetermined functions.	C
IL1361	Test facilities and equipment for the design or development of aircraft or gas turbine aero-engines, the following and specially designed components, accessories and specially designed ODMA software therefor— (a) (a) Supersonic (Mach 1.4 to Mach 5), hypersonic (Mach 5 to Mach 15) and hypervelocity (above Mach 15) wind tunnels except— (i) supersonic (Mach 1.4 to Mach 5) wind tunnels not specially designed for or fitted with means of, preheating the air;	C

or

- (ii) wind tunnels specially designed for educational purposes and having a test section size (measured internally of less than 25 cm;
(Note: by test section size is understood the diameter of the circle, or the side of the square, or the longest side of the rectangle constituting possible shapes of the test section.)
- (b) (b) Devices C for simulating flow-environments of Mach 5 and above, regardless of the actual Mach number at which the devices operate, including hot shot tunnels, plasma arc tunnels, shock tubes, shock tunnels, gas tunnels and light gas guns
- (c) (c) Wind C tunnels and devices, other than two dimensional (2-D) sections that have unique capabilities for simulating Reynolds number flow in excess of 25×10^6 , at transonic velocities
- (d) (d) Automated C control systems, instrumentation (including sensors) and automated data-acquisition equipment, specially designed for use with wind tunnels and

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devices specified in head (a), (b) or (c) above

- (e) (e) Models, C specially designed for use with wind tunnels or with the devices specified in head (b) or (c) above, of aircraft, helicopters, airfoils, spacecraft, space-launch vehicles, rockets or surface-effect vehicles specified in the entries in Groups 1 and 3E relating thereto or of surface-effect vehicles specified in head (b) of the entry IL1416 relating to vessels

- (f) (f) Specially C designed electromagnetic interference and electromagnetic pulse (EMI/EMP) simulators

- (g) (g) Specially designed test facilities and equipment for the development of gas turbine aero-engines and components, the following—

- (1) special test facilities C capable of applying dynamic flight loads, measuring performance or simulating the design operating environments for rotating assemblies of aero-engines
- (2) test facilities, test rigs C and simulators for measuring combustion system and hot gas flow

path performance, heat transfer and durability for static assemblies and aero-engine components

- (3) specially designed test rigs, equipment or modified gas turbine engines which are utilized for development of gas turbine aero-engine internal flow systems (gas path seals, air-oil seals and disc cavity flow fields) C

IL1362

Vibration test equipment the following—

- (a) (a) Vibration test equipment using digital control techniques and specially designed ancillary equipment and specially designed ODMA software therefor C

except

- (i) individual exciters (thrusters) with a maximum thrust of less than 100 kN (22,500 lb);
(ii) analogue equipment;
(iii) mechanical and pneumatic exciters (thrusters);
(iv) vibrometers;

- (b) (b) High intensity acoustic test equipment capable of producing an overall sound pressure level of 140 dB or greater (referenced to 2×10^{-5} N/m²) or with a rated output of 4kW or greater and specially designed ancillary equipment and specially C

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designed ODMA
software therefor

except analogue
equipment.

- (c) (c) Ground C
vibration (including
modal survey) test
equipment that uses
digital control
techniques and
specially designed
ancillary equipment,
and specially
designed ODMA
software therefor

except analogue
equipment.

Note: vibration and
acoustic test systems
typically consist of
one or more exciters
(thrusters), or acoustic
noise generators, together
with ancillary equipment
for instrumentation,
control, data acquisition
and analysis.

IL1363

Specially designed water
tunnel equipment, components,
accessories and databases for
the design and development
of vessels, the following: and
specially designed ODMA
software therefor—

- (a) (a) Automated C
control systems,
instrumentation
(including sensors)
and data acquisition
equipment specially
designed for water
tunnels
- (b) (b) Automated C
equipment to control
air pressure acting
on the surface of
the water in the test
section during the
operation of the water
tunnel

(c) (c) Components and accessories for water tunnels, the following—

(1) balance and support systems C

(2) automated flow or noise measuring devices, and C

(3) models of hydrofoil vessels, surface-effect vehicles, SWATH vessels and specially designed equipment and components specified in heads (a), (b), (c), (e), (f), (g) and (h) in entry IL1416 in Group 3E for use in water tunnels C

(d) (d) Databases generated by use of equipment specified in this entry C

In this entry “database” shall have the same meaning as in entry IL1566 in Group 3G.

IL1364

Machinery and equipment for the manufacture of hydrofoil vessel and surface-effect vehicle and SWATH vessel structures and components, the following: and specially designed components and accessories therefor—

(a) (a) Specially designed equipment for manufacturing anisotropic, orthotropic or sandwich structures from components specified in subhead (h)(3) of the entry IL1416 in Group 3E C

Note: in this head—

1. “Anisotropic construction” means the use of fibre reinforcing members aligned

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so that the load-carrying ability of the structure can be primarily orientated in the direction of expected stress.

2. “Orthotropic construction” means a method of stiffening plates in which the structural members are at right angles to each other.
 3. “Sandwich construction” means the use of structural members or plates which are fabricated and permanently affixed in layers to enhance their strength and reduce their weight.
- (b) (b) Specially C designed equipment for the production and testing of flexible materials for skirts, seals, air curtains, bags and fingers for surface-effect vehicles
- (c) (c) Specially C designed equipment for the production of water-screw propellers and hub assemblies and water-screw propeller systems specified in heads (c) and (f) of entry IL1416 in Group 3E
- (d) (d) Specially C designed equipment for the production, dynamic balancing and automated testing and inspection of

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lift fans for surface-effect vehicles

(e) (e) Specially C
designed equipment
for the production of
water-jet propulsion
pumps rated at
3,000 hp or greater,
or multiple-pump
system equivalents
thereof

(f) (f) Specially C
designed equipment
for the production,
dynamic balancing
and automatic testing
of AC-AC
synchronous and AC-
DC systems, sector
disc and concentric-
drum rotors for DC
monopolar machines

IL1365 Equipment specially designed C
for in-service monitoring of
acoustic emissions in airborne
vehicles, or underwater
vehicles specified in the
entry IL1418 in Group 3E,
capable of discriminating
acoustic emissions related to
crack growth from innocuous
noise sources and capable
of spatial location of the
crack, and specially designed
components, accessories and
specially designed ODMA
software therefor

except, general purpose
acoustic emission equipment.

Note: The methods used
for discriminating acoustic
emissions from innocuous
noise sources include pattern
recognition techniques.

IL1370 Machine-tools for generating
optical quality surfaces,
specially designed components
and accessories the following

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and specially designed ODMA software therefor—

(a) (a) Turning C machines using a single point cutting tool and having all of the following characteristics—

- (1) slide positioning accuracy less (finer) than 0.0005 mm per 300 mm of travel, TIR (peak-to-peak);
- (2) slide positioning repeatability less (finer) than 0.0002 mm per 300 mm of travel, TIR (peak-to-peak);
- (3) spindle run-out (radial and axial) less than 0.0004 mm TIR (peak-to-peak);
- (4) angular deviation of the slide movement (yaw, pitch and roll) less (finer) than 2 seconds of arc (peak-to-peak) over full travel;
- (5) slide perpendicularity less than 0.001 mm per 300 mm of travel, TIR (peak-to-peak);

(b) (b) Fly cutting C machines having both of the following characteristics—

- (1) spindle run-out (radial and axial) less than 0.0004 mm TIR (peak-to-peak);
- (2) angular deviation of slide movement (yaw, pitch and roll) less (finer) than 2 seconds of arc (peak-to-peak) over full travel;

(c) (c) Specially designed

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components, the
following—

- (1) spindle assemblies, C
consisting of spindles
and bearings as a
minimal assembly,
except those assemblies
with axial and radial
axis motion measured
along the spindle axis
in one revolution of
the spindle equal to or
greater (coarser) than
0.0008 mm TIR (peak-to-
peak)
- (2) linear induction C
motors used as drives
for slides, having
all of the following
characteristics—
 - (i) stroke greater than
200 mm;
 - (ii) nominal force rating
greater than 45N;
 - (iii) minimum controlled
incremental movement
less than 0.001 mm;
 - (d) (d) Single point C
diamond cutting tool
inserts having all
of the following
characteristics
- (1) flawless and chip-free
cutting edge when
magnified 400 times in
any direction;
- (2) cutting radius between
0.1 and 5 mm;
- (3) cutting radius out-of-
roundness less than 0.002
mm TIR (peak-to-peak).

ILO1371

Anti-friction bearings, the
following—

- (a) Ball and roller bearings
having an inner bore
diameter of 10 mm
or less and tolerances
of ABEC 5, RBEC

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5 or better and either
of the following
characteristics—

- (1) made of special materials C
that is to say, with
rings, balls or rollers
made from any steel
alloy or other material
(including but not limited
to high-speed tool steels,
Monel metal, beryllium,
metalloids, ceramics
and sintered metal
composites), except
the following; low-
carbon steel, SAE-52100
high carbon chromium
steel, SAE-4615
nickel molybdenum
steel, AISI-440C
(SAE-51440C) stainless
steel (or national
equivalents), or
- (2) manufactured for use C
at normal operating
temperatures over 150°C
either by use of special
materials or by special
heat treatment
- (b) (b) Ball and roller
bearings (exclusive
of separable ball
bearings and thrust
ball bearings) having
an inner bore
diameter exceeding
10 mm and having
tolerances of ABEC
7, RBEC 7 or
better and either
of the following
characteristics—
 - (1) made of special C
materials, that is to say,
with rings, balls or rollers
made from any steel
alloy or other material
(including but not limited
to high-speed tool steels,
Monel metal, beryllium,
metalloids, ceramics

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and sintered metal composites), except the following; low-carbon steel, SAE-52100 high carbon chromium steel, SAE-4615 nickel molybdenum steel, AISI-440C (SAE-51440C) stainless steel (or national equivalents), or

- (2) manufactured for use at normal operating temperatures over 150°C either by use of special materials or by special heat treatment C
- (c) (c) Ball and roller bearings having tolerances better than ABEC 7 C
- (d) (d) Gas-lubricated foil bearings C
- (e) (e) Bearing parts usable only for bearings specified in this entry, the following: outer rings, inner rings, retainers, balls, rollers and sub-assemblies C

There shall be excluded from this entry hollow bearings.

IL1372

Technology for industrial gas turbine engines, the following—

- (a) (a) Technology common to industrial gas turbine engines and gas turbine aero-engines specified in head (d) of the entry IL1460 in Group 3E D
- (b) (b) Technology common to industrial gas turbine engines and marine gas turbine engines D

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	specified in the entry IL1431 in Group 3E	
IL1385	<p>Specially designed production equipment for compasses, gyroscopes (gyros), accelerometers and inertial equipment specified in the entry IL1485 in Group 3E</p> <p>Note: This entry includes—</p> <p>(a) For ring laser gyro equipment, the following equipment used to characterize mirrors, having the threshold accuracy shown or better:</p> <ol style="list-style-type: none"> (1) Rectilinear scatterometer (10 ppm) (2) Polar scatterometer (10 ppm) (3) Reflectometer (50 ppm) (4) Profilometer (5 angströms) <p>(b) For other inertial equipment:</p> <ol style="list-style-type: none"> (1) Inertial Measurement Unit (IMU) module tester (2) IMU platform tester (3) IMU stable element handling fixture (4) IMU platform balance fixture (5) Gyro tuning test station (6) Gyro dynamic balance station (7) Gyro run-in/motor test station (8) Gyro evacuation and fill station (9) Centrifuge fixture for gyro bearings (10) Accelerometer axis align station (11) Accelerometer test station 	C

IL1388

Specially designed equipment for the deposition, processing and in-process control of inorganic overlays, coatings and surface modifications, for non-electric substrates by processes specified in entry IL1389 in this Group, the following: and specially designed automated handling, positioning, manipulation and control components and specially designed ODMA software therefor—

- (a) (a) stored C programme controlled chemical vapour deposition (CVD) production equipment with both of the following characteristics

(1) process modified for one of the following—

- (a) pulsating CVD;
- (b) controlled nucleation thermal decomposition (CNTD); or
- (c) plasma enhanced or plasma assisted CVD; and

(2) any of the following characteristics—

- (a) incorporating high vacuum (less than or equal to 10^{-7} atm) rotating seals;
- (b) operating at reduced pressure (less than 1 atm); or
- (c) incorporating in situ coating

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thickness
control;

(b) (b) Stored C
programme
controlled ion
implantation
production
equipment having
beam currents of 5
mA or higher

(c) (c) Stored C
programme
controlled electron
beam physical vapour
deposition (EB-
PVD) production
equipment with either
of the following
characteristics

(i) incorporating power
systems greater than 80
kW; or

(ii) (1) incorporating
power systems
greater than 50
kW; and
(2) having both of
the following
characteristics:
(a) incorporating
a liquid pool
level laser
control system
which regulates
precisely the
ingots feed rate;
and
(b) incorporating
a computer
controlled
rate monitor
operating on
the principle
of photo-
luminescence
of the ionised
atoms in the
vaporant stream
to control the
deposition rate

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of a coating
containing
two or more
elements

(d) (d) Stored C
programme
controlled plasma
spraying production
equipment having
any of the following
characteristics—

- (1) operating at atmospheric pressure discharging molten or partially molten material particles into air or inert gas (shrouded torch) at nozzle exit gas velocities greater than 750 m/sec calculated at 293 K at 1 atmosphere;
- (2) operating at reduced pressure controlled atmosphere (less than or equal to 100 millibar (0.1 atm) measured above and within 30 cm of the gun nozzle exit) in a vacuum chamber capable of evacuation down to 10^{-4} millibar prior to the spraying process; or
- (3) incorporating in situ coating thickness control.

(e) (e) Stored C
programme
controlled sputter
deposition
production
equipment capable of
current densities of 5
 mA/cm^2 or higher at
a deposition rate of
10 micrometres/hr or
higher

(f) (f) Stored C
programme
controlled cathodic
arc deposition
production

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equipment with either of the following characteristics—

- (1) incorporating target areas larger than 45.6 cm²; or
- (2) incorporating a magnetic field steering control of the arc spot on the cathode
- (g) (g) Deposition C process or surface modification equipment for stored programme controlled production processing which enables the combining of any individual deposition processes specified in heads (a) to (f) above (inclusive) so as to enhance the capability of such individual processes

For the purpose of this entry “stored programme controlled” means controlled by using instructions stored in an electronic storage which a processor can execute in order to direct the performance of predetermined functions.

IL1389

Technology and specially designed ODMA software therefor, the following—

- (a) Technology for application to non electronic devices designed to achieve—

by any process specified D in column 1 of the Table below on any substrate specified in that part of column 2 of the Table which relates to that process any inorganic overlay coating or inorganic surface modification

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coating specified in that part of column 3 of the Table which relates to that substrate

except that this head does not include technology for single stage pack cementation of solid airfoils.

(b) (b) Specially designed software for the technology included in head (a) D ODMA for the included

Note: The processes included in column 1 are defined in Notes A(a)-(i) below. Other terms used in the Table are defined in Notes B(1)-(8) below.

TABLE

1. Coating process	2. Substrate	3. Resultant coating
A. chemical deposition (CVD)	vapour superalloys	aluminides for internal surfaces, alloyed aluminides or noble metal modified aluminides
	titanium or titanium alloys	carbides aluminides of alloyed aluminides
	ceramics	silicides or carbides
	carbon-carbon, carbon-ceramics, or metal matrix composites	silicides, carbides, mixtures thereof or dielectric layers
	copper or copper alloys	tungsten or dielectric layers
	silicon carbide or cemented tungsten carbide	carbides, tungsten, mixtures thereof or dielectric layers
B. electron-beam vapour deposition (EB-PVD)	physical superalloys	alloyed silicides, alloyed aluminides MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia) or mixtures thereof (including mixtures

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1. Coating process	2. Substrate	3. Resultant coating
		of the above with silicides or aluminides)
	ceramics	silicides or modified zirconia (except calcia-stabilized zirconia)
	aluminium alloys	MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia) or mixtures thereof
	corrosion resistant steel	MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia)
	carbon-carbon, carbon-ceramic, or metal matrix composites	silicides, carbides, mixtures thereof or dielectric layers
	copper or copper alloys	tungsten or dielectric layers
	silicon carbide or cemented tungsten carbide	carbides, tungsten, mixtures thereof or dielectric layers
C. electro-phoretic deposition	superalloys	alloyed aluminides or noble metal modified aluminides
D. pack cementation	superalloys	alloyed aluminides or noble metal modified aluminides
(see also A above)	carbon-carbon, carbon-ceramic or metal matrix composites	silicides, carbides or mixtures thereof
	aluminium alloys	aluminides or alloyed aluminides
E. plasma spraying (high velocity or low pressure only)	superalloys	MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia), or mixtures thereof

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1. Coating process	2. Substrate	3. Resultant coating
F. slurry deposition	aluminium alloys	MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia), or mixtures thereof
	corrosion resistant steel	MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia), or mixtures thereof
	titanium or titanium alloys	carbides or oxides
	refractory metals	fused silicides or fused aluminides
G. sputtering (high rate, reactive or radio frequency only)	carbon-carbon, carbon-ceramic or metal matrix composites	silicides, carbides or mixtures thereof
	superalloys	alloyed silicides, alloyed aluminides noble metal modified aluminides, MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia) platinum or mixtures thereof (including mixtures of the above silicides or aluminides)
	ceramics	silicides, platinum or mixtures thereof
	aluminium alloys	MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia), or mixtures thereof

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1. Coating process	2. Substrate	3. Resultant coating
H. ion implantation	corrosion resistant steels	MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia), or mixtures thereof
	titanium or titanium alloys	borides or nitrides
	carbon-carbon, carbon-ceramic or metal matrix composites	silicides, carbides, mixtures thereof or dielectric layers
	copper or copper alloys	tungsten or dielectric layers
	silicon carbide or cemented tungsten carbide	carbides, tungsten or dielectric layers
	high temperature bearing steels	tantalum or niobium columbium
	beryllium or beryllium alloys	borides
	carbon-carbon, carbon-ceramic or metal matrix	silicides, carbides, mixtures thereof or dielectric layers
	titanium or titanium alloys	borides or nitrides
	silicon nitride or cemented tungsten carbide	nitrides, carbides or dielectric layers
	sensor window materials transparent to electromagnetic waves, as follows: silica, alumina, silicon, germanium, zinc sulphide, zinc selenide or gallium arsenide	dielectric layers

Notes

A. The definitions of processes specified in column 1 of the Table are as follows:

- (a) “Chemical Vapour Deposition” (CVD) is an overlay coating or surface modification coating process wherein a metal, alloy composite or ceramic is deposited upon a heated substrate. Gaseous reactants are reduced or combined in the vicinity of a substrate resulting in the deposition of the desired elemental, alloyed or compounded material on the substrate. Energy for this decomposition or chemical reaction process is provided by the heat of the substrate.

- (1) CVD includes the following processes: out-of-pack, pulsating, controlled nucleation thermal decomposition (CNTD), plasma enhanced or plasma assisted processes.
- (2) “Pack” means a substrate immersed in a powder mixture.
- (3) The gaseous material utilized in an out-of-pack process is produced using the same basic reactions and parameters as the pack cementation process, except that the substrate to be coated is not in contact with the powder mixture.

- (b) “Electron beam physical vapour deposition” (EB PVD) is an overlay coating process conducted in a vacuum chamber, wherein an electron beam is directed onto the surface of a coating material causing vaporization of the material and resulting in condensation of the resultant vapours onto a substrate positioned appropriately, and includes a case where gases are added to the chamber during the processing.
- (c) “Electrophoretic deposition” is a surface modification coating or overlay coating process in which finely divided particles of a coating material suspended in a liquid dielectric medium migrate under the influence of an electrostatic field and are deposited on an electronically conducting substrate.

NB:

Heat treatment of parts after coating materials have been deposited on the substrate, in order to obtain the desired coating, is an essential step in the process.

- (d) “Pack cementation” is a surface modification coating or overlay coating process wherein a substrate is immersed in a powder mixture, a so-called pack, that consists of:
 - (1) the metallic powders that are to be deposited (usually aluminium, chromium, silicon or combinations thereof);
 - (2) an activator (normally a halide salt); and
 - (3) an inert powder, most frequently alumina.

The substrate and powder mixture is contained within a retort which is heated to between 1030 K to 1375 K for sufficient time to deposit the coating.

- (e) “Plasma spraying” is an overlay coating process wherein a gun (spray torch), which produces and controls a plasma, accepts powdered coating materials, melts them and propels them towards a substrate, whereon an integrally bonded coating is formed.

For this purpose

- (1) “High velocity” means more than 750 metres per second.
 - (2) “Low pressure” means less than ambient atmospheric pressure.
- (f) “Slurry deposition” is a surface modification coating or overlay coating process wherein a metallic or ceramic powder with an organic binder is suspended in a liquid and is applied to a substrate by either spraying, dipping or painting; subsequently air or oven dried, and heat treated to obtain the desired coating.
- (g) “Sputtering” is an overlay coating process wherein positively charged ions are accelerated by an electric field towards the surface of a target (coating material). The kinetic energy of the impacting ions is sufficient to cause target surface atoms to be released and deposited on the substrate.

NB:

Triode, magnetron or radio frequency sputtering to increase adhesion of coating and rate of deposition are included.

- (h) “Ion implantation” is a surface modification coating process in which the element to be alloyed is ionized, accelerated through a potential gradient and implanted into the surface region of the substrate. The definition includes processes in which the source of the ions is a plasma surrounding the substrate and processes in which ion implantation is performed simultaneously with electron beam physical vapour deposition or sputtering.
- (i) “Cathodic arc deposition” employs a cathode which is consumable and has an arc discharge established on the surface by a momentary contact of ground trigger. Arc spots form and begin to erode randomly but uniformly the cathode surface creating a highly ionised plasma. The anode can be either a cone attached to the periphery of the cathode through an insulator or the chamber can be used as an anode. Substrates appropriately

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positioned receive deposits from the ionised plasma. Substrate biasing is used for non-line-of-sight deposition. A gas can be introduced in the vicinity of the substrate surface in order to react during deposition to synthesise compound coatings.

B. The definitions of other terms used in the Table are as follows—

- (1) “Coating process” includes coating repair and refurbishing as well as original coating.
- (2) Multiple-stage coatings in which an element or elements are desposited prior to application of the aluminide coating, even if these elements are deposited by another coating process, are included in the term “alloyed aluminide coating”, but the multiple use of single-stage pack cementation processes to achieve alloyed aluminides is not included in the term “alloyed aluminide coating”.
- (3) Multiple-stage coatings in which the noble metal or noble metals are laid down by some other coating process prior to application of the aluminide coating are included in the term “noble metal modified aluminide coating”.
- (4) “Mixtures” consist of infiltrated material, graded compositions, co-deposits and multilayer deposits and are obtained by one or more of the coating processes specified in this table.
- (5) “MCrAlX” refers to an alloy where M equals cobalt, iron, nickel or combinations thereof and X equals hafnium, yttrium, silicon or other minor additions in various proportions and combinations.
- (6) “Aluminium alloys” as a substrate in this Table means alloys usable at temperatures above 500 K (227°C).
- (7) “Corrosion resistant steel” means such steel as complies with AISI (American Iron and Steel Institute) 300 series or equivalent national standard for steels.
- (8) “Refractory metals” as a substrate in this Table means the following metals and their alloys: niobium (columbium), molybdenum, tungsten and tantalum.

There shall be excluded from this entry technology for single-stage pack cementation of solid air foils.

IL1391	Robots, robot controllers and robot end-effectors the following: and specially designed components and specially designed ODMA software therefor—
	Note: for the purposes of this entry specially designed components includes mechanical structures.
	(a) Robots having any of the following characteristics—
	(1) capable of employing feedback information in real-time processing from one or more sensors to generate or modify programmes or to generate or modify numerical programme data
	C

except—

- (1.) robots capable of using only information derived from sensors which can be used to measure—
 - (a) the internal state of the robot, ie, velocity, position (by other than inertial position measuring systems), drive motor current or voltage, fluid or gas pressure or temperature;
 - (b) through-the-arc current (or voltage) for weld seam tracking; or
 - (c) binary or scalar values for:
 - (1) determining the position of the robot relative to a work piece;
 - (2) tool drive motor voltage or current or hydraulic/ pneumatic pressure for determination of force or torque; or
 - (3) external safety functions.
- (2.) robots capable of using only information derived from vision systems having any of the following characteristics—
 - (a) capable of processing no more than 100,000 pixels using an industrial television camera, or no more than 65,536 pixels using a solid-state camera;

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- (b) using a single scene analysis processor having neither a word size of more than 16-bit (excluding parity bits) not parallel processing for the same task;
- (b) Note: Systems with a 16-bit word length and not more than a 32-bit architecture are regarded as 16-bit systems for the purposes of this exception.
- (c) software not capable of full three-dimensional mathematical modelling or full three-dimensional scene analysis;
Note:
Approximation of the third dimension by viewing at a given angle or limited grey scale interpretation for the perception of depth or texture (2½D) is included.
- (d) having no user-accessible programmability other than by input reference images through the system's camera; or
- (e) capable of no more than one scene analysis every 0.1 second.
- (3.) robots capable of using only information derived from end-effectors not specified in head (c) below.

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- (2) specially designed to comply with national safety standards applicable to explosive munitions environments C
- (3) incorporating means of protecting hydraulic lines against externally induced punctures caused by ballistic fragments (e.g. incorporating self-sealing lines) and designed to use hydraulic fluids with flash points higher than 839 K (566°C) C
- (4) specially designed for underwater use such as those incorporating special techniques or components for sealing, pressure compensation or corrosion resistance C
- (5) operable at altitudes exceeding 30,000 metres C
- (6) specially designed for outdoor applications and meeting military specifications therefor C
- (7) specially designed or rated for operating in an electromagnetic pulse (EMP) environment C
- (8) specially designed or rated as radiation-hardened beyond that necessary to withstand normal industrial (other than nuclear industry) ionising radiation C
- (9) equipped with a robot manipulator arms which contain fibrous and filamentary materials specified in entry IL1763 in Group 3I C
- (10) equipped with precision measuring devices C

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specified in entry IL1532
in Group 3F

- (11) specially designed to move autonomously its entire structure through three-dimensional space in a simultaneously co-ordinated manner, except systems in which the robot moves along a fixed path C

Note:

This head (a) does not include robots specially designed for household use or those modified from household robots for preuniversity educational purposes not specified elsewhere in this entry

- (b) (b) Electronic controllers for robots having any of the following characteristics—

- (1) controllers specially designed to be part of a robot specified in sub head (a) (2) to (8), (10) or (11) above C
- (2) minimum programmable increment less (finer) than 0.001 mm per linear axis C
- (3) having more than one integral interface which meets or exceeds ANSI/IEEE standard 488-1978, IEC publication 625-1 or any equivalent standard for parallel data exchange C
- (4) capable of being programmed by means of other than lead-through, key-in (such as without processing, on-line or C

off-line) or teach-pendant techniques

- (5) word size exceeds 16 bit C
(excluding parity bits)

Note: systems with a 16-bit word length and not more than a 32-bit architecture are regarded as 16-bit systems for the purpose of this sub-head.

- (6) incorporating C
interpolation algorithms for an order of interpolation higher than two

- (7) generation or C
modification by one-line, real-time processing of the programmed path, velocity and functions other than the following—

- (i) manual velocity override;
- (ii) linear, rotary or Cartesian offset;
- (iii) manual robot path editing (including manual path compensation) excluding source language used to programme automatically the robot path, velocity or function;
- (iv) branching to pre-programmed modification of robot path, velocity or function;
- (v) fixed cycles (e.g. macro instructions or pre-programmed sub-routines); or
- (vi) keyed-in or teach-in modifications;

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except controllers limited to operations with robots included in any of the exceptions to head (a).

(c) (c) End-effectors having any of the following characteristics—

- (1) having integrated computer-aided data processing, except those using sensors used to measure the parameters or values described in exception 1 to head (a)(1) above. C
- (2) equipped with an integral interface which meets or exceeds ANSI/IEEE Standard 488-1978, IEC publication 625-1, or any equivalent standard for parallel data exchange C
- (3) having any of the characteristics specified in sub-heads (a)(2) to (8) and (10) above C

In this entry—

“robot” means a manipulation mechanism, which may be of the continuous path or of the point-to-point variety, may use sensors, is multifunctional and capable of positioning or orienting material, parts, tools or special devices through variable movements in three dimensional space. It incorporates three or more closed or open loop servo-devices which may include stepping motors; and has user-accessible programmability by means of teach/playback method or by means of an electronic

computer which may be a programmable logic controller, without mechanical intervention. “Robot” does not include the following devices—

- (1) Manipulation mechanisms which are only manually/teleoperator controllable;
- (2) Fixed sequence manipulation mechanisms which are automated moving devices, operating accordingly to mechanically fixed programmed motions, where the programme is mechanically limited by fixed stops, such as pins or cams, and the sequence of motions and the selection of paths or angles are not variable or changeable by mechanical, electronic or electrical means;
- (3) Mechanically controlled variable sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions, where the programme is mechanically limited by fixed, but adjustable stops, such as pins or cams, or the sequence

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- of motions and the selection of paths or angles are variable within the fixed programme pattern, and variations or modifications of the programme pattern (eg, changes of pins or exchanges of cams) in one or more motion axes are accomplished only through mechanical operations;
- (4) Non-servo-controlled variable sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions and the programme is variable but the sequence proceeds only by the binary signal from mechanically fixed electrical binary devices or adjustable stops;
- (5) Stacker cranes which are Cartesian coordinate manipulator systems manufactured as an integral part of a vertical array of storage bins and designed to access the contents of those bins for storage or retrieval; “end-effectors” include grippers, active tooling units being devices for

applying motive power, process energy or sensing to the workpiece and any other tooling that is attached to the baseplate on the end of the robot's manipulator arm(s); "active tooling unit" is a device for applying motive power, process energy or sensing to the workpiece; "sensor" means a detector of a physical phenomenon, the output of which (after conversion into a signal that can be interpreted by a controller) is able to generate programmes or modify programmed instructions or numerical programme data. This includes sensors with machine vision, infrared imaging, acoustical imaging, tactile feel, inertial position measuring, optical or acoustic ranging or force or torque measuring capabilities.

IL1399

Software and technology for automatically controlled industrial systems, to produce assemblies or discrete parts, the following—

- (a) (a) Software with C all the following characteristics—
 - (1) specially designed for automatically controlled industrial systems which include at least eight items of the following equipment in any combination—
 - (a) machine tools or dimensional inspection machines

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- specified in
head (b) of entry
IL1091 in Group
3A or IL1370 in
this Group;
- (b) robots specified
in entry IL1391
in this Group;
- (c) digitally
controlled spin-
forming or
flow-forming
machines
specified in the
entry IL1075 in
Group 3A;
- (d) digitally
controlled
equipment of the
type specified
in entry IL1080,
IL1081, IL1086
or IL1088 in
Group 3A;
- (e) digitally
controlled
electric arc
devices specified
in the entry
IL1206 in Group
3C;
- (f) digitally
controlled
equipment of the
type specified in
the entry IL1354
or IL1355
(head(b)) of this
Group;
- (g) digitally
controlled
equipment of the
type specified in
the entry IL1357
in this Group;
- (h) digitally
controlled
electronic
equipment of the
type specified in

the entry IL1529
in Group 3F;

- (i) any digitally
controlled
measuring
system specified
in entry IL1529
in Group 3F

- (2) integrating, in a
hierarchical manner,
while having access to
data which may be stored
outside the supervisory
digital computer, the
manufacturing processes
with—

- (i) design functions;
or

- (ii) planning and
scheduling
functions;

- (3) (i) automatically
generating and
verifying the
manufacturing
data and
instructions,
including
selection of
equipment and
sequences of
manufacturing
operations,
for the
manufacturing
processes, from
design and
manufacturing
data; or

- (ii) automatically
reconfiguring
the
automatically
controlled
industrial
system through
reselecting
equipment and
sequences of
manufacturing
operation

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by real-time
processing of
data pertaining
to anticipated
but unscheduled
events;

except—
software which only
provides rescheduling
of functionally identical
equipment within flexible
manufacturing units
using prestored part
programmes and a
prestored strategy for the
distribution of the part
programmes; and
software (in machine
executable form only)
for industrial sectors
other than nuclear,
aerospace, shipbuilding,
heavy vehicles,
machine building,
microelectronics and
electronics.

- (b) (b) Technology D
for the design
of automatically
controlled industrial
systems which will
be used with the
software specified
in head (a)
above, whether the
conditions required
by subhead (a)(1)
above are met

In this entry

an “automatically
controlled industrial
system” is a combination
of:

- (1) one or more
flexible
manufacturing
units; and
- (2) a supervisory
digital computer
for coordination
of the independent

sequences
of computer
instructions to,
from and within
the flexible
manufacturing
units;
a “flexible manufacturing
unit” is an entity which
comprises a combination
of a digital computer
including its own main
storage and its own
related equipment and at
least one of the pieces of
equipment referred to in
sub-head (a)(1)(a) to (i)
inclusive in this entry.

GROUP 3E

Transportation equipment

IL1401

Reciprocating diesel engine
development and production
technologies, including
specially designed software,
the following—

- (a) (a) Development D
and production
technology, including
specially designed
software, for
reciprocating diesel
engine ground
vehicle propulsion
systems having all
of the following
characteristics—
 - (1) a box volume of 1.2m³ or
less;
 - (2) an overall power output
of more than 750 kW
based on 80/1269/EEC,
ISO 2534 or national
equivalents;
 - (3) a power density of more
than 700 kW/m³ of box
volume.

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- (b) (b) Development D
and production
technology for solid
or dry film cylinder
wall lubrication
permitting operation
at temperatures in
excess of 723 K
(450°C) measured on
the cylinder wall at
the top limit of travel
of the top ring of the
piston

In this entry the “box volume” means the product of three dimensions at right angles to each other measured in the following way—

Length: the length of the crankshaft from front flange to flywheel face;

Width: the greatest of the following:

- (a) the outside dimension from valve cover to valve cover;
- (b) the dimension of the outside edges of the cylinder heads;
- or
- (c) the diameter of the flywheel housing;

Height: the greater of the following:

- (a) the dimension of the crankshaft centreline to the top plane of the valve cover (or cylinder head) plus 2 times the stroke; or
- (b) the diameter of the flywheel housing.

IL1416

Vessels (including ships and surface-effect vehicles), water-screw propellers and hub assemblies, water-screw propeller systems, moisture and particulate separator

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systems and specially designed components, the following—

- (a) (a) Hydrofoil S, I
vessels with
automatically
controlled foil
systems which are
capable of speeds
of above 40 knots
in rough water (Sea
State Five)
- (b) (b) Surface-effect C
vehicles, namely
hovercraft, air
cushion vehicles
(both sidewall and
skirted varieties)
and all variations
of vehicles using
the wing-in-ground
effect for positive lift
- (c) (c) Small C
waterplane area
twin-hull (SWATH)
vessels having
underwater hulls
whose cross-
sectional area varies
along the longitudinal
axis between points
two major diameters
from the bow and two
major diameters from
the stern
- (d) (d) Ships
and vessels fitted
with any of the
following—
 - (1) equipment specified S, I
in Group 1, in entry
IL1485 in this Group or
in entry IL1501, IL1502
or IL1510 in Group 3F
 - (2) degaussing facilities S, I
or
 - (3) closed ventilation C
systems designed into
the vessel which are
designed to maintain

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air purity and positive pressure regardless of the conditions external to the vessel except where those closed ventilation systems are specially designed for and incorporated in the vessel's medical facilities only

(e) (e) Water-screw propellers and hub assemblies, the following—

(1) supercavitating propellers rated at greater than 10,000 hp C

(2) controllable-pitch propellers and hub assemblies rated at above 40,000 hp capacity C

(f) (f) Water-screw propeller systems, the following—

(1) contrarotating propeller systems rated at greater than 20,000 hp C

(2) ventilated, base-ventilated and super-ventilated propeller systems C

(3) systems employing pre-swirl and post-swirl techniques for smoothing the flow into a propeller so as to improve propulsive efficiency of— C

(i) SWATH vessels, hydrofoil vessels, and surface-effect vehicles, or C

(ii) other vessels whose propeller rotation speed is above 200 rpm, or having propellers with a C

rating exceeding
50,000 hp per shaft

(g) (g) Moisture and C
particulate separator
systems which are
capable of removing
99.9 per cent of
particles larger than
2 micrometers in
diameter with a
maximum pressure
loss of 1.6 kPa
(16 millibar) for gas
turbine engine air
inlets

(gg) (gg) Technology
for moisture and
particulate separator
systems specified in
head (g) above only
the following—

(1) technology for D
preventing water leakage
around the filter stages

(2) technology for D
integrating the
components of such a
system

(h) (h) Specially
designed components
for vessels covered
by heads (a), (b)
and (c) above, the
following—

(1) advanced hull forms
which incorporate any of
the following—

(i) stepped hull for C
hydrofoil vessels

(ii) hulls for air cushion C
vehicles with
trapezoidal platforms

(iii) hulls for surface- C
effect vehicles with
catamaran-like
sidewalls

(iv) hulls for wing-in- C
ground effect vehicles

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- (v) underwater hulls and struts for SWATH vessels C
- (2) fully submerged subcavitating or supercavitating hydrofoils C
- (3) lightweight structural components for SWATH vessels, hydrofoil vessels and surface-effect vehicles, constructed using anisotropic, orthotropic or sandwich construction methods C

In this subhead—

1. “Anisotropic construction methods” means the use of fibre reinforcing members aligned so that the load-carrying ability of the structure can be primarily orientated in the direction of expected stress.
2. “Orthotropic construction methods” means the means of stiffening plates, in which the structural members are at right angles to each other.
3. “Sandwich construction methods” means the use of structural members or plates which are fabricated and permanently affixed in layers to enhance their strength and reduce their weight.

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- (4) flexible skirts, seals and fingers for surface-effect vehicles C
- (5) systems for automatically controlling the stability of SWATH vessels, hydrofoil vessels or surface-effect vehicles C
- (6) power transmission shaft systems which incorporate composite material components, for SWATH vessels, hydrofoil vessels or surface-effect vehicles C
- (7) lightweight, high capacity (K factor greater than 150) gearing (planetary, cross-connect and multiple input/output gears and bearings) for SWATH vessels, hydrofoil vessels and surface-effect vehicles C
- (8) water-cooled electrical propulsion machinery (motor and generator), including AC-AC synchronous and AC-DC systems, sectored-disc and concentric-drum rotors for DC homopolar machines, for SWATH vessels, hydrofoil vessels and surface-effect vehicles C
- (9) superconducting electrical propulsion machinery for SWATH vessels, hydrofoil vessels and surface-effect vehicles C
- (10) lift fans for surface-effect vehicles, rated at greater than 400 hp C
- (11) waterjet propulsor systems rated at 3,000 input hp or greater for C

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- hydrofoil vessels and
surface-effect vehicles
- PL7009 Other vessels (including
ships), the following: and
specially designed components
therefor—
- (a) (a) Vessels having I
special structural
features for landing
personnel and/or
vehicles on a beach
 - (b) (b) Vessels I
capable of supporting
helicopter operations
and maintenance
 - (c) (c) Vessels I
capable of
submerging
 - (d) (d) Vessels not I
elsewhere specified
in this Part of this
Schedule of below
100 tonnes GRT
including inflatable
craft in an inflated
or uninflated state
except light vessels,
fire floats and
dredgers
 - (e) (e) Ships S, L, I
with decks and
platforms specially
strengthened to
receive weapons
- IL1417 Submersible systems including
those incorporated in a
submersible vehicle, the
following: and specially
designed components
therefor—
- (a) (a) Automatically- C
controlled
atmosphere-
regeneration systems
specially designed
or modified for
submersible vehicles
which, in a
single chemical-

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reaction cycle, ensure
carbon dioxide
removal and oxygen
renewal

(b) (b) Systems
specially designed or
modified for the
automated control of
the motion of a
submersible vehicle
using navigation data
and having closed-
loop servo-control(s)
so as to—

(1) enable the vehicle to C
move within ten metres
of a predetermined point
in the water column

(2) maintain the position C
of the vehicle within
ten metres of a
predetermined point in
the water column

or

(3) maintain the position of C
the vehicle within ten
metres while following a
cable on or under the sea
bed

except automated control
systems incorporated in
underwater bulldozers
or trench-cutters not
capable of operating at
depths greater than 100
metres and possessing
only negative buoyancy.

(c) (c) Underwater
vision systems, the
following—

(1) television systems C
(comprising camera,
lights, monitor and
signal transmission
equipment) specially
designed or modified
for remote operation
with a submersible
vehicle, having a

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limiting resolution, when measured in the air, more than 500 lines, using IEEE Standard 208/1960 or any equivalent standard

- (2) systems specially designed or modified for remote operation with a submersible vehicle employing techniques to minimize the effects of back-scatter, such as range-gated illuminators C

except television cameras used merely through a porthole.

- (d) (d) Remotely controlled articulated manipulators specially designed or modified for use with submersible vehicles and having any of the following characteristics—

- (1) systems which control the manipulator using information from sensors which measure force or torque applied to an external object, distance from an external object, or tactile sense between the manipulator and an external object C

except systems where force or torque are only measured and then displayed to the operator.

- (2) controlled by proportional master-slave techniques or by using a dedicated stored-programme computer C

or

- (3) capable of exerting a force of 250 Newtons or more or a torque of 250 Newton-metres or more and using C

titanium based alloys or
fibrous and filamentary
composite materials in
their structural members

(e) (e) Photographic
cameras and
associated equipment
specially designed or
modified for use
underwater, having a
film format of 35
mm or larger, and
capable of any of the
following—

(1) film advancement of C
more than 5 frames per
second

(2) annotating the film with C
data provided by a source
external to the camera

(3) taking more than 250 full C
frame exposures without
changing the film

(4) autofocusing specially C
designed or modified for
use underwater

or

(5) operating at depths of C
more than 1,000 metres

(f) (f) Light systems
specially designed or
modified for use
under water, the
following—

(1) stroboscopic
lights capable
of—

(i) light output energy of C
more than 150 joules
per flash

or

(ii) flash rates of more C
than 5 flashes per
second at a light
output energy of more
than 10 joules per
flash

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- (2) other lights and associated equipment, capable of operating at depths of more than 1,000 metres

C

In this entry “limiting resolution” in television is a measure of resolution usually expressed in terms of the maximum number of lines per picture height discriminated on a test chart.

IL1418

Deep submergence vehicles, manned or unmanned, tethered or untethered, capable of operating at depths exceeding 1,000 metres, and specially designed or modified associated systems, equipment, components and materials therefor, including the following—

C

- (a) (a) pressure housings or pressure hulls;
- (b) propulsion motors and thrusters;
- (c) hull penetrators or connectors.

IL1425

Floating docks, and software and technology therefor, the following—

- (a) Floating docks specially designed for use at remote locations (i.e. without support from shore bases) incorporating all of the following facilities—
 - (1) welding and pipe fitting repair shop(s);
 - (2) electrical and electronic repair shop(s);
 - (3) mechanical repair or metal working machine shop(s)

and containing more C
than 3000 kW (4,000
hp) of electrical power
generation equipment

(b) (b) Floating docks C
specially equipped to
permit the operation,
maintenance or repair
of nuclear reactors

(c) (c) Floating docks
having both the
following
characteristics—

(1) a lifting
capacity of
more than
36,364 tonnes;

(2) larger than
120 metres
in length and
30 metres
in width,
measured
between the
pontoons.

(d) (d) Specially C
designed software
for computer-
controlled pumping
and flooding systems
for the above floating
docks, to permit the
docking of listing
vessels

(e) (e) Technology,
the following—

(1) for that portion of the D
design of a floating dock
specified in head (a)
above which relates to
the incorporation of the
three types of facilities
specified in that head

(2) for design, production D
and use of onboard
floating dock facilities
specified in head (b)
above which permit the
operation, maintenance

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- and repair of nuclear
reactors
- IL1431 Marine gas turbine engines C
(marine propulsion or
shipboard power generation
engines), whether originally
designed as such or adapted
for such use, and specially
designed components therefor
- Note: for the purpose of
this entry “shipboard power
generation” does not include
offshore platform applications.
- IL1460 Aircraft and helicopters,
aero-engines and aircraft
and helicopter equipment,
and technology therefor, the
following—
- (a) (a) Aircraft and C
helicopters, except
those which do not
contain equipment
specified in Group
1 or in the entries
IL1485 or IL1501 in
Groups 3E and 3F
and which are of
types which are in
bona fide normal civil
use
- (b) (b) Technology
for aircraft and
helicopter airframes,
for aircraft
propellers, and for
aircraft and
helicopter airframe,
aircraft-propeller and
helicopter-rotor-
systems components,
and specially
designed ODMA
software therefor, the
following—
- (1) design technology D
using computer-aided
aerodynamic analyses
for integration of the
fuselage, propulsion
system and lifting and

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control surfaces to
optimize aerodynamic
performance throughout
the flight regime of an
aircraft

(2) technology for the design
of active flight control,
the following—

(i) technology for configuration D
design for inter-
connecting multiple
microelectronic
processing elements
(on-board computers)
to achieve high-
speed data transfer
and high-speed data
integration for control
law implementation

(ii) technology for control law D
compensation
for sensor location
and dynamic airframe
loads, namely
compensation for
sensor vibration
environment and for
variation of sensor
location from centre of
gravity

(iii) technology for electronic D
management of
systems redundancy
and data redundancy
for fault detection,
fault tolerance and
fault isolation

except
technology for the design
of physical redundancy in
hydraulic or mechanical
systems or in electrical
wiring.

(iv) technology for design of flight controls D
which permit in-flight
reconfiguration of

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force and moment
controls

- (3) design technology for integration of flight control, navigation and propulsion control data into a flight management system for flight path optimization D
- (4) design technology for protection of avionic and electrical sub-systems against electromagnetic pulse (EMP) and electromagnetic interference (EMI) hazards from sources external to the aircraft, the following—
 - (i) technology for design of shielding systems D
 - (ii) technology for the configuration design of hardened electrical circuits and sub-systems D
 - (iii) technology for determination of hardening criteria for the above D
- (5) technology for the design, production and reconstruction of adhesively bonded airframe structural members designed to withstand operational temperatures in excess of 120°C D

except
airframe structural members for engine nacelles and thrust reversers.
- (6) technology for the design and production of propeller blades constructed wholly or partly of composite D

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materials, and specially
designed hubs therefor

except
technology for the
production of propeller
blade—

- (a) constructed wholly
of wood or glass-
fibre-reinforced
plastics; or
- (b) which are
constructed mainly
of wood or glass-
fibre-reinforced
plastics and which
use other materials
only in the leading
edge or tip.

(7) technology for the D
design and production
of digital electronic
synchrophasers specially
designed for propellers;
technology for the design
of digital electronic
controls for propellers;
and technology for the
production of digital
electronic controls for the
propeller blades and hubs
described in sub-head (b)
(6) above

(8) technology for the design D
and production of active
laminar flow control
lifting surfaces including
design data used to
substantiate the design
approach

(9) technology for the D
development of
helicopter multi-axis
fly-by-light or fly-by-
wire controllers which
combine the functions
of at least two of the
following into one
controlling element

- (i) collective controls;
- (ii) cyclic controls;

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(iii) yaw controls.

- (10) technology for the development of circulation controlled anti-torque or directional control systems for helicopters D

Note: “Circulation-controlled anti-torque and directional control systems” utilise air blown over aerodynamic surfaces to increase or control the forces generated by the surfaces. buried fan-in-fin anti-torque designs fitted or not fitted with guide vanes such as the fenestron are excluded from this subhead.

- (11) technology for the development of helicopter rotor blades incorporating variable geometry airfoils utilizing trailing edge flaps or tabs or pivoted nose droop, which can be controlled in position in flight D

- (12) technology for the development of active control of helicopter blades and other surfaces used to generate aerodynamic forces and moments D

Note: “Active control” (of helicopter blades and other surfaces used to generate aerodynamic forces and moments) functions to prevent undesirable helicopter vibrations, structural loads or helicopter rotor dynamic behaviour by autonomously

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processing outputs from multiple sensors and then providing necessary preventive commands to effect automatic control.

- (c) (c) Helicopter C power transfer systems and technology therefor

except—

- (i) helicopter power transfer systems for use in civil helicopters only, the following—
- (1) those which have been in civil use in civil helicopters for more than eight years;
 - (2) those which do not contain, and were not fabricated utilizing, any of the technologies shown in Table 2 below;
 - (3) those for replacement in or servicing of specific, previously exported helicopters;
- (ii) technological documents resulting from helicopter power transfer system performance and installation design studies; fabrication technology, or overhaul and refurbishing

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technology for
specific helicopter
power transfer
systems in civil use
in civil helicopters
for more than eight
years unless listed
in Table 2 below.

Note: Documents
resulting from
helicopter power
transfer system
performance and
installation design
studies do not
include documents
containing
technology for:
computer-aided
design (CAD);
computer-aided
design/manufacture
(CAD/CAM);
or parametric
performance
analysis, engine
analysis and
selection, or
component
design utilizing
unpublished
technical data.

- (d) (d) Gas C
turbine engines and
auxiliary power units
(APUs) for use in
aircraft or helicopters
and technology
therefor—

except

- (i) those for use in
civil aircraft or civil
helicopters only,
the following—
(1) jet, turboprop
and turboshaft
aircraft
engines in
civil use in
civil aircraft
or civil
helicopters

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- for more than eight years;
 - (2) gas turbine powered aircraft APUs in civil use in bona fide civil aircraft or civil helicopters for more than eight years;
- (ii) technological documents resulting from aircraft performance and installation design studies; fabrication technology, or overhaul and refurbishing technology for specific gas turbine aero-engines or gas turbine powered aircraft APUs in civil use in civil aircraft or civil helicopters for more than twelve years, unless listed in Table 1 below.
Note: Aircraft performance and installation design studies does not include technology for: computer-aided design (CAD); computer-aided design/manufacturing (CAD/CAM); or parametric engine performance analysis, engine cycle analysis and selection, or component aerodynamic design utilizing

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unpublished
technical data.

- (e) (e) Specially designed components for gas turbine engines, APUs and helicopter power transfer systems specified in heads (c) and (d) above, the following—

- (1) embodying technologies C
listed in Tables 1 or 2
below
- (2) hot-section components C
- (3) engine control system C
components
- (4) gas turbine engine C
or APU rotor system
components (including
bearings)

Notes:

1. The period of civil use referred to in heads (c) and (d) above begins with the date that the particular engine or helicopter power transfer system (model and specifications) or its most recent modification was certified as airworthy for commercial service or commercial navigability under the standards and requirements of the government of the country in which it was manufactured: modification does not include minor safety or operational changes which do not significantly enhance the performance of a particular gas turbine aero-engine or improve its reliability. For the purposes of this entry:

- (a) A gas turbine aero-engine which is recertified as the result of incorporating any

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technology listed in Table 1 below is to be treated as a newly certified engine. Recertification which does not result from incorporation of such technology, or modifications which do not require recertification by national authorities, will not affect the period of civil use of the engine;

- (b) Modification of a gas turbine APU by incorporation of any technology listed in Table 1 will cause it to be treated as a new APU. Other modifications will not affect the period of civil use of the APU.
- (c) Modification of a helicopter power transfer system by incorporation of any technology listed in Table 2 will restart the period of civil use for the helicopter power transfer system as though it were newly certified in a helicopter. Other modifications will not affect the period of civil use of the helicopter power transfer system.

2. This entry does not include gas turbine engines, APUs and helicopter power transfer systems for civil use and modifications (and technology therefore) certified or re-certified for civil use, as described in Note 1 prior to the 1st January 1979, other than:

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Helicopters over 4,530 kg empty weight, and power transmissions systems therefor.

Note: Empty weight is understood to include normal installation and normal minimum crew, but does not include fuel or payload.

Aero-engines, the following—

- (i) Piston engines;
- (ii) Jet engines of less than 2,625 kg thrust;
- (iii) Turboprop or turboshaft engines of less than 2,500 horsepower or with a residual thrust of less than 453 kg.

3. Head (d) above does not include those engines which contain none of the technologies listed in Table 1 below for use in civil aircraft or civil helicopters.

Table 1

TECHNOLOGY RELATING TO THE FOLLOWING

I. Materials and manufacturing procedures

Ceramic, ceramic-composite or composite hot-section components (combuster, turbine blades and vanes, seals, discs, flow path)

Turbine blades on basis of directional solidification or monocrystal technology

- directional solidification
- monocrystal technology

Turbine blades consisting of several parts connected by diffusion bonding

Fibre technology in frames or in highly stressed discs, casings, blades and vanes

Protective coating technology for air-cooled turbine blades and vanes with internal and external cooling passages and their related flow paths capable of operating in high gas temperature environments (in excess of 1,499°C), irrespective of the actual gas temperature environment in which they will be used, involving applications of metallic or ceramic material by vapour, pack, plasma, electron beam, sputtering or sintering processes

Metallic coatings

- plasma sprayed
- other

Ceramic Coatings

Application of powder metallurgy for fan compressor and turbine blades or vanes; discs, wheels, reduction gears, engine main shafts and frames

- discs
- fan, compressor and turbine blades or vanes, wheels, reduction gears, engine main shafts and frames

Cooled components on basis of electrostream or laser drilling methods;

- electrostream drilling
- laser drilling

Electron beam drilling for small holes in turbine blades and vanes

Titanium or superalloy—casting on basis of centrifugal techniques

Ceramic core casting technology for casting holes in turbine blades and vanes

II. Construction methods

Adjustable flow path geometry and associated control systems for:

- fans
- gas generator turbine(s)
- fan/power turbine(s)
- propelling nozzles

(Adjustable flow path geometry and associated control systems do not include: inlet guide vanes, variable pitch fans, variable stators or bleed valves for compressors.)

Full authority or hybrid digital electronic control and respective sensor equipment

High temperature (capable of utilizing gases heated above 1,100°C) heat exchangers for preheating compressor exit air

Combustors with combustion in several stages

Maintenance of compressor or turbine tip clearance through methods employing active compensating casing technology:

- compressor alone
- turbine alone
- compressor and turbine

Ceramic bearings

Nozzles with thrust vectoring (not including reverse thrust)

Table 2

TECHNOLOGY RELATING TO THE FOLLOWING

1. Materials and manufacturing procedures

A. Rotor heads, containing:

- Hot-isostatically pressed materials

B. Gear boxes, containing:

- Novikoff-type gears
- Gears or gear support structures based on materials applying directional solidification or monocrystal technology
- High contact-ratio double-helical (arrow-shaped) gears
- Fibre technology
- Hot-isostatically pressed components
- Gear tooth surfaces hardened by vacuum carburizing or ion nitriding

C. Drive shaft systems containing super-critical drive shafts

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II. Construction methods

A. Components fabricated by diffusion bonding

B. High-survivability loss-of-lubrication technology for high-speed bearings (DN equal to or greater than 2.4 million where D is expressed in millimetres and N in rpm)

In this entry—

“civil aircraft” and “civil helicopters” means only those types of civil aircraft and civil helicopters which are listed by designation in published airworthiness certification lists by the civil aviation authorities to fly commercial civil internal and external routes or for legitimate civil, private or business use.

“helicopter power transfer systems” means all those components which transfer power from the engine to the main and tail rotor blade(s).

Note: Aero-engines, APUs or helicopter power transfer systems which have any special feature designed for a military application are specified in the entry ML10 in Group 1.

PL7010 Aircraft and helicopters having L, Z
a maximum all up weight of
680 Kg or more

PL7011 Specially designed components W
for aircraft and helicopters
specified in head (a) of the
entry IL1460 other than
components falling within
a description in Group 1 or
under any other heading in
Group 3 of Part II, of this
Schedule

IL1465 Spacecraft and launch vehicles,
the following—

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- (a) (a) Spacecraft, C
manned or unmanned
(not including their
payloads)

except scientific mission
space probes which do
not contain equipment
specified in head (c)
below or elsewhere in
this Schedule.

- (b) (b) Launch C
vehicles

- (c) (c) Propulsion C
systems, guidance
equipment, attitude
control equipment
and on-board
communications
equipment for remote
control of the
equipment specified
in head (a) or (b)
above

- (d) (d) Specially C
designed components
for the equipment
specified in heads (a),
(b) and (c) above

In this entry “spacecraft”
means active and passive
satellites and space probes.

IL1485

Compasses, gyroscopes,
(gyros), accelerometers
and inertial equipment, the
following: and specially
designed software and
specially designed components
therefor—

- (a) (a) Gyro C
compasses with
provision for
determining and
transmitting ship’s
level reference data
(roll, pitch) in
addition to own ship’s
course data

- (b) (b) Integrated C
flight instrument

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systems which
include
tyrostabilisers or
automatic pilots for
aircraft and specially
designed integration
software therefor

except—

- (1) flight instrument
systems integrated
solely for VOR/
ILS navigation and
approaches, or
- (2) integrated flight
instrument systems
which—
 - (i) have been
in normal
civil use for
more than
two yhears;
and
 - (ii) are standard
equipment
and software
of aircraft
not specified
in the entry
IL1460 in this
Group.

Note:

An “integrated flight
instrument system” is
a primary instrument
display system of
attitude and azimuth
with facilities for giving
manoeuvre guidance
information to the pilot
and often integrated with
an autopilot to the extent
of embodying a common
unit for setting up the
required demands.

- (c) (c) Gyro- C
astro compasses and
other devices which
derive position or
orientation by means
of automatically
tracking celestial
bodies

- (d) (d) Gyro- C
stabilisers used for
other purposes than
aircraft control

except—

- (1) those for stabilising
an entire surface
vessel; or
 - (2) those which have
been in normal civil
use for more than
two years.
- (e) (e) Automatic C
pilots used for
purposes other than
aircraft control and
specially designed
integration software
therefor, except
marine types for
surface vessels
 - (f) (f) Accelerometers C
with a threshold of
0.005 g or less or a
linearity error within
0.25 per cent of full
scale output or both,
which are designed
for use in inertial
navigation systems or
in guidance systems
of all types
 - (g) (g) Gyros with a C
rated free directional
drift rate (rated free
precession) of less
than 0.5 degree (1
Sigma or r.m.s.) per
hour in a 1 g
environment
 - (h) (h) Continuous C
output
accelerometers which
utilize servo or force
balance techniques
and gyros, both
specified to function
at acceleration levels
greater than 100 g

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- (i) (i) Inertial C
or other equipment
using accelerometers
specified in head
(f) or (h) above
or gyros specified
in head (g) or (h)
above, and systems
incorporating such
equipment, and
specially designed
integration software
therefor
- (j) (j) Specially C
designed test,
calibration and
alignment equipment
for goods specified in
heads (a) to (i) above

GROUP 3F

Note: Goods specified in the heads of this Group may also be specified in Group 1 of this Part of this Schedule.

**Electronic equipment
including Communications,
radar, and Scientific
Instruments and apparatus**

PL7004

Electrical or electronic W
equipment, whether or not
separately specified in an entry
in this Schedule, in respect of
which a certificate has been
issued to the knowledge of the
exporter by or on behalf of
the Secretary of State to the
effect that the equipment to
which the certificate relates
meets or has been modified or
designed to meet government
standards concerned with the
limitation of compromising
electromagnetic radiation

IL1501

Navigation, direction
finding, radar and airborne
communication equipment and
technology, the following—

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- (a) Airborne communication equipment having any of the following characteristics, and specially designed components and specially designed ODMA software therefor,
 - (1) designed to operate at frequencies greater than 156 MHz C
 - (2) incorporating facilities for—
 - (i) the rapid selection of more than 200 channels per equipment; or C
 - (ii) equipment using frequency synthesis techniques Cexcept equipment operating in the frequency range of 108 to 137 MHz with 760 channels or fewer at not less than 25 kHz spacing, and which has been in normal civil use for at least one year;
 - (3) rated for continuous operation over a range of ambient temperatures extending from below -55°C to above $+55^{\circ}\text{C}$ C
 - (4) designed for modulating methods employing any form of digital modulation using time and frequency redundancy such as Quantized Frequency Modulation (QFM) C
- except equipment which does not have the characteristics referred to in sub-head (a)(4) above and
- (a) is to equip civil aircraft, or

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- (b) is normal standard equipment incorporated in civil aircraft.
- (b) (b) Navigation and direction finding equipment and technology, the following: and specially designed components and specially designed ODMA software and specialised testing, calibrating and training/simulating equipment therefor—
 - (1) airborne navigation equipment and direction finding equipment and technology, the following—
 - (i) equipment designed C
to make use of
Doppler frequency phenomena, except navigation equipment to be installed in civil aircraft or civil helicopters, and which is normal standard equipment of a type installed in civil aircraft or civil helicopters
 - (ia) technology for D
navigation equipment using Doppler frequency phenomena
 - (ii) equipment utilising C
the constant velocity or the rectilinear propagation characteristics of electro-magnetic waves having frequency less than

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4×10^{14} hz (0.75
microns)

except—

- (a) standard commercial
airborne equipment
needed to equip
civil aircraft or
civil helicopters
or as normal
standard equipment
incorporated in
civil aircraft or
civil helicopters
being exported for
civil commercial
use provided such
equipment is in
conformity with ICAO
standards and assures
no function exceeding
those resulting from
such standards, is
not designed to use
satellite-broadcasted
navigation signals
and is not designed
to make use of
hyperbolic grids at
frequencies greater
than 3 MHz;

Note: Normal
standard
equipment
includes Marker
beacons, ILS,
VOR (OMNI),
Omega, Loran A
and B; or

- (b) Loran C equipment
having all of
the following
characteristics:
 - (a) it has been in normal
civil use for a period
of more than one year;
 - (b) it is standard
commercial
equipment;

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- (1) needed to equip civil aircraft or civil helicopters; or
- (2) incorporated in civil aircraft or civil helicopters;
- (c) it is equivalent in all characteristics and performances to standard equipment of aircraft not specified in entry IL1460 in Group 3E;
- (d) it is in conformity with ICAO standards;
- (e) it is not designed to make use of hyperbolic grids at frequencies higher than 3MHz;
- (f) it does not contain electronic equipment which:
 - (1) can compute the position of the aircraft in one coordinate system when furnished position information in another coordinate system (namely coordinate conversion equipment);
 - (2) is specified in entry IL1565 in Group 3G and
 - (3) has been in normal civil use for a period of less than one year or
- (c) direction finding equipment specially designed for search and rescue purposes and operating at a frequency of 121.5 MHz or 243 MHz, and personal locator beacons operating in

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this form (which may also have an additional channel selectable for voice mode only);

(iii) radio altimeters, the following—

(a) pulse modulated C

(b) frequency modulated C
having a displayed electrical output accuracy better than ± 0.914 m over the range between 0 and 30.4 m or better than $\pm 3\%$ above 30.4 m

except standard commercial airborne equipment needed to equip civil aircraft or civil helicopters or as normal standard equipment incorporated in civil aircraft or civil helicopters being exported for civil commercial use, provided such equipment is equivalent in all characteristics and performance to standard equipment of aircraft not specified in entry IL1460 in group 3E, and in which are frequency-modulated radio altimeters which have been in normal civil use for a period of more than one year;

(c) frequency modulated C
which have been in normal civil use for less than one year

(iiia) Technology for radio altimeters referred to in sub-head (b)(1)(ii) (b) above even when D

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excluded from that
sub-head

(iv) direction finding C
equipment operating
at frequencies greater
than 5MHz

(v) equipment rated for C
continuous operation
over a range of
ambient temperatures
extending from below
−55°C to above +55°C

(2) Ground and marine C
equipment for use with
airborne navigation
equipment utilising the
constant velocity or the
rectilinear propagation
characteristics of
electromagnetic waves
having a frequency less
than 4×10^{14} Hz (0.75
micron)

except—

ground and
marine equipment
for use with
airborne navigation
equipment using
the constant
velocity or
rectilinear
propagation
characteristics of
electromagnetic
waves having a
frequency less
than 5×10^{14} Hz
(wavelength 0.75
micrometre),
provided, in the
case of ground
equipment, it is
for use at civil
airports or for civil
use in association
with civil airborne
equipment, and—

(1) is in conformity
with ICAO

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standards and
assures no function
exceeding those
resulting from such
standards;

- (2) is not designed
to make use of
hyperbolic grids at
frequencies greater
than 3 MHz;

- (3) ground and marine C
direction finding
equipment operating at
frequencies greater than
30 MHz

except—
equipment, other
than single side band
equipment, operating at
frequencies up to 157
MHz and employing a
loop system or a system
employing a number
of spaced vertical
aerials uniformly
disposed around the
circumference of a circle,
excluding electronically
communicated types;

- (4) timing receivers C
whose only function is
automatically providing
time derived from
satellite signals to
within 1 millisecond of
Universal Coordinate
time (UCT) or better

- (5) ground or marine C
navigation and geodetic
positioning systems
designed for use with
satellite-provided timing
positioning or navigation
information

except—
equipment which can
only be used with
TRANSIT satellite
systems or other systems
not also specified

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elsewhere in this Schedule, and which is also specified in sub-head (b)(4) above. These shall be excluded from sub-heads (b)(4) and (5) global positioning satellite receivers which have all of the following characteristics:

- (1) capable only of processing the L1 channel (also called the standard Positioning Service (SPS) channel);
 - (2) capable of only the Short-Term Code (Coarse Acquisition Code (C/A) code) with short term generation cycle;
 - (3) no decryption capabilities;
 - (4) including no cesium beam standards; and
 - (5) including no null steerable antennae
- (c) (c) Radar equipment and specially designed components, specialised testing, calibrating and training/simulating equipment and specially designed software therefor, the following—

- (1) airborne radar equipment C
except—
airborne civil weather-radar conforming to international standards for civil weather radar provided it does not include any of the following characteristics—

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- (a) phased array antennae;
 - (b) frequency agility;
 - (c) spread spectrum; or
 - (d) any signal processing specially designed for tracking of vehicles.
- (2) ground and marine radar equipment, the following—
 - (i) equipment operating at a frequency not in normal civil use or at a frequency of more than 10.5 GHz C
 - (ii) equipment operating at a frequency of less than 1.5 GHz and having a peak output power from the transmitter greater than 2.5 MW; or operating at a frequency within the range of 1.5 to 3.5 GHz and having a peak output power from the transmitter greater than 1.5 MW; or operating at a frequency within the range of 3.5 to 6 GHz and having a peak output power from the transmitter greater than 1 MW; or operating at a frequency within the range of 6 to 10 GHz and having a peak output power from the transmitter greater than 500 kW C
 - (iii) equipment operating at a frequency of less than 3.5 GHz and having an 80 per cent or better probability of detection for a C

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10 sq.m. target at a free space range of 250 nautical miles; or operating at a frequency within the range of 3.5 to 10.5 GHz and having an 80 per cent or better probability of detection for 10 sq.m. target at a free space range of 100 nautical miles

- (iv) equipment utilising other than pulse modulation with a constant or staggered pulse repetition frequency, in which the carrier frequency of the transmitted signal is not changed deliberately between groups of pulses, from pulse to pulse, or within a single pulse; C

except commercial civil airport radar using a carrier frequency that may change from - pulse to pulse between two fixed frequencies separated in time and in frequency by constant magnitudes

- (v) equipment utilising a Doppler technique for any purposes other than M.T.I. systems using a conventional double or triple pulse delay line cancellation technique C

- (vi) equipment including any digital signal processing techniques used for automatic target tracking, or having a facility for electronic tracking C

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(vii) equipment including C
signal processing
techniques (other than
those specified in sub
head (c)(2)(vi) above,
which have been in
normal civil use for a
period of less than two
years)

(viii) equipment ground C
radar, having been in
commercial use for a
period of less than one
year

There shall be excluded
from head (c), secondary
radar equipment specially
designed for civil air
traffic identification and
control purposes.

The following shall be
excluded from this entry—

- (a) equipment assemblies for
civil marine automatic
radar plotting aids
or electronic relative
motion analyzers
designed to achieve the
requirements published
by the International
Maritime Organization
in accordance with the
Safety of Life at Sea
(SOLAS) conventions,
provided the designed
tracking speeds do not
exceed relative values of
greater than 150 knots
(77.1 metres/second);
- (b) ground radar of the hand-
held and automobile-
mounted type used for
vehicle speed monitoring
by police authorities
and operating in the
frequency band 10.5 to
10.55 GHz;

In this entry the terms “civil
aircraft” and “civil helicopters”
include only those types

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	of civil aircraft and civil helicopters which are listed by designation in published airworthiness certification lists by any civil aviation authority to fly commercial civil internal and external routes or for normal civil, private or business use.	
IL1502	<p>Communication, detection or tracking equipment of a kind using ultra-violet radiation, infrared radiation or ultrasonic waves, and specially designed components and specially designed software therefor except—</p> <p>ultrasonic devices which operate in contact with a controlled material to be inspected, or which are used for industrial cleaning, sorting or materials handling, industrial and civilian intrusion alarm, traffic and industrial movement control and counting systems, medical applications, emulsification, homogenisation, or simple educational or entertainment devices;</p> <p>For the purpose of this exception— “simple educational devices” are devices designed for use in teaching basic scientific principles and demonstrating the operation of those principles in educational institutions. underwater ultrasonic communications equipment designed for operation with amplitude modulation and having a communications range of</p>	C

500 m or less (Sea State 1), a carrier frequency of 40 to 60 kHz and a carrier power supplied to the transducer of 1 W or less;
the following equipment—

- (a) industrial equipment employing cells not specified in the entry IL1548;
- (b) industrial and civilian intrusion alarm, traffic and industrial movement control and counting systems;
- (c) medical equipment;
- (d) industrial and civilian intrusion alarm, traffic and industrial movement control and counting systems;
- (e) simple educational or entertainment devices which employ photo cells;
- (f) flame detectors for industrial furnaces;
- (g) equipment for non-contact temperature measurement for laboratory or industrial purposes utilising a single detector cell with no scanning of the detector
- (h) instruments capable of measuring radiated power or energy having a response time constant exceeding 10 ms;
- (i) equipment designed for measuring radiated power

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- or energy for
laboratory,
agricultural or
industrial purposes
using a single
detector cell with
no scanning of
the detector cell
assemblies or
probes specially
designed therefor
having a response
time constant
exceeding 1
microsecond;
 - (j) infrared geodetic
equipment,
provided that
equipment uses
a lighting source
other than a laser
and is manually
operated or uses
a lighting source
(other than a laser
or a light emitting
diode) remote from
the measuring
equipment;
- the following
equipment—
- (a) infrared thermal
imaging equipment
having all
the following
characteristics:
 - (1) the detector
is a single
element;
 - (2) the detector
is neither
a charge
coupled
device
(CCD) nor
an integrate-
while-scan
device;
 - (3) the detector is
either:
 - (i) not
cooled;
 - or

- (ii) cooled by using a liquid nitrogen Dewar vessel; and
- (4) the equipment is:
 - (i) non-ruggedised, medical equipment; or
 - (ii) has both of the following:
 - (a) a resolution not exceeding 22,500 resolvable elements; and
 - (b) a Noise Equivalent Temperature Difference (NETD) (or temperature sensitivity) of no less than 0.1°C;
- (b) infrared viewing equipment having all the following characteristics:
 - (1) the detector is a pyroelectric vidicon without reticle;
 - (2) the equipment is designed for fire fighting and buried body detection; and
 - (3) the optimal sensitivity

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is in the
wavelength
range from
8 to 14
micrometers

Note:

This entry includes infra red or ultra-violet sensing devices not specified in Group 1 of this Schedule and which contain image intensifiers specified in entry IL1555 in this Group.

IL1510

Marine or terrestrial acoustic or ultrasonic systems or equipment specially designed for positioning surface vessels or underwater vehicles, or for detecting or locating underwater or subterranean objects or features and specially designed components of such systems or equipment, including but not limited to hydrophones, transducers, beacons, towed hydrophone arrays, beamformers and geophones and specially designed software therefor

C

except—

Marine systems or equipment, the following—

(A) active (transmitting, or transmitting and receiving) systems or equipment, including but not limited to depth sounders and fish-finders and their associated beamformers, the following:

(1) depth sounders used solely for measuring the depth of water or the

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- distance of
submerged or
buried objects
vertically
below the
apparatus;
- (2) horizontally-
operated
object
detection
or location
systems
having all of
the following
characteristics:
 - (a) transmitting
frequency
of 15
kHz or
greater;
 - (b) sound
pressure
level
less than
250 dB
(reference
1
micropascal
at 1
metre)
for
equipment
with
operating
frequency
between
15 and
30 kHz,
with no
decibel
limitation
for
equipment
operating
at
frequencies
of 30
kHz or
higher;
 - (c) transmission
capability
limited
to ± 10

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- per cent
of the
design
centre
frequency;
 - (d) not
designed
to
withstand
pressure
during
normal
operation
at
depths
greater
than
1,000
metres;
 - (e) displaying
a range
of 5,000
metres
or less;
 - (3) electronic
noise sources
for vertically
directional
use only, or
mechanical
(eg air gun
or vapour-
shock gun)
or chemical
noise sources;
 - (4) acoustic
systems or
equipment for
positioning
surface
vessels or
underwater
vehicles,
provided that:
 - (a) their
control
capability
is
limited
to
release
and
basic

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- (b) transponder capabilities;
they are not capable of processing responses from more than four beacons in the calculation of a single point, and have neither devices nor software for correcting automatically velocity-of-propagation errors for point calculation, nor any coherent signal processing means;
- (c) they are capable only of operating within a range of less than 1,000 metres or, if capable of operating beyond

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- the
range
of more
than
1,000
metres,
are not
capable
of
achieving
positional
accuracy
of better
(less)
than 20
metres
when
measured
at a
range of
1,000
metres;
- (d) transducers,
acoustic
modules
or
hydrophones
therefor
are not
designed
to
withstand
pressure
during
normal
operation
at
depths
greater
than
1,000
metres;
and
- (e) beacons
therefor
are not
designed
to
withstand
pressure
during
normal
operation

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at
depths
greater
than
1,000
metres,
do not
have
oscillators
with a
stability
greater
than
 10^{-5}
over
periods
of 24
hours,
and do
not use
complex
codes or
beamformers
which
have
shaded
or
formed
beams;

- (B) passive (receiving,
whether or not
related in normal
application to
separate active
equipment)
acoustic
hydrophones or
transducers having
all of the following
characteristics:
- (1) independently
mounted or
configured
and not
reasonably
capable of
assembly
by the user
into a towed
hydrophone
array;
 - (2) incorporating
sensitive

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- elements
made of
piezoelectric
ceramics or
crystal:
- (a) with a
sensitivity
no
better
than
−180
dB
(reference
1 volt
per
micropascal)
when
not
designed
for
operation
at
depths
of more
than
100 m
and not
acceleration
compensated;
- (b) with a
sensitivity
no
better
than
−192
dB
(reference
1 volt
per
micropascal)
when
not
designed
for
operation
at
depths
of more
than
100 m;
- (c) with a
sensitivity
no

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better
than
−204
dB
(reference
1 volt
per
micropascal)
when
not
designed
for
operation
at
depths
of more
than
1000 m.

Terrestrial systems
or equipment having
both the following
characteristics—

- (a) not reasonably
capable of
conversion
by the user to
underwater or
marine applications
specified in this
entry;
- (b) not employing
geophones or
other transducers
specified in this
entry.

Moving Coil or moving
magnet electromagnetic
geophones.

IL1514

Pulse modulators capable of C
providing electric impulses
of peak power exceeding
20 MW or of a duration of
less than 0.1 microsecond, or
with a duty cycle in excess of
0.005; and pulse transformer,
pulse-forming equipment or
delay lines being specially
designed components for such
modulators

IL1516

Receivers, the following:
and specially designed
components, accessories and

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specially designed software
therefor—

- (a) (a) Panoramic C
radio receivers
(which search or
scan automatically
a part of the
electromagnetic
spectrum and indicate
or identify the
received signals)
except ancillary
equipment for
commercial receivers
with which the
frequency searched
does not exceed a
bandwidth of 20
MHz or does not
incorporate a raster
or storage display
capability
- (b) (b) Digitally- C
controlled radio
receivers, whether
or not computer
controlled, which
search or scan
automatically a
part of the
electromagnetic
spectrum, in which
the switching
operation takes less
than 10 milliseconds,
and which indicate or
identify the received
signals, except non-
ruggedized, digitally-
controlled pre-set
type radio receivers
designed for use in
civil communications
which have 200
selective channels or
fewer
- (c) (c) Receivers
for spread spectrum
and frequency agile
systems having a
total transmitted

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bandwidth which
is—

(1) 100 or more
items greater
than the
bandwidth
of any one
information
channel; and

(2) in excess of 50 kHz C

(d) (d) Receivers C
which incorporate
digital signal
processing

except receivers
specially designed for
internationally allocated
civil frequency bands
only and where digital
signal-processing circuits
are not user accessible
programmable.

In this entry—

“spread spectrum”
means as the technique
whereby energy in a
relatively narrow-band
communication channel
is spread over a much
wider energy spectrum
under the control of
a random or pseudo-
random bit stream. On
receipt, the signal is
correlated with the same
bit stream to achieve
the reverse process of
reducing the bandwidth
to its original form.
By allocating different
bit streams to different
subscribers transmitting
simultaneously,
significantly greater use
can be made of available
bandwidth.
“Frequency agility” (or
“frequency hopping”)
is a system in which
the transmission

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frequency of a single communication channel is made to change by discrete steps under the control of a similar bit stream.

IL1517

Radio transmitters, the following: and specially designed components therefor—

- (a) (a) Transmitters C
or transmitter-amplifiers designed to operate at output frequencies greater than 960 MHz
- (b) (b) Transmitters
or transmitter-amplifiers designed to provide any of the following features—
 - (1) any system of pulse modulation (this does not include amplitude, frequency- or phase-modulated televisions or telegraphic transmitters or pulse-width modulated sound broadcasting transmitters)— C
 - (2) rated for operation over a range of ambient temperatures extending from below -40°C to above $+60^{\circ}\text{C}$ C
- (c) (c) Transmitters for spread spectrum and frequency agile systems having a total transmitted bandwidth which is—
 - (1) 100 or more times greater than the bandwidth of any one information channel; and

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(2) in excess of 50
kHz;

There shall be excluded
from this entry transmitters
or transmitter-amplifiers,
or systems containing such
equipment, accessories and
sub-assemblies therefor,
with any of the following
characteristics—

- (a) specially designed for
medical applications
and operating at ISM
frequencies;
- (b) having an output power
of not more than 10
W, which are specially
designed for—
 - (1) industrial or civil
intrusion detection
and alarm;
 - (2) industrial and
traffic detection,
counting, speed
measurement,
identification and
movement control;
 - (3) carrying
information from
equipment within
paragraph (a) or (b)
(1) or (b)(2) to this
exception or the
information from
environmental, air
or water pollution
detection or
measurement
systems.
- (c) transmitters using
wideband amplifiers
designed for non-
frequency agile civil
applications.

For the purposes of this
entry “spread spectrum”
and “frequency agile”
are as defined in entry
IL1516 above.

PL7003

Burst transmitters and
associated receiving equipment

W

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(except simple on-line morse or other data signal convertors or standard items of ADP equipment) and specialised assemblies, sub-assemblies and components therefor

In this entry a “burst transmitter” is any electronic equipment or device for use with radio or other communications systems, whether part of a transmitter or modulation device or ancillary to it, which has a capability to accept and store data (telegraphic, speech or other) and to transmit these at transmission speeds/bit rates which are multiples of the input keying speed/bit rates, the purpose or effect of which is to reduce total message duration time and thus to evade detection by other than the intended recipient.

IL1518

Telemetry and telecontrol equipment suitable for use with aircraft (piloted or pilotless), space vehicles or weapons (guided or unguided), and specially designed test equipment therefor

C

except equipment specially designed to be used for remote control of toys such as model planes and boats and having electric field strength of not more than 200 microvolts per metre at a distance of 500 metres.

IL1519

Telecommunication transmission equipment and measuring and test equipment, the following: and specially designed components and specifically designed software therefor—

- (a) Telecommunication transmission equipment employing digital techniques (including

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the digital processing
of analogue signals)
and having at least
one of the following
characteristics—

(1) designed for a total
digital transfer
rate which, at the
highest multiplex
level, exceeds—

(a) 45 million bits/s C
(including when
designed for
underwater use); or

(b) 8.5 million bit/s for C
stored programme
controlled digital
crossconnection
equipment

Note:

In the case of—

(a) line terminating
equipment;

(b) intermediate
amplifier
equipment;

(c) repeater
equipment;

(d) regenerator
equipment; or

(e) translation
encoders
(transcoders);
“90 million bit/s”
shall be substituted
for “45 million bit/
s” in heading (a)(1)
(a) above.

(2) designed for a data
signalling rate which
exceeds—

(a) 1,200 bit/s when: C

(i) employing an
automatic error
detection and
correction system; and

(ii) retransmission is
not required for
correction;

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- (b) 9,600 bit/s when using the bandwidth of one voice channel or C
- (c) 64,000 bit/s when using baseband C
- (b) (b) Electronic measuring or test equipment specially designed for the equipment specified in the sub-head (a)(1) above C

except—

- (a) telemetering, telecommand and telesignalling equipment designed for industrial purposes, and data transmission equipment not intended for the transmission of written or printed text;
- (b) facsimile equipment other than the equipment specified in entry IL1527 in this Group;
- (c) equipment employing exclusively the direct current transmission technique.

In this entry—

“bandwidth of one voice channel”—

in the case of data communication equipment designed to operate in one voice channel of 3,100 Hz, has the same meaning as in CCITT Recommendation G.151;

“data signalling rate”—

as defined in ITU Recommendation 53–56, taking into account that, for non-binary modulation

“baud” and “bit per second” are not equal. Bits for coding, checking and synchronisation functions are to be included;

“telecommunication transmission equipment” means one or more of the following items of equipment:

- (a)
 - (1) line terminating equipment;
 - (2) intermediate amplifier equipment;
 - (3) repeater equipment;
 - (4) regenerator equipment;
 - (5) translation encoders (transcoders);
 - (6) multiplex equipment;
 - (7) modulators/demodulators (modems);
 - (8) transmultiplex equipment (see CCITT Rec. G701);
 - (9) stored programme controlled digital crossconnection equipment;
- (b) which is designed for use in single or multi-channel communication via:
 - (1) wire (line);
 - (2) coaxial cable;
 - (3) optical fibre cable; or
 - (4) radio.

IL1520

Radio relay communication equipment, specially designed test equipment and specially

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designed software, the following and specially designed components and accessories therefor—

- (a) (a) Radio C relay communication equipment designed for use at frequencies exceeding 960MHz excluding technology excluded from head (c) below

except—

- (i) microwave radio links for fixed civil installations operating at fixed frequencies not exceeding 19.7 GHz, employing analogue transmission with a capacity of up to 2,700 voice channels of 3 kHz each or of a television channel of 6 MHz maximum nominal bandwidth and associated sound channels;
- (ii) microwave radio links for fixed civil installations operating at fixed frequencies not exceeding 19.7 GHz, employing digital transmission techniques designed for operation at a total bit rate not exceeding 8.5 million bit/s;
- (iii) ground communication radio equipment for use with temporarily fixed services operated

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- by the civilian
authorities and
designed to be used
at fixed frequencies
not exceeding 15
GHz with a power
output of not more
than 5 W;
- (iv) TV-receive-
only (TVRO)
stations for satellite
reception specially
designed for use at
fixed frequencies
meeting ITU
standards in civil
television or sound
radio systems
in the following
frequency ranges—

(1) S- band:	2.5– 2.69 GHz
(2) C- band:	3.4–4.2 GHz
	4.5–4.8 GHz
(3) Ku- and Ka- band:	10.7– 12.75 GHz

- (v) equipment specially
designed for the
transmission of
television signals
- (1) between camera
and studio or
between studio
and television
transmitter; and
- (2) not exceeding a
line-of-site distance
with respect to any
one installation;
- (vi) equipment specially
designed to be
installed and
operated in
communication

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satellite earth
stations using—

- (1) INTELSAT;
 - (2) MARISAT;
 - (3) EUTELSAT; or
 - (4) INMARSAT;
- (b) (b) Stand-alone C
radio transmission
media simulators/
channel estimators
and specially
designed software
therefor, specially
designed for testing
equipment specified
in head (a) above,
except those in which
the adjustments are
only made manually
- (c) (c) Technology D
for equipment
specified in head
(a) above, employing
quadrature
amplitude-
modulation, (QAM)
techniques

except—
technology for
installation, operation or
maintenance.

- (d) (d) Technology D
for equipment
specified in the
exception (vi) to head
(a) above

except—
technology for
installation, operation or
maintenance.

There shall be excluded from
this entry—

equipment for civil
television transmission or
for general commercial
traffic or technology
for the installation,
maintenance, and
operation thereof,
provided—

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- (a) the equipment is not designed for operation at a total bit rate exceeding 45 million bits/s; and
- (b) the equipment does not employ quadrature-amplitude-modulation (QAM) techniques;

equipment for civil industrial use including telephone channels for the operation of such networks and the engineering service circuits required for the maintenance of telecommunication links or technology for the installation, maintenance and operation thereof, provided that—

- (a) microwave radio links employing analogue transmission techniques have a capacity not exceeding 2,700 voice channels of 4 kHz each;
- (b) microwave radio links employing digital transmission techniques operate at a frequency not exceeding 19.7 GHz and are designed to operate at a total digital bit rate not exceeding 45 million bit/s; and
- (c) the equipment does not employ quadrature-amplitude-modulation (QAM) techniques.

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PL7008 Tropospheric scatter L, I
communication equipment
using analogue or digital
modulation techniques

IL1521 Solid-state amplifiers the
following: and specially
designed components and
accessories therefor—

(a) (a) Amplifiers C
exceeding a
maximum output
power of 2 kW at
operating frequencies
between 10 and 35
MHz inclusive

(b) (b) Amplifiers C
exceeding a
maximum output
power of 50 W at
operating frequencies
between 35 and 400
MHz

(c) (c) Amplifiers C
where the product of
the maximum output
power times the
maximum operating
frequency is more
than 2×10^{10} WHz at
operating frequencies
above 400 MHz

except solid state amplifiers
which—

are specially designed
for community television
distribution systems; or
have a bandwidth of 10
MHz or less.

In this entry “bandwidth”
means the range of frequencies
over which the power
amplification does not drop
to less than one half of its
maximum value.

IL1522 Lasers and equipment
containing lasers, the
following—

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- (a) (a) Lasers, and C
specially designed
components therefor,
including
amplification stages

except, save when
specially designed for
equipment specified
in head (b) below, the
following—

- (i) argon, krypton or
non-tunable dye
lasers having one of
the following sets
of characteristics—
 - (1) an output
wavelength
between
0.2 to 0.8
micrometre, a
pulsed output
energy not
exceeding
0.5 joule per
pulse and an
average or
continuous
wave
maximum
rated single-
or multi-mode
output power
not exceeding
20W; or
 - (2) an output
wavelength
between
0.8 and 1.0
micrometre, a
pulsed output
energy not
exceeding
0.25 joule per
pulse and an
average or
continuous
wave
maximum
rated single-
or multi-mode
output power

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- not exceeding
10 watts;
- (ii) helium-cadmium,
nitrogen and
multigas lasers
not elsewhere
specified in this
head with both
of the following
characteristics—
 - (1) an output
wavelength
shorter
than 0.8
micrometre;
 - (2) a pulsed
output not
exceeding
0.5 joule per
pulse and an
average or
continuous-
wave
maximum
rated single-
or multi-mode
output power
not exceeding
120 watt;
- (iii) helium-neon
lasers with an
output wavelength
shorter than 0.8
micrometre;
- (iv) ruby-lasers
with both of
the following
characteristics—
 - (1) an output
wavelength
shorter
than 0.8
micrometre;
 - (2) an energy
output not
exceeding
20 joules per
pulse;
- (v) CO₂, CO or
CO/CO₂ lasers
having either of
the following
characteristics—

- (1) an output wavelength in the range of 9 to 11 micrometres and a pulsed output energy not exceeding 2 joules per pulse and a maximum rated average single- or multi-mode output power not exceeding 1.2 kW or a continuous-wave maximum rated single- or multi-mode output power not exceeding 5.0 kW; or
 - (2) an output wavelength in the range of 5 to 7 micrometres and having a continuous-wave maximum rated single- or multi-mode output power not exceeding 50 watts;
- (vi) Nd:YAG lasers having an output wavelength of 1.064 micrometres with any of the following characteristics—
 - (1) a pulsed output not exceeding 0.5 joule per pulse and maximum rated average

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- single- or multi-mode output power not exceeding 10 watts or a continuous-wave maximum rated single- or multi-mode output power not exceeding 50 watts;
- (2) a pulsed output not exceeding 10 joules per pulse with a pulse width not less than 50 microseconds and a maximum rated average single- or multi-mode output power not exceeding 50 watts;
- (3) a pulsed output not exceeding 1.5 joules per pulse, a maximum rated average single- or multi-mode output power not exceeding 25 W, and used for pumping tunable pulsed dye lasers specified in (ix) below;
- (vii) Nd:Glass lasers with both of the following characteristics—

- (1) an output wavelength in the range of 1.05 to 1.06 micrometres; and
 - (2) a pulsed output not exceeding 2 joules per pulse;
- (viii) tunable CW dye lasers, with both of the following characteristics—
 - (1) an output wavelength shorter than 0.8 micrometre; and
 - (2) an output not exceeding an average or continuous-wave maximum rated single- or multi-mode output power of 1 W;
- (ix) tunable pulsed lasers (for argon and krypton lasers, see exception (i) to head (a) above), including dye, having all of the following characteristics—
 - (1) an output wavelength between 0.15 and 0.8 micrometre;
 - (2) a pulse duration not exceeding 100 nanoseconds;
 - (3) a pulsed output energy not exceeding

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- 0.5 jule per pulse; and
- (4) an average power not exceeding 10 watts;
- (x) single-element semiconductor lasers with a wavelength shorter than 1 micrometre designed for, and used in, equipment excluded by paragraph (xiii), (xiv), (xix) or (xx) to head (b) below;
- (xi) semiconductor lasers having—
 - (1) an output wavelength no longer than 1,000 nm; and
 - (2) a continuous wave (CW) output power not exceeding 100 mW;
- (xii) uncooled, unsegmented mirrors with glass or dielectric substrates for use as end reflectors for laser resonators;
- (b) (b) Equipment C containing lasers, and specially designed components therefor

except the following equipment containing lasers of the types excluded from head (a) above—

- (i) specially designed for industrial and civilian intrusion detection and alarm systems;

- (ii) specially designed for medical applications;
- (iii) equipment for educational and laboratory purposes;
- (iv) specially designed for traffic and industrial movement control and counting systems;
- (v) specially designed for detection of environmental pollution;
- (vi) optical spectrometers and densitometers;
- (vii) equipment containing continuous-wave helium-neon gas lasers (but see head (c) below);
- (viii) textile-cutting and textile-bonding equipment;
- (ix) paper-cutting equipment;
- (x) equipment containing lasers for drilling diamond dies for the wire drawing industry;
- (xi) electronic scanning equipment with auxiliary electronic screening unit specially designed for printing processes, including such equipment when used for the production of colour separations;
- (xii) laser-radar (lidar) equipment specially designed for surveying or

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- meteorological observation;
- (xiii) consumer-type reproducers for video and audio discs, employing non-erasable media;
- (xiv) price scanners (point of sale);
- (xv) equipment designed for surveying purposes, provided there is no capability of measuring range;
- (xvi) equipment specially designed for the marking of components;
- (xvii) specially designed gravure (printing plate) manufacturing equipment;
- (xviii) equipment specially designed for visual entertainment purposes (laser light shows) provided it has no holographic capability;
- (xix) electronic printers, including those capable of being used with digital computers, which have a capacity not exceeding 2,000 lines (30 pages) per minute or 300 characters per second;
- (xx) electronic copiers, including those capable of being used with digital computers, which have a capacity not exceeding 30 pages per minute and which do not

include any of the following—

- (1) Optical Character Recognition (OCR) equipment which is not excepted from control by exception (h)(2)(iv)(k) of the entry IL1565 in Group 3G;
- (2) digitising equipment which is not excepted from control by exception (h)(2)(iv)(b) in the entry IL1565 in Group 3G;
- (3) image enhancement capability;

(c) (c) Measuring C systems which have both of the following characteristics

- (i) contain a laser; and
- (ii) maintain for at least 48 hours, over a temperature range of $\pm 10\text{K}$ around a standard temperature and at a standard pressure—
 - (1) a resolution over their full scale of ± 0.1 micrometre or better; and
 - (2) an accuracy of ± 1 part per million or better;

(d) (d) Particle C measuring systems employing helium-neon lasers, designed

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for measuring
particle size and
concentration in
gases, which have
both of the following
characteristics—

- (i) capable of measuring
particle sizes of 0.3
micrometre or less; and
- (ii) capable of characterising
Class 10 clean air or
better.

In this entry—

“tunable” refers to the
ability of a laser to
produce an output at any
wavelength within its
tuning range. A line-
selectable laser which
can operate only on
discrete wavelengths is
not tunable.

the term “specially
designed components”
includes active and
passive components in
semi-fabricated forms
as well as in fabricated
forms;

a “laser” is an assembly
of components designed
to produce a coherent
light which is amplified
by stimulated emission of
radiation;

“equipment containing
lasers” means that
the equipment uses
coherent light for a
certain application.

IL1526

Optical fibres, optical
cables and other cables and
components and accessories,
the following—

- (a) (a) Unarmoured C
or single-armoured
ocean cable having
an attenuation of
1.62 dB/km (3.0 kB
per nautical mile) or

less, measured at a frequency of 600 kHz

(b) (b) Optical-fibre communication cable or optical fibres therefor, having any of the following characteristics—

(1) the optical fibre is C
designed for single mode light propagation

(2) the optical fibre—
(i) is designed for multimode light propagation; and

(ii) has an attenuation of C
less than 1.0 dB/km at a wavelength of 1300 nm

(3) the optical fibre is C
capable of withstanding a proof test tensile strength of 1.1×10^9 N/m² or more

(4) the optical fibre is C
specially designed for underwater use or

(5) the optical fibre is C
specially designed to be insensitive to nuclear radiation

(c) (c) Optical fibres for sensing purposes, having any of the following characteristics—

(1) specially fabricated C
either compositionally or structurally, or modified by coating to be acoustically, thermally, inertially, electromagnetically or nuclear radiation sensitive

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- (2) modified structurally
or by coating to have
either—
- (i) a beat length
of more than
50 cm (low
birefringence),
except if
designed for
operation at
wavelengths of
less than 650
nm; or
 - (ii) a beat length of less than 5 cm (high
birefringence) C
 - (d) (d) Secure C
communication
cable, being either
coaxial or
multiconductor
communication cable
protected by
mechanical or
electrical means from
physical damage
or intrusion in
such a manner
that communications
security is maintained
between terminals
without the necessity
for encryption
- except cable which is
armoured only by either
a tough outer sheath or
by an electromagnetic
screen
- (e) (e) Components C
and accessories
specially designed for
the optical fibres or
cable specified in
this entry including
fibre-optic bulkhead
or hull penetration
connectors
impervious to
leakage at any depth
for use in ships

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or vessels, and
multiport fibre-optic
couplers (including
T, star, bidirectional
and wavelength
division multiplexing
and demultiplexing
couplers)

except connectors for
use with optical fibres or
cable with a repeatable
coupling loss of 0.5 dB
or more.

In this entry—

“beat length” means the
distance, over which two
orthogonally polarised
signals, initially in phase,
must pass in order to
achieve 2 Pi radian(s)
phase difference;

“proof test” consists
of on-line or off-line
production screen testing
that dynamically applies
a prescribed tensile
stress over a 0.5 to 3
m length of fibre at a
running rate of 2 to 5 m/
s while passing between
capstans approximately
15 cm in diameter. The
ambient temperature
is a nominal 20°C and
relative humidity 40%

IL1527

Cryptographic equipment C
designed to ensure secrecy
of communications (such
as telegraphy, telephony,
facsimile, video, and data
communications) or of
stored information; and
specially designed components
therefor, and software
controlling or computers
performing the functions of
such cryptographic equipment

except simple cryptographic
devices or equipment
ensuring only the privacy

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of communications, the following—

- (a) equipment for voice transmission making use of fixed frequency inversions of fixed band scrambling techniques in which the transposition changes occur not more frequently than once every 10 seconds;
- (b) standard civil facsimile and video equipment designed to ensure the privacy of communications by an analogue transmission using non-standard practices for intended receivers only (video system equipment effecting the transposition of analogue data);
- (c) video systems for pay television and similar restricted audience television, including industrial and commercial television equipment using other than standard commercial sweep systems.

Note 1. This entry includes video systems which, for secrecy purposes, use digital techniques (conversion of an analogue, ie video or facsimile signal into a digital signal).

Note 2. Digital computers and digital differential analysers (incremental computers) designed or modified for, or combined with, any cypher machines, cryptographic equipment devices or techniques including software, microprogramme control (firmware).

IL1529

Electronic equipment and instruments for testing, measuring (e.g. time interval measurement), calibrating or counting, or for microprocessor/microcomputer development, the following: and specially designed software therefor—

(a) Equipment, the following—

(1) equipment designed as reference frequency standards for laboratory use and having either of the following characteristics—

(i) a long-term drift (ageing) over 24 hours or more of 1 part in 10^{10} or better

or

(ii) a short-term drift (stability) over a period from 1 to 100 seconds of 1 part in 10^{12} or better

(2) equipment containing frequency standards having any of the following characteristics—

(i) designed for mobile use and having a long-term drift (ageing) over 24 hours or more of 1 part in 10^9 or better

(ii) designed for fixed ground use and having a long term drift (ageing) over 24 hours or more of 5 parts in 10^{10} or better or

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- (iii) a short-term drift (stability) over a period from 1 to 100 seconds of 1 part in 10^{12} or better C
- (b) (b) Instruments, the following—
- (1) instruments designed for use at frequencies exceeding 18 GHz C
- (2) comb frequency generators designed and rated for use at frequencies exceeding 12.5 GHz C
- (3) instruments designed for use at frequencies exceeding 1 GHz, the following—
- (i) swept-frequency network analyzers for the automatic measurement of complex equivalent circuit parameters over a range of frequencies C
- (ii) specially calibrated microwave instrumentation receivers capable of measuring amplitude and phase simultaneously C
- (iii) automatic frequency (heterodyne) converters and transfer oscillators C
- (iv) instruments in which the functions can be controlled by the injection of digitally-coded electrical signals from an external source C
- (4) instruments having both of the following characteristics— C

- (i) user-accessible programmability, and
 - (ii) a user-alterable programme and data storage of more than 65,536 bit
- except either of the following types—
- (1) instruments where the user-accessible programmability is limited to—
 - (a) the replacement of fixed storage devices (e.g. ROMs) which are not specified in this Schedule; or
 - (b) the selection of pre-programmed functions from a menu;or
 - (2) instruments which—
 - (a) have been designed for nonstrategic use and by nature of design, software microprogramme control, specialised logic control (hardware) or performance are substantially restricted to the particular application for which they have been designed; and
 - (b) are not specified elsewhere in this entry.
- (5) test instruments with user-accessible programmability and having any of the following characteristics—

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- (i) specially designed to examine or compare one or more binary coded streams of electrical signals C
 - (ii) a maximum sampling rate of more than 100 MHz C
 - (iii) a maximum of more than 32 channels excluding a maximum of 6 qualifier channels C
 - (iv) a figure of merit of more than 400 C
 - (v) a capability of state coupled timing analysis (ie synchronized mode state/timing analysis) C
 - (vi) a total acquisition memory for word storage exceeding 32,768 bit with an acquisition memory for bit storage per channel exceeding 1,024 bit; C
- or
- (vii) a total acquisition memory for word storage exceeding 16,384 bit with an acquisition memory for bit storage per channel exceeding 2,024 bit C
- except—
- (a) logic probes, logic pulsers, digital current tracers (current sniffers), signature analysers and other digital circuit testers for observing single events or providing stimuli at single test points;

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- (b) logic clips and logic comparators;
 - (c) digital word generators capable of operating at a maximum clock rate of 2 MHz or less with word lengths of 8 bit or less;
 - (6) microprocessor or microcomputer development instruments or systems, capable of developing software for, or capable of, programming microcircuits specified in the entry IL 1564 in this Group C
- except—
- microprocessor or microcomputer development instruments or systems which can be used to develop software for, or to programme, a family of microprocessor microcomputer microcircuits not designed or produced in a country listed in Schedule 2 provided that—
 - (a) the instruments or systems can be used only for microprocessor or microcomputer microcircuits having an operand (data) word length of less than or equal to 8 bit and not having an arithmetic logic unit (ALU) wider than 8 bit; and

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(b) the family contains at least one microprocessor or microcomputer microcircuit and which is not specified in the entry IL 1564 in this Group.

(c) (c) Digital counters, the following—

(1) those capable of counting successive input signals with less than 5 nanoseconds time difference without prescaling (digital division) of the input signal C

Note: for counters or timers having a time interval measurement mode see also head (d) below

(2) those employing prescaling of the input signal, in which the prescaler is capable of resolving successive input signals with less than 1 nanosecond time difference C

(3) those capable of measuring burst frequencies exceeding 100 MHz for a burst duration of less than 5 milliseconds C

(d) (d) Time interval measuring equipment employing digital techniques, capable of measuring time intervals of less than 5 nanoseconds on a single shot basis C

(e) (e) Testing equipment rated to C

maintain specified
operating data when
operating over a
range of ambient
temperatures from
below -25°C to
above $+55^{\circ}\text{C}$

(f) (f) Digital
voltage measuring
apparatus, with or
without electrical
outputs, irrespective
of the physical units
in which calibrated,
with a reading
speed (from zero
to the measured
value) faster than
25 accesses per
second and having
any of the following
characteristics—

(1) a digital resolution at C
all points on the scale
greater than one part in
200,000

(2) an accuracy, measured C
without reference to an
external standard, better
than 1 part in 50,000
(0.002%) of reading over
an ambient temperature
range of $\pm 5^{\circ}\text{C}$ or more,
or a stability better than
 10^{-6} of reading over a
period of 24 hours or
more

(3) capable of more than C
500 independent
measurements per second

except—

(a) visual quantization
apparatus capable
of providing an
average value,
displayed or not,
of the results of the
measurement;

(b) multichannel
analyzers of

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- all types used
in nuclear
experimentation;
- (c) industrial
telemeasuring
devices in which
a pre-set storage
value is used
as a basis for
measuring.
- (g) (g) Transient C
recorders, utilizing
analogue-to-digital
conversion
techniques, capable
of storing transients
by sequentially
sampling single input
signals at successive
intervals of less than
50 nanoseconds

In this entry—

a “family” means a group
of microprocessor or
microcomputer microcircuits
which have:

- (a) the same architecture;
- (b) the same basic
instruction set; and
- (c) the same basic
technology (e.g. only
NMOS or only CMOS);

“figure of merit” means the
product of the maximum
sampling rate in MHz and
the number of input channels
excluding qualifier channels;

“manufacturer” means the
individual or organisation
designing the instrument
for the intended application
(in contrast to an individual
or organisation merely
programming an instrument at,
or in accordance with, a user’s
request);

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“comb frequency generators” means devices which generate a spectrum of harmonics;

“swept-frequency network analyzers” means the automatic measurement of equivalent circuit parameters over a range of frequencies. This involves swept-frequency measurement techniques but not CW point-to-point measurements;

“amplitude and phase receivers” means instruments capable of measuring the amplitude of a microwave signal or the amplitude of two microwave signals and the relative phase between them. (The principal application of these instruments is the measurement of near and far zone phase and amplitude antenna patterns. They can also be used for measurement of microwave device and components characteristics. In general, they are more sophisticated and sensitive (better than -100 dBm) than phase and impedance measuring instruments such as RF vector impedance meters and vector voltmeters. They also feature wide dynamic range (80 dB) and very good linearity (approximately ± 0.25 kB).);

“frequency (heterodyne) converters” means instruments which down convert an unknown frequency by mixing with an accurately known frequency. The accurately known frequency is developed by multiplication of a crystal-derived reference which is passed through a harmonic generator. By mixing the appropriate harmonic and

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the unknown frequencies,
an accurate third frequency
results;

“transfer oscillators” means
instruments which can be
based on the property of
harmonic mixing. Differences
exist in that a local oscillator
is utilized whereas a crystal-
derived reference frequency
is utilized in the case of
heterodyne converters. The
unknown frequency is mixed
with the local oscillator (LO)
and the two are phase-locked
by tuning the LO. The LO can
then be measured by a counter;

“user-accessible
programmability” means
the facility allowing a user
to insert, modify or replace
programmes by means other
than:

- (a) a physical change
in wiring or
interconnections; or
- (b) the setting of function
controls including entry
of parameters;

“burst frequency
measurement” counters contain
special gating circuits which
start only when the input signal
is present and stop counting at
the completion of the burst;

“pulse frequency profiling”
means the capability of
measuring the changes of
frequency (or phase) within
a pulse as a function of time;
such changes in frequency
would be present in a
transmitted pulse-compression
radar pulse (“chirp radar”).
This profiling may be achieved
by internal or external gating.
Pulse frequency profiling
does not include frequency

IL1531

modulation tolerance while it is being frequency modulated.

Frequency synthesizers and equipment containing such frequency synthesizers, and specially designed components and accessories therefor, the following—

(a) (a) Frequency C synthesizers containing frequency standards specified in head (a) in the entry IL 1529 in this Group or temperature-compensated crystal oscillators specified in head (c) to the entry IL 1587 in Group 3G

(b) (b) Instrument frequency synthesizers and synthesized signal generators, and specially designed components and accessories therefor, designed for ground use, producing output frequencies whose accuracy and short and long-term stability are controlled by, derived from, or disciplined by the input frequency or internal master standard frequency, and having any of the following characteristics—

(1) a maximum synthesized C output frequency of more than 550 MHz

(2) any of the following noise characteristics—

(i) a single sideband C (SSB) phase noise

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better than -120 dBc/Hz when measured at a 20 kHz offset from the carrier frequency

- (ii) a single sideband (SSB) phase noise better than -106 dBc/Hz when measured at a 100 Hz offset from the carrier frequency C

- (iii) an integrated phase noise better than -60 dBc/Hz referred to a 30 kHz band centred on the carrier and excluding this 1 Hz band centred on this carrier or C

- (iv) an integrated AM phase noise better than -70 dB/Hz referred to a 30 kHz band centred on the carrier and excluding the 1 Hz band centred on this carrier C

except—

synthesized signal generators specified in sub-heads (b)(1) or (b)(2)(i) above having a maximum synthesized output frequency of 1,400 MHz or a single sideband phase noise of not less than -136 dBc/Hz when measured at an offset of 20 kHz from a carrier frequency of 100 MHz, provided the technology supplied is the minimum necessary for the use of such generators.

- (3) electrically programmable in C

frequency (in that the output frequency can be controlled or selected by the injection of digitally coded electrical signals from an external control source) with a frequency switching time of less than 10 milliseconds

- (4) electrically C
programmable in phase
(in that the phase of the output frequency can be varied relative to the internal or external reference standard, or selected in accordance with an externally supplied code or signal with a switching speed from one selected phase value to another of less than 10 milliseconds)
except equipment incorporating pre-emphasis networks for frequency modulation
- (5) having a level of spurious components in the output, measured relative to the selected output frequency better than;
 - (i) -60 dB harmonic; or C
 - (ii) -92 dB non-harmonic C
- (6) having more than C
three different selected synthesized output frequencies available simultaneously from one or more outputs
- (7) with facilities for pulse C
modulation of the output frequency
 - (c) (c) Airborne
communication
equipment using
frequency
synthesizers, the
following: and

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specially designed
components and
accessories
therefor—

- (1) equipment designed to receive or transmit frequencies greater than 156 MHz C
- (2) equipment incorporating facilities for the rapid selection of more than 200 channels per equipment, except equipment operating in the frequency range of 108 to 137 MHz incorporating facilities for the rapid selection of 760 channels or fewer at not less than 25 kHz channel spacing, which have been in normal civil use for at least one year C
- (3) equipment with a frequency switching time of less than 10 milliseconds C
- (4) frequency synthesizers, designed for airborne communication equipment, whether supplied separately or with the said equipment, exceeding any of the parameters referred to in head (b) above C
 - (d) Digitally-controlled radio receivers, whether or not computer-controlled, which search or scan automatically a part of the electromagnetic spectrum, using frequency synthesizers, the following and specially designed

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components and
accessories
therefor—

- (1) digitally-controlled receivers in which the switching operation takes less than 10 milliseconds, (except non-ruggedized digitally-controlled preset type radio receivers designed for use in civil communications, which have 200 selective channels or fewer) C

- (2) frequency synthesizers designed for digitally controlled radio receivers whether supplied separately or with the said receiver, exceeding any of the parameters in head (b) above C

except those specially designed for receivers excepted from sub-head (d)(1) above or those specially designed for use in tuners for entertainment type receivers.

- (e) (e) Radio transmitters incorporating transmitter drive units, exciters and master oscillators using frequency synthesis, the following: and specially designed components and accessories therefor—

- (1) those having an output frequency of up to 32 MHz with a frequency resolution of better than 10 Hz and with a frequency switching C

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time of less than 10
milliseconds

- (2) those having an output frequency from 32 MHz to 235 MHz with a frequency resolution of better than 250 Hz and with a frequency switching time of less than 10 milliseconds C
- (3) those having an output frequency of more than 235 MHz C

except—

- (i) television broadcasting transmitters having an output frequency from 470 MHz to 960 MHz with a frequency resolution of not better than 1 kHz and where the manually-operated frequency synthesizer incorporated in or driving the transmitter has an output frequency not greater than 120 MHz;
- (ii) FM and AM ground communication equipment for use in the land mobile service and operating in the 420 to 470 MHz band, with a power output of 50 W or less for mobile units and 300 W or less for fixed units, with a frequency resolution of not better than 6.25 kHz and with a frequency

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- switching time
of more than 50
milliseconds;
- (iii) portable (personal)
or mobile
radiotelephones for
civil use, eg for use
with commercial
civil cellular
radiocommunications
systems having all
of the following
characteristics—
 - (a) operating in
the 420 to 960
MHz range;
 - (b) a power
output of 25
W or less; and
 - (c) a frequency
switching
time of 10 ms
or more.
- (4) those having more than C
three different selected
synthesized output
frequencies available
simultaneously from one
or more outputs
- (5) those with facilities for C
pulse modulation of
the output frequency of
the transmitter or of the
incorporated frequency
synthesizer
- (6) those frequency C
synthesizers designed
for the above equipment,
whether supplied
separately or with
the said equipment,
exceeding any of the
parameters referred to in
head (b) above

There shall be excluded from
this entry—

equipment in which the output
frequency is produced by
the addition or subtraction of
two or more crystal oscillator

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frequencies which may be followed by multiplication of the result.

In this entry—

“frequency synthesiser” means any kind of frequency source or signal generator, regardless of the actual technique used, providing a multiplicity of simultaneous or alternative output frequencies, from one or more outputs, controlled by, derived from or disciplined by a lesser number of standard (or master) frequencies;

“frequency switching time” means the maximum time (ie delay), when switched from one selected output frequency to another selected output frequency, to reach:

- (a) a frequency within 100 Hz of the final frequency; or
- (b) an output level within 1.0 dB of the final output level.

PL7013

Transceivers having an output frequency of up to 32 MHz and using frequency synthesis with a frequency resolution of 10 Hz or better X

In this entry “transceiver” means equipment which comprises a radio transmitter and a radio receiver and which uses part or all of the same circuitry in both transmit and receive modes.

IL1532

Precision linear and angular measuring systems, the following: and specifically designed components and specially designed ODMA software therefor—

- (a) Contact-type systems and linear voltage differential

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transformers (LVDT)
therefor, the following—

- (1) contact type measuring systems having all of the following characteristics— C

- (i) range equal to or less than 5 mm;
- (ii) linearity equal to or better than ± 0.1 per cent; and;
- (iii) drift equal to or less than 0.1 per cent per day at a standard ambient test room temperature ± 1 K;

- (2) linear voltage differential transformers with no compensation networks and having either of the following characteristics—

- (i) range equal to or less than 5 mm C

or

- (ii) linearity equal to or better than ± 0.2 per cent C

- (b) (b) Linear measuring machines having all of the following characteristics— C

- (1) two or more axes;
- (2) range in any axis greater than 200 mm;
- (3) accuracy (including any compensation) better than ± 0.0008 mm per any 300 mm segment of travel;

except optical comparators.

- (c) (c) Angular measuring systems having an accuracy equal to or better than ± 1 second of arc C

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except optical instrument, such as autocollimators, using collimated light to detect angular displacements of a mirror

(d) (d) Non-contact type measuring systems having, at a standard ambient test room temperature $\pm 1\text{K}$, either of the following pairs of characteristics—

(1) effective probe measurement diameter less than 0.5 mm and drift less than 0.5 per cent per day C

or

(2) linearity better than ± 0.3 per cent and drift less than 0.5 per cent per day C

(e) (e) Contact type measuring systems specially designed for combined, simultaneous linear-angular inspection of hemishells, having both the following characteristics— C

(1) linear accuracy equal to or better than ± 0.005 mm in any 5 mm; and

(2) angular accuracy equal to or better than ± 1 minute in any 90° of arc.

In this entry—

“accuracy” means the maximum deviation, positive or negative, of an indicated value from an accepted standard or true value;

“linearity” means the maximum deviation of the actual characteristics (average of upscale and

downscale readings),
positive or negative,
from a straight line
so positioned as to
equalise and minimise
the maximum deviations.

IL1533

Signal analysers (including
spectrum analysers),
having any of the following
characteristics: and specially
designed components,
accessories and specially
designed ODMA software
therefor—

- (a) (a) Non- C
programmable and
capable of operating
at frequencies over
12.5 GHz
- (b) (b) Programmable C
and capable of
operating at
frequencies over 1
GHz
- (c) (c) Having a C
display bandwidth in
excess of 125 MHz
- (d) (d) Including a C
scanning preselector
for analyzing
frequencies of more
than 1 GHz
- (e) (e) Incorporating C
a tracking signal
generator for
analyzing
frequencies of more
than 1 GHz
- (f) (f) Radio C
frequency analysis
having an overall
display dynamic
range of better than
80 dB
- (g) (g) Employing C
time compression of
the input signal

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- (h) (h) Employing C
fast fourier
Transform
techniques

except

- (1) optical spectrum
analysers;
- (2) instruments
specified only in
head (c) above
provided that
the instruments
are not capable
of operating at
frequencies over 2
GHz.

IL1534

Flatbed microdensitometers
(except cathode-ray types),
having any of the following
characteristics: and specially
designed components
therefor—

- (a) (a) A recording C
or scanning rate
exceeding 5,000 data
points per second
- (b) (b) A figure of C
merit better (less)
than 0.1, defined
as the product of
the density resolution
(expressed in density
units) and the spatial
resolution (expressed
in micrometres)

except equipment with
a spatial resolution
not better (less) than
2 micrometres and a
density resolution not
better (less) than 0.01
density unit

- (c) (c) An optical C
density range greater
than 0 to 4

Note: Density resolution
expressed in density units
is measured over the

IL1537

optical density range of the instrument.

Microwave (including millimetric wave) equipment, including parametric amplifiers capable of operating at frequencies over 1 GHz the following: (other than microwave equipment specified in the entries IL1501, IL1517, IL1520 and IL1529 in this Group)—

- (a) (a) Rigid and C flexible waveguides designed for use at frequencies in excess of 18 GHz
- (b) (b) Waveguides C having a bandwidth ratio greater than 1.7:1
- (c) (c) Waveguide components, the following—
 - (1) directional couplers C having a bandwidth ratio greater than 1.7:1 and directivity over the band of 20 dB or more
 - (2) rotary joints capable of C transmitting more than one isolated channel or having a bandwidth greater than 5 per cent of the centre mean frequency, except those used in air traffic control equipment carrying combinations of frequencies suitable for secondary surveillance radar antennae co-mounted on a primary radar antenna and which do not have a bandwidth exceeding 5 per cent of the centre mean frequency

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- (3) magnetic, including C
gyro-magnetic,
waveguide components
- (4) diode waveguide C
components using diodes
specified in the entry
IL1544 in this Group
- (d) (d) Transverse
electromagnetic
mode (TEM) devices
the following—
 - (1) those using magnetic, C
including gyro-magnetic,
properties;
or
 - (2) those using diodes C
specified in the entry
IL1544 in this Group
- (e) (e) Transmit C
Receive (TR) and
anti-TR) tubes and
specially designed
components therefor,
except those designed
for use in waveguides
and which are in
normal civil use
for ground marine
radar and having
any of the following
characteristics—
 - (i) they operate at a peak
power not exceeding 3
MW and at a frequency
of 1.5 GHz or less;
 - (ii) they operate at a peak
power not exceeding 1.2
MW and at a frequency
over the range of 1.5 to 6
GHz;
 - (iii) they operate at a peak
power not exceeding 300
kW and at a frequency
over the range of 6 GHz
to 10.5 GHz.
- (f) (f) Assemblies C
and sub-assemblies in
which the isolating

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base material
functions as a
dielectric (as used in
stripline, microstrip,
or slotline) except
for those items
specifically designed
for use in civil
television systems to
meet ITU standards
and using as an
isolating material
paper base phenolics,
glass cloth melamine,
glass cloth epoxy
resin, polyethylene
terephthalate or other
isolating material
with an operating
temperature not
exceeding 150°C

- (g) (g) Phased array C
antennae and sub-
assemblies, designed
to permit electronic
control of beam
shaping and pointing
and specially
designed components
therefor including
but not limited
to duplexers, phase
shifters and
associated high-
speed diode switches

except—
duplexers and phase
shifters specifically
designed for use in civil
television systems or
in other civil radar or
communication systems
not specified elsewhere
in this Schedule.

- (h) (h) Other C
antennae specially
designed for
operation at
frequencies above
30 GHz having a
diameter of less than

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1 metre, and specially designed components therefor

- (i) (i) Microwave C assemblies and sub-assemblies capable of being used at frequencies above 3 GHz and having circuits fabricated by the same processes used in integrated circuit technology, which include active circuit elements

- (j) (j) Microwave C assemblies and sub-assemblies which contain band-pass or band-stop filters and are capable of operating at 3 GHz or greater

except microwave assemblies, sub-assemblies or amplifiers or combinations therefor and technology for the use thereof, having all of the following characteristics—

- (a) fixed tuned at the time of manufacture to operate only within the ITU satellite broadcasting band from 11.7 to 12.5 GHz;
- (b) not capable of being retuned to a new frequency band by the user; and
- (c) specially designed for use with, or in, civil television receivers

- (k) (k) Amplifiers C except—

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- (1) parametric or paramagnetic amplifiers having any of the following characteristics—
 - (i) they are specially designed for medical applications;
 - (ii) they are specially for use in simple educational devices and operate at industrial, scientific or medical (ISM) frequencies; or
 - (iii) they have an output power of not more than 10 W and are specially designed for:
 - (a) industrial or civilian intrusion detection and alarm systems;
 - (b) traffic or industrial movement control and counting systems;
 - (c) environmental pollution air or water detection systems;
- (8) microwave assemblies, sub-assemblies or amplifiers or combinations therefor, having all of the following characteristics and technology for the use thereof—
 - (a) fixed tuned at the time of manufacture to operate only within the ITU satellite broadcasting band from 11.7 to 12.5 GHz;

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- (b) not capable of being returned to a new frequency band by the user; and
- (c) specially designed for use with, or in, civil television receivers;
- (d) simple educational devices
- (l) (l) Modulators C using PIN (positive-intrinsic-negative) transistor technology

In this entry “simple educational devices” are devices designed for use in teaching basic scientific principles and demonstrating the operation of those principles in educational institutions.

IL1541

Cathode-ray tubes having any of the following characteristics—

- (a) (a) A resolving C power of 32 lines per mm or more, using the shrinking raster method of measurement
- (b) (b) With travelling C wave or distributed deflection structure using delay lines, or incorporating other techniques to minimise mismatch of fast phenomena signals to the deflection structure, except when using segmented plate (sectioned Y-plate) structure
- (c) (c) Incorporating C microchannel-plate electron multipliers;

- except—
cathode-ray tubes having
all of the following
characteristics—
- (i) the microchannel
plate electron
multipliers have
a hole pitch of 25
micrometres or
more;
 - (ii) the tubes are not
ruggedised for
military use;
 - (iii) the tubes have a
horizontal sweep
slower than 200 ns/
cm; and
 - (iv) the electron gun is
mounted parallel to
the screen surface.
- (d) (d) Technology D
for the design
or production of
microchannel
electron multipliers
specified in head (c)
above

IL1542

Cold cathode tubes and
switches, the following—

- (a) (a) Triggered C
spark-gaps, having an
anode delay time of
15 microseconds or
less and rated for
a peak current of
3,000 A or more;
specially designed
parts therefor, and
equipment
incorporating such
devices except cold
cathode relay tubes or
decade counter tubes
- (b) (b) Cold cathode C
tubes (other than
ignitrons) whether
gas-filled or not,
operating in a
manner similar to a
spark gap, containing
three or more

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electrodes and having
all the following
characteristics—

- (1) rated for an anode peak voltage of 2,500 volts or more;
- (2) rated for peak currents of 100A or more;
- (3) having an anode delay time of 10 microseconds or less; and
- (4) having an envelope diameter of less than 25.4 mm.

In this entry “triggered spark-gaps” are tubes with a structure consisting of two opposed anodes with shapes resembling flattened hemispheres, and with one or more triggering probes placed approximately in the centre of one anode. The structure is sealed and contains a mixture of gases, principally nitrogen, under less than atmospheric pressure.

IL1544

Semiconductor diodes, the following: and dice and wafers therefor—

- (a) (a) Semiconductor C diodes, designed or rated for use at input or output frequencies exceeding 12.5 GHz
- (b) (b) Mixer C and detector diodes designed or rated for use at input or output frequencies greater than 3 GHz

except—

- (i) point contact diodes designed or rated for use at input or output frequencies of 12.5 GHz or less;
- (ii) Schottky diodes designed or rated

for mixed use at
input or output
frequencies of less
than 12.5 GHz
and having a noise
figure of more than
6.5 dB;

- (iii) Schottky diodes
designed or rated
for detector use
at input or output
frequencies of less
than 12.5 GHz and
having a minimum
rated tangential
sensitivity of
either worse than
−45 dBm under
unbiased conditions
or worse than −50
dBm under biased
conditions.

- (c) (c) Oscillator
and amplifier devices
such as Gunn, Impatt,
Trapatt, TED and
LSA, including those
used for the direct
conversion of dc to
rf power, designed
or rated for use at
either—

- (1) output frequencies above C
1 GHz but not exceeding
4 GHz with a peak power
more than 2 W or a
maximum CW power
more than 200 mW

or

- (2) output frequencies above C
4 GHz but not exceeding
12.5 GHz with a peak
power more than 1 W or
a maximum CW power
more than 100 mW

- (d) (d) Voltage C
variable capacitance
diodes designed or
rated for use at input

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or output frequencies
greater than 1.6 GHz

(e) (e) Fast
recovery diodes, the
following—

(1) having a rated maximum C
reverse recovery time of
less than 1 nanosecond

(2) having both a rated C
forward rectified current
over 5 A and a rated
maximum reverse
recovery time of less than
20 nanoseconds

(f) (f) PIN diodes C
designed or rated for
use at input or output
frequencies above 1.7
GHz, with a peak
power of greater than
5 W or a maximum
CW power of greater
than 500 mW

There shall be excluded from
this entry semiconductor
diodes based upon germanium,
selenium or copper oxide

IL1545

Transistors, the following and
dice and wafers therefor—

(a) Transistors based upon
silicon and having
any of the following
characteristics—

(1) an operating frequency C
exceeding 1.5 GHz

(2) an operating frequency C
not exceeding 1.5 MHz
and a maximum collector
dissipation of more than
300 W

(3) an operating frequency C
exceeding 1.5 MHz and
a maximum collector
dissipation of more than
250 W

(4) an operating frequency C
exceeding 200 MHz and
a product of operating

frequency (in GHz) times
the maximum collector
dissipation (in watts) of
more than 10; or

- (5) being majority carrier- C
type transistors,
including but not
limited to junction
field-effect transistors
(FETs) and metal-oxide
semiconductor transistors
(MOS)

except field-effect
transistors having
any of the following
characteristics—

- (a) a maximum power
dissipation of no
more than 6 W
and an operating
frequency not
exceeding 1.0 GHz;
(b) a maximum power
dissipation of no
more than 1 W
and an operating
frequency not
exceeding 2.0 GHz;
(c) designed for
audio frequency
applications
(b) (b) Transistors
based upon gallium
arsenide and having
any of the following
characteristics—

- (1) an operating frequency C
exceeding 1 GHz

- (2) a maximum power C
dissipation of more than
1 W; or

- (3) a noise figure of less than C
3 dB

- (bb) (bb) Technology D
unique to transistors
based upon gallium
arsenide

- (c) (c) Transistors C
based upon any

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semiconductor
material other than
germanium, silicon
or gallium arsenide

In this entry—

“maximum collector
dissipation” is the
continuous dissipation
measured under the
optimum cooling
conditions specified by
the manufacture;
“operating frequency”
is the frequency used
in measuring any of the
following:

- (a) output power;
- (b) power gain (G_{pE} ,
 G_{pB} , G_{pC} , G_{pS} , or
 G_{pD});
- (c) gain bandwidth
product (f_T); or
- (d) noise figure

IL1547

Thyristors, the following: and
dice and wafers therefor—

- (a) (a) Designed C
for use in pulse
modulators having a
rated turn-on time
of less than 1
microsecond where
the rated peak current
exceeds 150 A
- (b) (b) Having a rated C
turn-off time of less
than 1 microsecond
- (c) (c) Having a C
rated turn-off time of
from 1 microsecond
to less than 2.3
microseconds, except
those having a rated
peak current of 50
A or less and
encapsulated in non-
hermetically sealed
packages
- (d) (d) Having a C
rated turn-off time
of from 2.3 to 10

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microseconds and a
figure of merit more
than 100

In this entry—

“figure of merit” is the
product of the repetitive
peak off-state voltage
(v_{drm}) in kilovolts and
the repetitive peak on-
state current (I_{trm}) in
amperes as shown on the
thyristor data sheets;
the “turn-off time” for
gate-turn-off thyristors
is the sum of the gate
controlled time T_{DQ} and
the gate controlled fall
time T_{fq} to reach 10 per
cent of the initial on-state
current.

IL1548

Photosensitive components,
including linear and focal-
plane arrays, the following:
and dice and wafers therefor—

(a) (a) Photosensitive
components,
including
photodiodes,
phototransistors,
photothyristors,
photoconductive
cells and similar
photosensitive
components, having
either of the
following
characteristics—

(1) having a peak sensitivity C
at a wavelength longer
than 1,200 nanometres
or shorter than 190
nanometres

or

(2) having a peak sensitivity C
at a wavelength shorter
than 300 nanometres and
having an efficiency of
less than 0.1 per cent
relative to peak response

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at wavelengths longer
than 400 nanometres

except vacuum
photodiodes specially
designed for use in
spectrophotometry
having a peak response at
a wavelength shorter than
300 nanometres.

- (b) (b) Semiconductor C
photodiodes and
phototransistors with
a response time
constant of 95 ns
or less measured
at the operating
temperature for
which the time
constant reaches a
minimum

except semiconductor
photodiodes which are
not space qualified with
a response time constant
of 0.5 ns or more and
with a peak sensitivity
at a wavelength neither
longer than 920 nm nor
shorter than 300 nm

- (c) (c) Photo sensitive C
components specially
designed or rated
as electromagnetic,
including laser and
ionized-particle
radiation resistant

- (d) (d) Linear C
and focal plane
arrays (hybrid or
monolithic) having
the characteristics
specified in heads (a)
(1) or (2) or (b)
above, and specially
designed components
therefor

There shall be excluded from
this entry—

- (a) germanium photo devices
with a peak sensitivity at

- a wavelength shorter than 1,750 nanometres;
- (b) infrared single-element encapsulated photoconductive cells or pyroelectric detectors intended for civil applications and using any of the following—
 - (1) evaporated lead sulphide;
 - (2) triglycine sulphate with a surface area of 20 mm² or less;
 - (3) lead-lanthanum-zirconium titanate ceramic;
- (c) single-element encapsulated mercury-cadmium-telluride (HgCdTe) uncooled (295 K ambient temperature operation) photo-electromagnetic (pem) or photoconductive (pc) mode photodetectors with a peak sensitivity at a wavelength shorter than 11,000 nanometres.

In this entry—

The “time constant” is the time taken from the application of a light stimulus for the current increment to reach a value of $1 - 1/e$ times the final value (ie 63 per cent of the final value); “space qualified” means products which are stated by the manufacturer as designed and tested to meet the special electrical, mechanical or environmental requirements for use in rockets, satellites or high-altitudes flight systems operating at altitudes of 100 km or more.

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- IL1549 Photomultiplier tubes, the following—
- (a) (a) Those for C
which the maximum
sensitivity occurs at
wavelengths shorter
than 300 nanometres

except photomultiplier
tubes specially
designed for use in
spectrophotometry
having a peak sensitivity
at a wavelength shorter
than 300 nanometres.
 - (b) (b) Those having C
an anode pulse rise
time of less than 1
nanosecond
 - (c) (c) Those which C
contain
microchannel-plate
electron multipliers
- IL1553 Flash discharge type X-ray C
systems, including tubes,
having all of the following
characteristics—
- (a) (a) Peak power
greater than 500 MW;
 - (b) Output voltage
greater than 500 kV;
 - (c) Pulse width less than
0.2 microsecond
- IL1555 Electron tubes, the following:
and specially designed
components therefor—
- (a) (a) Electron tubes
for image conversion
or intensification
which incorporate
any of the
following—
 - (1) fibre optic face plates C
specified in head (a) of
the entry IL1556 in this
Group
 - (2) microchannel-plate C
electron multipliers

or

(3) gallium arsenide or other C
epitaxially grown semi-
conductor photocathodes
specified in head (c) to
the entry IL1556 in this
Group

(aa) (aa) Technology D
for image intensifiers
or converters
incorporating fibre-
optic plates or
microchannel plate
electron multipliers,
or electron tubes for
cameras
incorporating such
intensifiers or
converters

(b) (b) Electron tubes
for television/video
cameras, having any
of the following
characteristics—

(1) incorporating fibre-optic C
face plates specified in
head (a) of the entry
IL1556 in this Group

(2) incorporating C
microchannel-plate
electron multipliers

or

(3) coupled with electron C
tubes specified at head
(a) above

(c) (c) Ruggedised C
electron tubes for
television/video
cameras having a
maximum length-to-
bulb diameter ratio of
5:1 or less

There shall be excluded from
this entry—

commercial standard
television/video camera
tubes not incorporating
fibre-optic plates

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IL1556

specified in head (a) of the entry IL1556; commercial standard X-ray amplifier tubes.

Optical elements and elements for optical tubes, the following—

(a) (a) Non- C
flexible fused fibre-optic plates or bundles, having all of the following characteristics—

- (1) a fibre pitch (centre-to-centre spacing) of less than 10 micrometres;
- (2) a light-absorbing medium surrounding each fibre, or interstitially placed between fibres; and
- (3) a diameter greater than 13 mm;

(b) (b) Microchannel- C
plates for electron image amplification, having both of the following characteristics—

- (1) 15,000 or more hollow tubes per plate; and
- (2) hole pitch (centre-to-centre spacing) of less than 25 micro-metres

(c) (c) Semi- C
transparent photocathodes incorporating epitaxially grown layers of compound semiconductors, such as gallium arsenide

(d) (d) Diffractive type optical elements specially designed for display screens, with any of the following characteristics—

- (1) a transmission of more than 90 per cent outside the reflection band and reflection of more than 75 per cent inside the reflection band, which has less than 15 nanometres bandwidth and is matched to the frequency of the display light source C
- (2) a rear projection screen brightness gain of more than 10 times the gain of a Lambertian scatterer with an equivalent area, and less than 10 per cent variation in brightness across the exit aperture C
or
- (3) specially designed for use in helmet-mounted displays C

IL1558

Electronic vacuum tubes (valves) and cathodes, the following: and other components specially designed for those tubes—

- (a) (a) Tubes in which space charge control is utilized as the primary functional parameter, including triodes and tetrodes, the following C
- (1) tubes rated for continuous wave operation having either of the following characteristics—
- (i) those above 4 GHz at maximum rated anode dissipation C
or
- (ii) those within the frequency range 0.3 to 4 GHz and for which, under any condition of C

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cooling, the product of the maximum rated anode dissipation, expressed in watts, and the square of the maximum frequency expressed in GHz, at the maximum rated anode dissipation is greater than 10^4 ; except tubes specially designed for television transmitters operating in the frequency range of 0.047 to 0.96 GHz and rated for operation without a grid current, for which the product of the rated anode dissipation, expressed in watts, and the square of the maximum frequency, expressed in GHz, may reach 2×10^4

- (2) tubes rated only for pulse operation having either of the following characteristics—
- (i) above 1 GHz with maximum peak pulse output power greater than 45 kW C
- or
- (ii) between 0.3 and 1 GHz and for which, under any condition of cooling, the product of the peak pulse output power, expressed in watts, and the square of the maximum frequency, expressed in GHz, is greater than 4.5×10^4 C
- (3) tubes specially designed for use as pulse modulators for radar or similar applications, having a peak anode C

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voltage rating of 100 kV
or more, or rated for a
peak pulse power of 20
MW or more

- (b) (b) Tubes which C
utilize interaction
between a beam
of electrons and
microwave elements
and in which
the electrons travel
in a direction
perpendicular to the
applied magnetic
field, including but
not limited to
magnetrons, crossed-
field amplifier tubes
and crossed-field
oscillator tubes

except—

- (i) fixed frequency
and tunable pulsed
magnetrons and
crossfield amplifier
tubes which are in
normal civil use,
the following—
- (1) magnetrons
designed to operate
at frequencies
below 3 GHz
with a maximum
rated peak output
power of 5 MW
or less, or between
3 to 12 GHz with
the product of
the maximum
rated peak output
power, expressed
in kilowatts, and
the frequency,
expressed in
Giga-hertz, less
than 4,200 and a
frequency tuning
time of more than
100 milliseconds;
- (2) crossed-field
amplifier tubes
designed to operate

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- at frequencies
below 4 GHz with
a maximum rated
average output
power of 1.2 kW or
less, a bandwidth
of 200 MHz or less
and a gain of less
than 15 dB;
- (ii) fixed frequency
continuous wave
magnetrons
designed for medial
use or for industrial
heating or cooking
purposes operating
at a frequency of
2.375 GHz ± 0.05
GHz or 2.45 GHz
 ± 0.05 GHz with
a maximum rated
output power not
exceeding 6 kW
or, at a frequency
lower than 1 GHz,
with a maximum
rated output power
not exceeding 35
kW;
- (iii) magnetrons,
specially designed
for particle
accelerators for
medical radiation
therapy, having all
of the following
characteristics—
 - (1) capable of
operation only at a
frequency of 3,000
MHz ± 15 MHz or
at a frequency of
2,856 MHz ± 15
MHz;
 - (2) not capable
of being tuned
mechanically or
electronically
outside the above
bands;
 - (3) mechanically
tuned within the
above bands;

- (4) having a peak output power not exceeding 10 MW and an average output power not exceeding 15 kW.

The exception in paragraph (iii) above does not apply to technological documents the information in which relates to goods excluded in paragraph (iii).

- (c) (c) Tubes which C utilise interaction between a beam of electrons and microwave elements or cavities and in which the electrons travel in a direction parallel to the applied magnetic field (including Klystrons or travelling wave tubes)

except—

- (i) continuous wave tubes having all of the following characteristics—
 - (1) designed for use in civil ground communication;
 - (2) an instantaneous bandwidth of half an octave or less, ie the highest operating frequency is not higher than 1.5 times the lower operating frequency;
 - (3) the product of the rated output power

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- (expressed in W) and the maximum operating frequency (expressed in GHz) of no more than 300;
- (4) an operating frequency no higher than 20 GHz;
- (5) no multiple grid electron guns; and
- (6) collectors with no more than two depressed stages;
- (ii) pulsed tubes, having all of the following characteristics—
 - (1) for civil applications
 - (2) an instantaneous bandwidth of half an octave or less ie the highest operating frequency is not higher than 1.5 times the lowest operating frequency;
 - (3) collectors with no more than two depressed stages; and
 - (4) either of the following:
 - (a) a peak saturated output power not exceeding 1 kW, an average

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- output power
not exceeding
40 W and
the operating
frequency not
exceeding 10
GHz;
or
- (b) a peak
saturated
output not
exceeding
100 W, an
average
output power
not exceeding
20 W and
the operating
frequency
between 10
and 20 GHz;
- (iii) pulsed tubes,
having all of
the following
characteristics—
 - (1) for civil
applications;
 - (2) designed
for fixed
frequency
operation;
 - (3) operating
frequencies
below 3.5
GHz;
 - (4) a peak output
power of 1.6
MW or less;
and
 - (5) an operating
bandwidth of
less than 1 per
cent;
- (iv) tubes, having all
of the following
characteristics—
 - (1) used as fixed-
frequency
or voltage-
tunable
oscillator
tubes;

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- (2) designed to operate at frequencies below 20 GHz; and
- (3) a maximum output power of less than 3 W;
- (v) klystrons specially designed for particle accelerators for medical radiation therapy, having all the following characteristics—
 - (1) capable of operation only at a frequency of 3,000 MHz ± 15 MHz or at a frequency of 2,856 MHz ± 15 MHz;
 - (2) not capable of being tuned mechanically or electronically outside the above bands;
 - (3) mechanically tuned within the above bands;
 - (4) having a peak output power not exceeding 10 MW and an average output power not exceeding 15 kW.

The exception in paragraph (v) above does not apply to technological documents the information in which relates to goods excluded in paragraph (v).

- (d) (d) Tubes which C
utilize interaction
between an electron
beam and microwave
elements or cavities
but do not require
a magnetic field to
control or focus the
electron beam, except
low power reflex
oscillator klystrons
designed to operate
at frequencies below
20 GHz and at
a maximum output
power of less than 3
W
- (e) (e) Tubes which C
utilize interaction
between a beam
of electrons and
microwaves elements
or cavities in which
the electrons drift in
a direction parallel to
the applied magnetic
field but also require
for their operation
a large component
of velocity transverse
to the direction of
the applied magnetic
field, including
gyrotrons, ubitrons
and peniotrons
- (f) (f) Tubes designed C
to withstand on any
axis an acceleration
of short duration
(shock) greater than
1,000 g
- (g) (g) Tubes C
designed for
operation in ambient
temperatures
exceeding 200°C
- (h) (h) Tubes of C
the type specified in
heads (c), (d) or
(e) above, which are
designed to operate

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with no filament
or cathode heating
element as indicated
by the absence
of heating supply
connections

(i) (i) Tubes which C
utilize a modulated
beam of electrons
striking one or
more semiconductor
diodes to provide
power gain

(j) (j) Cathodes
for electronic vacuum
tubes, the
following—

(1) those specially designed C
for tubes specified in
heads (a) to (i) above
(inclusive)

or

(2) impregnated cathodes C
capable of producing a
current density exceeding
0.5 A/cm² at rated
operating conditions

In this entry—

“frequency tuning time”
is the time required to
change the operating
frequency from a starting
frequency, through the
maximum frequency,
through the minimum
frequency, and return to
the starting frequency,
ie one complete tuning
cycle. (“Frequency
tuning time”:

$$T = \left(\frac{1}{2fD} \right) \text{ fD: dither rate).}$$

IL1559

Hydrogen/hydrogen isotope
thyratons of ceramic-metal
construction and having any of
the following characteristics:
and accessories therefor—

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- (a) (a) A peak C
pulse power output
exceeding 12.5 MW
- (b) (b) A peak anode C
voltage greater than
25 kV
- (c) (c) A peak current C
rating greater than 1.5
kA

Note. For thyratrons rated for both single-shot (crowbar) and modulator service, the figure for modulator service should be used.

IL1560

Capacitors designed for or capable of maintaining their rated electrical and mechanical characteristics during their specified operating lifetime, and technology therefor, the following—

- (a) (a) Monolithic C
ceramic capacitors
(other than boundary
layered capacitors)
using non-ferro-
electric strontium
titanate (SrTiO_3)
dielectric rated for
operation over the
whole range of
ambient temperatures
from below -55°C to
above $+85^\circ\text{C}$
- (b) (b) Technology D
for the design
and production of
tantalum capacitors
rated for operation at
ambient temperatures
exceeding 125°C ,
except sintered
electrolytic types
having a casing made
of epoxy resin or
which are sealed or
coated with epoxy
resin

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IL1561	<p>Materials specially designed and manufactured for use as absorbers of electromagnetic waves having frequencies greater than 2×10^8 Hz and less than 3×10^{12} Hz</p> <p>except, save when contained in paint,</p> <ul style="list-style-type: none"> (i) hair type absorbers, whether constructed of natural or synthetic fibres, with non-magnetic loading to provide absorption; (ii) absorbers whose incident surface is non-planar in shape, including pyramids, cones, wedges and convoluted surfaces, and which have no magnetic loss; and (iii) absorbers having all of the following characteristics— <ul style="list-style-type: none"> (1) they are made of: <ul style="list-style-type: none"> (a) plastic foam materials (flexible or non-flexible) with carbon-loading to provide absorption; or (b) organic binders with magnetic material loading which do not provide broad-band absorption performance with low reflectivity; (2) the incident surface is planar; (3) their tensile strength is less than 7×10^6 N/m²; and 	C
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- (4) their compressive strength is less than $14 \times 10^6 \text{ N/m}^2$; and
- (5) they cannot withstand more than 450 K (177°C).

In this entry—

“Broad-band absorption performance with low reflectivity” means less than 5 per cent echo compared with metal over a bandwidth greater than ± 15 per cent of the centre frequency of the incident energy.

IL1564

Assemblies of electronic components, modules, printed circuit boards with mounted components, substrates and integrated circuits, including packages therefor, the following—

NOTE:

Integrated circuits are categorized as follows:

- monolithic integrated circuits
- microcomputer microcircuits
- microprocessor microcircuits
- multichip integrated circuits
- film type integrated circuits
- hybrid integrated circuits
- optical integrated circuits

- (a) (a) Substrates C for printed circuit boards, including ceramic substrates and coated metal substrates (single-sided, double-sided or multilayer), and

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thin copper foils
therefor

except—

- (1) printed circuit boards manufactured from any of the following materials—
 - (a) paper base phenolics;
 - (b) glass cloth melamine;
 - (c) glass epoxy resin uncoated or coated with copper foil of a thickness of 18 micrometres or more;
 - (d) polyethylene terephthalate; or
 - (e) any other insulating material having all of the following characteristics:
 - (i) a maximum continuous rated operating temperature not exceeding 423 K (150°C);
 - (ii) a dissipation factor equal to or more than 0.009 at 1 MHz;
 - (iii) a relative dielectric constant equal to or less than 8 at 1 MHz; and
 - (iv) a coefficient of expansion

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equal to or
more than
 $\pm 10^{-5}/\text{K}$ over
a temperature
range of 273
K to 393
K (0°C to
120°C);

- (2) ceramic substrates
having no more
than two layers of
interconnections,
including the
ground plane; or
- (3) copper foil having
a thickness of 18
micrometre or
more;

- (b) (b) Ceramic C
packages for
integrated circuits
which are designed
for hermetically
sealed pin or pad grid
array, leadless carrier
or surface-mounted
configurations

except those having
all of the following
characteristics—

- (1) single-in-line, dual-
in-line or flat-pack
configuration;
- (2) pin, pad or lead
spacings of 2.50
mm or more; and
- (3) 40 leads or less;

- (c) (c) Assemblies,
modules and printed
circuit boards with
mounted
components, with
any of the following
characteristics—

- (1) those which include C
substrates for printed
circuit boards specified
in head (a) above

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- (2) those which contain components specified in this Schedule C
- except—
- (a) where the only components specified in this Schedule which they contain are capacitors;
 - (b) power supply assemblies;
 - (c) non-coherent light-emitting alphanumeric displays, which if incorporated monolithic integrated circuits have both the following characteristics:—
 - (i) used for decoding, controlling or driving the display; and
 - (ii) not integral with the actual display device; or
 - (f) simple encapsulated photo-coupler (transopter) assemblies, having both of the following characteristics—
 - (i) electrical input and output; and
 - (ii) any incorporated light-emitting diode can only emit non-coherent light;
 - (i) assemblies, modules or printed circuit boards with mounted components, having both of the following characteristics—
 - (i) designed for equipment not

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- specified elsewhere
in this Schedule;
and
- (ii) substantially
restricted to
the particular
application for
which they have
been designed by
nature of:
 - (1) design;
 - (2) performance;
 - (3) lack of user-
accessible
microprogrammability;
 - (4) lack of user-
accessible
programmability;
 - (5) software;
 - (6) microprogramme
control; or
 - (7) specialized logic
control.

NOTES:

- (1) For assemblies, modules
or printed circuit
boards with mounted
components which
are designed for, or
which have the same
functional characteristics
as, electronic computers
or related equipment, see
entry IL1565 in Group
3G.
- (2) This head does not
apply to assemblies,
modules or printed
circuit boards with
mounted components
which are designed for,
or which have the same
functional characteristics
as, equipment specified
elsewhere in this
Schedule.
- (d) (d) Monolithic C
integrated circuits,
microcomputer

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microcircuits,
microprocessor
microcircuits,
multichip integrated
circuits, film type
integrated circuits,
hybrid integrated
circuits and optical
integrated circuits

except—

- (1) encapsulated passive networks save technology for the manufacture of thin film passive networks;
- (2) encapsulated integrated circuits, having all of the following characteristics—
 - (A) not designed or rated as radiation hardened;
 - (B) not rated for operation at an ambient temperature below 233 K (−40°C) or above 358 K (85°C);
 - (C) packaged in any of the following casings:
 - (i) TO-5 outline cases (diameter 7.7 to 9.4mm);
 - (ii) hermetically sealed dual in-line cases; or
 - (iii) non-hermetically sealed cases; and
 - (D) being any of the following types:
 - (a) bipolar monolithic integrated circuits, having all of the

following
characteristics:

- (1) designed to perform a single digital logic function or a combination of digital logic functions;
 - (2) encapsulated in packages having 24 terminals or less;
 - (3) a basic gate propagation delay time of no less than 3 ns;
 - (4) a basic gate power dissipation of no less than 2 mW; and
 - (5) a product of the basic gate propagation delay time and the basic gate power dissipation per gate of no less than 30 pJ for types having a basic gate propagation delay time of 3 ns or more and less than 5 ns;
- (b) bipolar monolithic integrated circuits, having all of the following characteristics:
- (1) designed for operation in civil applications;
 - (2) being either:
 - (a) electronic switches,

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- externally
controlled
by inductive,
magnetic or
optical means; or
- (b) threshold value
switches; and
- (3) with switching
times of 0.5
microsecond or
more;
- (c) complementary
metal-oxide
semiconductor
(CMOS)
monolithic
integrated
circuits, having
all of the
following
characteristics:
 - (1) designed for
operation as
digital logic
circuit elements
but limited to
gates, inverters,
buffers, flip-
flops, latches,
multivibrators,
bilateral
switches, display
drivers, fixed
counters, fixed
frequency
dividers, storage
registers,
decoders,
voltage
translators,
encoders,
Schmidt
triggers, delay
timers, carry
generators, clock
generators, and
any combination
of the above
digital logic
functions;

- (2) encapsulated in packages having 24 terminals or less; and
- (3) a minimum value of the basic gate propagation delay time under any rated condition of no less than 10 ns;
- (d) positive-channel type or negative-channel type metal-oxide semiconductor (PMOS or NMOS) monolithic integrated circuits, having all of the following characteristics:
 - (1) designed for and by virtue of circuit design limited to use as serial digital shift registers;
 - (2) a maximum clock rate of 10 MHz; and
 - (3) a maximum of 1,024 bit per package;
- (e) silicon microcomputer microcircuits (save bit slice microcomputer microcircuits) having all of the following characteristics:
 - (1) mask programmed by the manufacturer for a civil

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- application prior
to exportation;
- (2) a word size
to speed ratio
of less than
or equal to
1.1 bit per
microsecond;
- (3) a speed-power
dissipation
product of more
than or equal to
1.2 microjoule;
- (4) not containing
on-the-chip;
- (a) a read-only
storage (ROM)
of more than
8,192 byte
(not including
the storage
space needed
for the micro-
programme);
- (b) a random
access storage
(RAM) of more
than 256 byte;
- (c) a
programmable
read-only
storage
(PROM);
- (d) multiplication
capabilities;
- (e) general
purpose
operating
systems
including CP/M;
or
- (f) high order
languages
including Tiny
Basic;
- (5) an operand
(data) word
length of less

than or equal to
8 bit;

- (6) not capable of
using storage
off-the-chip
for programme
storage; and
- (7) not rated for
operation at
an ambient
temperature
below 253 K
(−20°C) or
above 348 K
(75°C);
- (f) silicon
monolithic
integrated
circuits, micro-
computer
microcircuits,
microprocessor
micro-circuits,
multichip
integrated
circuits, film
type integrated
circuits, hybrid
integrated
circuits,
or optical
integrated
circuits, having
both of the
following
characteristics:
 - (1) no user-
accessible
microprogrammability;
and
 - (2) designed or
programmed by
the manufacturer
for one or more
of the following
applications:
 - (a) car electronics
including
entertainment,
instrumentation,
safety, comfort,

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- operations or
pollution;
- (b) home
electronics,
including audio
and video
equipment,
appliances,
safety,
education,
comfort, remote
controlled toys
or amusement;
- (c) timekeeping
applications
including
watches or
clocks;
- (d) personal
communications
up to 150
MHz, including
amateur radio
communication
and intercom;
- (e) cameras
not specified
elsewhere in
this Schedule
including cine
cameras but
excluding
imaging micro-
circuits;
- (f) medical
electronic
prostheses
including
cardiac
pacemakers,
hearing aids; or
- (g) civil telephone
subscriber
sets providing
neither ISDN
functions nor
encryption.

NOTE:

The
temperature
limits specified
in exception
(2)(B) to head
(d) above do
not apply to
exception (2)(D)
(f)(2)(a) or (f) to
head (d) above.

- (g) monolithic
integrated
circuits or
hybrid integrated
circuits, having
all of the
following
characteristics:
 - (1) not capable of
addressing off-
the-chip storage;
 - (2) no user-
accessible
microprogrammability;
and
 - (3) designed for
and by virtue of
circuit design
limited to
use in simple
calculators,
having both of
the following
characteristics:
 - (a) performing a
single function
in response to a
keystroke; and
 - (b) capable of
performing
floating point
additions of a
maximum of 13
decimal digits
(mantissa only)
in not less than
20 ms;
- (h) monolithic
integrated

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circuits or
hybrid integrated
circuits, having
both of the
following
characteristics:

(1) no user-
accessible
microprogrammability;
and

(2) designed for
and by virtue of
circuit design
limited to use
in simple key
programmable
calculators,
having both of
the following
characteristics:

(a) capable of
executing a
sequence of no
more than 256
programme steps
introduced into
a programme
storage on-
the-chip by a
sequence of
keystrokes; and

(b) capable of
performing
floating point
additions of a
maximum of 13
decimal digits
(mantissa only)
in not less than
20 ms;

(i) silicon
microprocessor
microcircuits
(save bit slice
microprocessor
microcircuits),
having all of
the following
characteristics:

(1) a word size
to speed ratio

- of less than
or equal to
1.25 bit per
microsecond;
- (2) a speed-power
dissipation
product of more
than or equal to
2 microjoule;
- (3) not containing
on-the-chip;
- (a) read-only
storage (ROM);
- (b) programmable
read-only
storage
(PROM);
- (c) random-access
storage (RAM)
of more than
1,024 bit; or
- (d) multiplication
instructions;
- (4) capable of
addressing
storage off-the-
chip of no more
than 65,536
byte;
- (5) an operand
(data) word
length of less
than or equal to
8 bit;
- (6) an arithmetic
logic unit (ALU)
not wider than 8
bit; and
- (7) not rated for
operation at
an ambient
temperature
below 253 K
(-20°C) or
above 348 K
(75°C);
- (j) storage
monolithic
integrated

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circuits or multi-chip integrated circuits, the following:

- (1) read-only memory (ROMs), having all of the following characteristics:
 - (a) mask programmed by the manufacturer for a civil application prior to exportation;
 - (b) a maximum of 8,192 bit per package;
 - (c) a maximum access time of no less than 450 ns; and
 - (d) not rated for operation at an ambient temperature below 253 K (-20°C) or above 348 K (75°C);
- (2) positive-channel type or negative-channel type metal-oxide semiconductor read-only memory (PMOS- or NMOS-ROMs), having all of the following characteristics:
 - (a) mask programmed by the manufacturer for a civil application prior to exportation;

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- (b) a maximum of 32,768 bit per package;
 - (c) a maximum access time of no less than 450 ns; and
 - (d) not rated for operation at an ambient temperature below 253 K (−20°C) or above 348 K (75°C);
- (3) positive-channel type or negative-channel type metal-oxide semiconductor read-only memory (PMOS- or NMOS-ROMs), having all of the following characteristics:
- (a) mask programmed or designed as character generators for a standard character font;
 - (b) a maximum access time of not less than 250 ns; and
 - (c) not rated for operation at an ambient temperature below 253 K (−20°C) or above 348 K (75°C);
- (4) programmable (non-erasable) read-only memory

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(PROMs)
having all of
the following
characteristics:

- (a) programmed
by the
manufacturer
for a civil
application prior
to exportation;
 - (b) a maximum
of 2,048 bit per
package;
 - (c) a maximum
access time of
not less than 250
ns; and
 - (d) not rated for
operation at
an ambient
temperature
below 253 K
(-20°C) or
above 348 K
(75°C);
- (5) programmable
(non-erasable)
read-only
memory
(PROMs)
having all of
the following
characteristics:
- (a) programmed
by the
manufacturer
for a civil
application prior
to exportation;
 - (b) a maximum
of 8,192 bit per
package;
 - (c) a maximum
access time of
not less than 450
ns; and
 - (d) not rated for
operation at
an ambient
temperature

below 253 K
(−20°C) or
above 348 K
(75°C);

- (6) bipolar random-access memory (RAMs), having any of the following pairs of characteristics:
 - (a) a maximum of 64 bit per package and a maximum access time of not less than 30 ns;
 - (b) a maximum of 256 bit per package and a maximum access time of not less than 40 ns; or
 - (c) a maximum of 1,024 bit per package and a maximum access time of not less than 45 ns;
- (7) metal-oxide-semiconductor dynamic random access memory (MOS-DRAMs), having all of the following characteristics:
 - (a) a maximum of 4,096 bit per package;
 - (b) a maximum access time of not less than 250 ns; and
 - (c) not rated for operation at an ambient temperature below 253 K

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(−20°C) or
above 348 K
(75°C);

- (8) metal-oxide semiconductor static random access memory (MOS-SRAMs), having both of the following characteristics:
 - (a) a maximum of 1,024 bit per package; and
 - (b) a maximum access time of not less than 340 ns;
- (k) amplifier monolithic integrated circuits, multi-chip integrated circuits, film type integrated circuits or hybrid integrated circuits, the following:
 - (1) audio amplifiers:
 - (a) having a maximum rated continuous power output of 50 W or less at an ambient temperature of 298 K (25°C); or
 - (b) encapsulated in non-hermetically sealed packages;
 - (Note:
For audio amplifiers, the 358 K (85°C) upper temperature

limit
specified
in
exception
(2)(B)
to head
(d) above
is not
applicable.)

- (2) instrumentation
amplifiers,
having all of
the following
characteristics:
 - (a) a best-case
rated linearity
of no better than
 ± 0.01 per cent at
a gain of 100;
 - (b) a maximum
gain-bandwidth
product of
no more than
7.5 expressed
in MHz (eg
a maximum
bandwidth of 75
kHz at -3 dB
and a gain of
100); and
 - (c) a typical slew
rate at unity-gain
not exceeding 3
V/microsecond;
- (3) isolation
amplifiers;
- (4) operational
amplifiers,
having all of
the following
characteristics:
 - (a) a typical unity-
gain open-loop
bandwidth of
no more than 5
MHz;
 - (b) a typical open-
loop voltage
gain of no more

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than 10^6 , ie 120
dB;

- (c) either:
 - (i) a maximum
intrinsic rated
input offset
voltage of no
less than 1.0
mV; or
 - (ii) a maximum
input offset
voltage drift of
no less than 5
microvolt/K;
- (d) a typical slew
rate at unity-gain
not exceeding 6
V/microsecond;
and
- (e) a typical
power
dissipation
of more than
10 mW per
amplifier, if the
typical slew rate
at unity-gain
exceeds 2.5 V/
microsecond;
- (5) untuned
alternating
current (AC)
amplifiers,
having both of
the following
characteristics:
 - (a) a bandwidth of
less than 3 MHz;
and
 - (b) a maximum
rated power
dissipation of
5 W or less
at an ambient
temperature of
298 K (25°C);
- (l) analogue
multiplier
or divider
monolithic

integrated
circuits,
multichip
integrated
circuits, film
type integrated
circuits or
hybrid integrated
circuits, having
both of the
following
characteristics:

- (1) a best-case
rated linearity
of no better than
 ± 0.5 per cent of
full scale; and
 - (2) a -3 dB small
signal bandwidth
of no more than
1 MHz;
- (m) converter
monolithic
integrated
circuits,
multichip
integrated
circuits, film
type integrated
circuits or
hybrid integrated
circuits, the
following:
- (1) analogue-
to-digital
converters,
having both of
the following
characteristics:
 - (a) a maximum
conversion rate
to rated accuracy
of no more than
50,000 complete
conversions
per second, ie a
conversion time
to maximum
resolution of
no less than 20

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micro-second;
and

- (b) an accuracy of
no better than
 ± 0.025 per cent
of full scale over
the specified
operating
temperature
range;
- (2) analogue-
to-digital
converters,
having both of
the following
characteristics:
 - (a) designed for
digital voltmeter
applications; and
 - (b) permitting
characteristics
corresponding
to those of
instruments
specifically
excluded from
head (f) of the
entry IL1529 in
this Group;
- (3) digital-to-
analogue
converters,
having both of
the following
characteristics:
 - (a) a maximum
settling time to
rated linearity of
no less than:
 - (i) 5
microseconds
for voltage
output
converters; or
 - (ii) 250 ns for
current output
converters; and
 - (b) non-linearity
of equal to or
worse than

±0.025 per cent
of full scale over
the specified
operating
temperature
range;

- (4) voltage
(rms-to-DC)
converters;
- (5) voltage-to-
frequency
converters
having all of
the following
characteristics:
 - (a) not employing
delta or
delta/sigma
modulation
techniques;
 - (b) a rated
accuracy of no
better than ±0.01
per cent of full
scale; and
 - (c) a gain drift of
no less than ± 50
 $\times 10^{-6}/\text{K}$ at rated
frequency;

Note:
“Gain
drift”
means the
maximum
change in
gain over
a specified
temperature
range.

- (n) interface
monolithic
integrated
circuits,
multichip
integrated
circuits, film
type integrated
circuits or
hybrid integrated
circuits, the
following:

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- (1) line drivers and line receivers having a typical propagation delay time from data input to output of not less than 15 ns;
- (2) peripheral or display drivers, having all of the following characteristics:
 - (a) a maximum rated output current of 500 mA or less;
 - (b) a typical propagation delay time from data input to output of not less than 20 ns; and
 - (c) a maximum rated output voltage of 80 V or less;
- (3) sense amplifiers, having both of the following characteristics:
 - (a) a typical propagation delay time from data input to output of not less than 15 ns; and
 - (b) a typical input threshold voltage of not less than 10 mV;
- (4) storage or clock drivers, having all of the following characteristics:

- (a) a maximum
rated output
current of 500
mA or less;
- (b) a maximum
rated output
voltage of 30 V
or less; and
- (c) a typical
propagation
delay time from
data input to
output of not
less than 20 ns;
- (o) peripheral
positive-channel
type or negative
channel type
metal-oxide-
semiconductor
(PMOS or
NMOS)
monolithic
integrated
circuits or
multichip
integrated
circuits,
designed only
for:
 - (1) the support of
microprocessor
microcircuits
which are
excluded by
exception (2)(D)
(i) to head (d)
above; and
 - (2) having any of
the following
functions:
 - (a) parallel input/
output controller
(PIO);
 - (b) serial input/
output controller
(SIO);
 - (c) dual
asynchronous
receiver/

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transmitter
(DART); or

(d) counter/timer
circuit (CTC);

(p) sample and
hold monolithic
integrated
circuits, hybrid
integrated
circuits, film
type integrated
circuits or
multichip
integrated
circuits, having
both of the
following
characteristics:

(1) an acquisition
time of not
less than 10
microseconds;
and

(2) a non-linearity,
of equal to or
worse than
 ± 0.01 per cent
of full scale for
a hold time of 1
microsecond;

(q) timing
monolithic
integrated
circuits, hybrid
integrated
circuits, film
type integrated
circuits or
multichip
integrated
circuits, having
both of the
following
characteristics:

(1) a typical timing
error of not less
than ± 0.5 per
cent; and

- (2) a typical rise time of not less than 100 ns;
- (r) voltage monolithic integrated circuits, multichip integrated circuits, film type integrated circuits or hybrid integrated circuits, the following—
 - (1) voltage comparators, having both of the following characteristics:
 - (a) a maximum input offset voltage of not less than 2 mV; and
 - (b) a typical switching speed (ie typical response time) of not less than 30 ns;
 - (2) voltage references, having both of the following characteristics:
 - (a) a rated accuracy of not better than ± 0.1 per cent; and
 - (b) a temperature coefficient of the voltage of not less than $15 \times 10^{-6}/\text{K}$;
 - (3) linear type voltage regulators, having both of

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the following
characteristics:

- (a) a rated
nominal output
voltage of 50 V
or less; and
- (b) a maximum
output current of
2A or less;
- (4) switching
type voltage
regulators,
having both of
the following
characteristics:
 - (a) a rated
nominal output
voltage of 40 V
or less; and
 - (b) a maximum
output current of
150 mA or less;

Note: For
voltage
regulators,
the 358
K (85°C)
upper
temperature
limit
specified
in
exception
(2)(B)
to head
(d) above
is not
applicable.
- (s) non-coherent
light-emitting
alphanumeric
displays,
which do not
incorporate
other monolithic
integrated
circuits;
- (t) non-coherent
light-emitting
alphanumeric

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displays, which
incorporate
monolithic
integrated
circuits having
both of the
following
characteristics:

(1) used for
decoding,
controlling
or driving the
display; and

(2) not integral
with the actual
display device;

(u) simple
encapsulated
photocoupler
(transopter)
optical
integrated
circuits, having
both of the
following
characteristics:

(1) electrical input
and output; and

(2) any
incorporated
light-emitting
diodes can
emit only non-
coherent light;

(3) unencapsulated
integrated circuits,
having all of
the following
characteristics—

(A) based
exclusively upon
silicon;

(B) not designed or
rated as radiation
hardened; and

(C) being any of the
following types:

(a) bipolar
monolithic

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integrated
circuits (save
complex
custom-built
bipolar digital
monolithic
integrated
circuits) having
all of the
following
characteristics:

- (1) designed to perform a single digital logic function or a combination of digital logic functions;
 - (2) a basic gate propagation delay time of not less than 5 ns;
 - (3) a product of the basic gate propagation delay time and the basic gate power dissipation per gate of not less than 70 pJ; and
 - (4) no more than 24 input/output pads;
- (b) bipolar monolithic integrated circuits (save complex custom-built bipolar digital monolithic integrated circuits) having all of following characteristics:
- (1) designed for operation in civil applications;
 - (2) being either:

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- (a) electronic switches, externally controlled by inductive, magnetic or optical means; or
- (b) threshold value switches;
- (3) with switching times of 0.5 microsecond or more; and
- (4) having no more than 24 input/output pads;
- (c) monolithic integrated circuits having all of the following characteristics:
 - (1) no user-accessible microprogrammability;
 - (2) designed for and by virtue of circuit design limited to use in civil radio or television receivers;
 - (3) rated for operation at 11 MHz or less;
 - (4) not designed for station scanning applications;
 - (5) not utilizing charge-coupled device (CCD) technology;
 - (6) not intended for beam lead bonding; and
 - (7) if intended for video or luminance

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amplifiers,
having both of
the following
characteristics:

- (a) a maximum
rated supply
voltage not
exceeding 30 V;
and
- (b) a typical
bandwidth
not exceeding
7.5MHz;
- (d) monolithic
integrated
circuits having
all of the
following
characteristics:
 - (1) no user-
accessible
microprogrammability;
 - (2) not utilizing
charge-coupled
device (CCD)
technology;
 - (3) not intended
for beam lead
bonding; and
 - (4) designed or
programmed by
the manufacturer
for one or more
of the following
applications
only:
 - (a) timekeeping
applications,
including
watches or
clocks; or
 - (b) cardiac
pacemakers or
hearing aids;
 - (e) amplifier
monolithic
integrated
circuits, the
following:

- (1) audio amplifiers, having a maximum rated power output of 25 W or less at an ambient temperature of 298 K (25°C);
- (2) operational amplifiers, having all of the following characteristics:
 - (a) a typical unity-gain open-loop bandwidth of not more than 5 MHz;
 - (b) a typical open-loop voltage gain of not more than 562,000 ie 115 dB;
 - (c) a maximum intrinsic rated input offset voltage of not less than 2.5 mV; and
 - (d) a typical slew rate at unity-gain not exceeding 2.5 V/microsecond;
- (f) voltage monolithic integrated circuits, the following:
 - (1) voltage comparators, having both of the following characteristics:
 - (a) a maximum input offset voltage of not less than 5 mV; and

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- (b) a typical switching speed (ie typical response time) of not less than 50 ns;
- (2) linear type voltage regulators having both of the following characteristics:
 - (a) a rated nominal output voltage of 40 V or less; and
 - (b) a maximum output current of 1A or less;
- (3) switching type voltage regulators having both of the following characteristics:
 - (a) a rated nominal output voltage of 40 V or less; and
 - (b) a maximum output current of 150 mA or less;
- (4) encapsulated integrated circuits having all of the following characteristics—
 - (a) not designed or rated as radiation hardened;
 - (b) not rated for operation at an ambient temperature below 233 K (−40°C) or

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above 358 K
(85°C);

(c) packaged in
hermetically
sealed ceramic
packages which
are specifically
expected from
head (b) of this
entry; and

(d) containing
unencapsulated
integrated
circuits which
are specifically
excepted by
exception (3) of
head (d) of this
entry.

(dd) Technological D
documents the
information in
which relates to the
manufacture of thin
film passive networks

In this entry—

“assembly” means a
number of electronic
components (eg circuit
elements, discrete
components, integrated
circuits, etc) connected
together to perform
a specific function,
replaceable as an entity
and normally capable of
being disassembled;

“basic gate power
dissipation” means the
power dissipation value
corresponding to the
basic gate utilized within
a family of monolithic
integrated circuits. This
may be specified, for a
given family, either as
the power dissipation
per typical gate or as the
typical power dissipation
per gate;

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“basic gate propagation delay time” means the propagation delay time value corresponding to the basic gate utilized within a family of monolithic integrated circuits. This may be specified, for a given family, either as the propagation delay time per typical gate or as the typical propagation delay time per gate;

“circuit element” means a single active or passive functional part of an electronic circuit, such as one diode, one transistor, one resistor, one capacitor, etc;

“discrete component” means a separately packaged circuit element with its own external connections;

“film type integrated circuit” means an array of circuit elements and metallic interconnections formed by deposition of a thick or thin film on an insulating substrate;

“hybrid integrated circuit” means any combination of integrated circuits, circuit elements or discrete components connected together to perform a specific function;

“manufacturer” means the individual or organization designing an integrated circuit or a programmed for an intended application, in contrast to an individual or organization merely programming an integrated circuit at, or in accordance with, a user’s request;

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“microcomputer microcircuit” means a monolithic integrated circuit or multichip integrated circuit containing an arithmetic logic unit (ALU) capable of executing general purpose instructions from an internal storage; on data contained in the internal storage; (the internal storage may be augmented by an external storage.)

“microprocessor microcircuit” means a monolithic integrated circuit or multichip integrated circuit containing an arithmetic logic unit (ALU) capable of executing a series of general purpose instructions from an external storage; (the microprocessor microcircuit normally does not contain integral user-accessible storage, although storage present on-the-chip may be used in performing its logic function.)

“module” means a number of electronic components (eg circuit elements, discrete components, integrated circuits etc) connected together to perform a specific function, replaceable as an entity and not normally capable of being disassembled; “monolithic integrated circuit” means a combination of passive or active circuit elements or both which:

- (a) is formed by means of diffusion processes,

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- implantation
- processes or
- deposition
- processes in
- or on a single
- semiconducting
- piece of material, a
- so-called “chip”;
- (b) can be considered
- as indivisibly
- associated; and
- (c) perform the
- function of a
- circuit;
- “multichip integrated
- circuit” means two
- or more monolithic
- integrated circuits
- bonded to a common
- substrate;
- “optical integrated
- circuit” means a
- monolithic integrated
- circuit or a hybrid
- integrated circuit,
- containing one or
- more parts designed to
- function as a photosensor
- or photoemitter or to
- perform an optical or
- electro-optical function;
- “speed” means the time
- to fetch an operand C
- and another operand D,
- both from an external
- storage outside any
- work register, add these
- operands and put the
- result back in storage.
- The addressing mode
- which yields the shortest
- execution time shall be
- used. The result of the
- add operation shall be
- stored in either the same
- location as one of the
- addends or in some other
- location. This choice
- shall be made to give the
- shortest execution time
- at the highest specified
- clock frequency;

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“speed-power dissipation product” means the product of the speed and the typical power dissipation which shall be taken at the clock frequency used in the speed computation. The typical power dissipation must be the lowest of the following:

- (a) the specified typical internal power dissipation;
- (b) one half the maximum internal power dissipation;
- (c) the product of the nominal supply voltage and typical total supply current; or
- (d) one half of the product of the nominal supply voltage and maximum total supply current;

“substrate” means a sheet of base material with or without an interconnection pattern and on which or within which discrete components, integrated circuits or both can be located;

“user-accessible microprogrammability” means the facility allowing a user to insert, modify or replace microprogrammes;

“user-accessible programmability” means the facility allowing a user to insert, modify or replace programmes by means other than:

- (a) a physical change in wiring or interconnections; or

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- (b) the setting of
function controls
including entry of
parameters.

GROUP 3G

Electronic Equipment including Computers, Software and Telecommunications, and Photographic Equipment

IL1565

Electronic computers, related equipment, equipment or systems containing electronic computers, and technology therefor, the following: and specially designed components and accessories for such electronic computers and related equipment—

- (a) (a) Analogue C
computers, and
related equipment
therefor, which are
designed or modified
for use in airborne
vehicles, missiles
or space vehicles
and rated for
continuous operation
at temperatures from
below 228 K (−45°C)
to above 328 K
(+55°C)
 - (b) (b) Equipment C
or systems containing
analogue computers
specified in head (a)
above
 - (c) (c) Analogue C
computers and
related equipment
therefor, other than
those specified in
head (a) above
- except—
- (i) those which
neither—
 - (a) are capable
of containing
more than
20 summers,

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- integrators,
multipliers
or function
generators;
nor
- (b) have facilities
for readily
varying the
interconnections
of such
components;
- (ii) those which have
all the following
characteristics—
 - (a) they use
neither:
 - (1) optical
computation
devices; nor
 - (2) acoustic
wave devices
specified
in the entry
IL1586 in
Group 3G;
 - (d) the rated
errors for
summers,
inverters and
integrators are
not less than:
 - (1) static : 0.01%
 - (2) total at 1
kHz: 0.15%
 - (g) the rated
errors for
multipliers
are not less
than:
 - (1) static : 0.25%
 - (2) total at kHz:
0.25%
 - (j) the rated
errors for
fixed function
generators
(log and sine/
cosine) are
not less than:
static : 0.1%
 - (k) they have
no more
than 350

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- operational amplifiers;
and
- (l) they have more than four integrator time scales switchable during one programme.

NOTE

1. The percentage for (ii)(b)(1) above applies to the actual output voltage; all the other percentages apply to full scale, that is from maximum negative to maximum positive reference voltages.
2. Total errors at 1 kHz for (ii)(b)(2) and (ii)(c)(2) above are to be measured with those resistors incorporated in the inverter, summer or integrator which provide the least error.
3. Total error measurements include all errors of the unit resulting from, for example, tolerances of resistors and capacitors, tolerances of input and output impedances of amplifiers, the effects of loading, the effects of phase shift or the generating of functions.

(d) (d) Hybrid C
computers and
related equipment
therefor, having
all the following
characteristics—

- (1) the analogue section
is specified in head (c)
above;
- (2) the digital section has an
internal fixed or alterable
storage of more than
2,048 bit; and
- (3) facilities are included
for processing numerical
data from the analogue
section in the digital
section or vice versa;

(e) (e) Analogue C
computers specified
in heads (a) to
(c) above (inclusive)
or digital computers
containing equipment
for interconnecting
analogue computers
with digital
computers

(f) (f) Digital
computers and
related equipment
therefor, with any
of the following
characteristics—

- (1) designed or modified for C
use in airborne vehicles,
missiles or space vehicles
and rated for continuous
operation at temperatures
from below 228 K
(−45°C) to above 328 K
(+55°C)
- (2) designed or modified to C
limit electromagnetic
radiation to levels
much less than those
required by government
civil interference
specifications

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- (3) designed as ruggedized or radiation-hardened equipment and capable of meeting military specifications for ruggedized or radiation-hardened equipment C
- (4) modified for military use, or C
- (5) designed or modified for certifiable multi-level security or certifiable user isolation applicable to government classified material or to applications requiring an equivalent level of security C
- (g) (g) Equipment or systems containing digital computers specified in head (f) above C
- (h) (h) Digital computers and related equipment therefor, (other than those specified in heads (e) and (f) above even when embedded in, incorporated in, or associated with equipment or systems, and other than digital computers embedded in equipment described elsewhere in this Schedule), including but not limited to the following— C
- (1) Digital computers and related equipment designed or modified for—
- (a) signal processing C
- (b) image enhancement C

- (c) local area networks C
- (d) multi-data-stream processing C
- (e) combined recognition, understanding and interpretation of image, continuous (connected) speech or connected word text other than signal processing or image enhancement C
- (f) real time processing of sensor data having both of the following characteristics: C
 - (1) concerning events occurring outside the computer using facility; and
 - (2) provided by equipment specified in entry IL1501, IL1502, IL1510 or IL1518 in Group 3F.
- (g) microprocessor or microcomputer development systems C
- (h) fault tolerance C
- (j) user-accessible microprogrammability except where this facility is limited to— C
 - except where this facility is limited to—
 - (a) loading, reloading or inserting of microprogrammes provided by the supplier; or
 - (b) simple loading of microprogrammes which may or may not be provided by the supplier, but which are neither designed to be accessible to the user nor accompanied by

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training or software
for user accessibility.

(k) data (message) C
switching

(l) stored programme C
controlled circuit
switching, or

(m) wide area networks C

(2) digital computers and C
related equipment
therefor, having
both the following
characteristics—

(a) size, weight, power
consumption and
reliability or other
characteristics (eg
bubble memory),
which allow easy
application in mobile
tactical military
systems; and

(b) ruggedised above the
level required for a
normal commercial/
office environment,
but not necessarily up
to levels specified in
head (f) above;

There shall be excluded
from head (h)—

(i) digital computers
and related
equipment therefor,
provided that—

(a) they are embedded
in other equipment
or systems; or they
do not include
related equipment
specified elsewhere
in this Schedule
other than input/
output control
unit-disk drive
combinations
described in
exception (iiA)
below to this head;

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- (b) they are not the principal element of the other equipment or systems in which they are embedded;
- (c) the other equipment or systems are not specified elsewhere in this Schedule;
- (d) they have been designed and used for non-strategic applications;
- (e) they are by nature of design or performance restricted to the particular application for which they have been designed;
- (f) the total processing data rate of any one embedded digital computer does not exceed 54 million bit per second;
- (g) the sum of the total processing data rate of each embedded digital computer does not exceed 100 million bit per second;
- (h) they do not include equipment or systems specified in sub-head (a)(2) of the entry IL1519 in Group 3F or by the entry IL1567 in this Group; and
- (j) they do not include equipment specified in sub-head (h)(1) other than equipment for:
 - (1) signal processing or image enhancement which lacks

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- user-accessible
programmability
and is embedded
in medical imaging
equipment; or
- (2) local area
networks not
specified elsewhere
in this Schedule.
- (ii) digital computers,
and related
equipment therefor,
provided that—
- (a) they are
incorporated in
other equipment or
systems;
- (b) they are not
the principal
element of the
other equipment
or systems in
which they are
incorporated;
- (c) the other
equipment or
systems are not
specified elsewhere
in this Schedule;
- (d) the total processing
data rate of any one
incorporated digital
computer does not
exceed 28 million
bit per second;
- (e) the total internal
storage available to
the user does not
exceed 9.8 million
bit;
- (f) they do not include
related equipment
specified elsewhere
in this Schedule
other than input/
output control
unit-disk drive
combinations
described in
exception (iiA)
below to this head;
- (g) they do not include
equipment or

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- systems specified
in sub-head (a)(2)
of the entry IL1519
in Group 3F or in
entry IL1567 in this
Group;
- (h) they do not
include equipment
specified in sub-
head (h)(2) above;
- (j) they do not
include equipment
specified in sub-
head (h)(1) other
than equipment for:
- (1) signal processing
or image
enhancement
which lacks
user-accessible
programmability
and is embedded
in medical imaging
equipment; or
- (2) local area
networks not
specified elsewhere
in this Schedule.
- (iiA) digital computers
or related
equipment
therefore, provided
that—
- (a) where there is
incorporated or
associated in input/
output control
unit-disk drive
combination, it has
all of the following
characteristics:
- (1) total transfer rate
not exceeding 5.5
million bit per
second;
- (2) total connected
net capacity not
exceeding 320
million bit;
- (3) no more than two
independent drives;
and

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- (4) total access rate not exceeding 80 accesses per second with a maximum access rate of 40 accesses per second per drive;
- (b) the goods in which digital computers or related equipment are incorporated or with which digital computers or related equipment are associated are excluded from head (h) of this entry by exception (i) or (ii) above.
- (iii) digital computers (other than those specified in sub-head (h)(1) above) and related equipment, having all the following characteristics—
 - (a) they are complete systems;
 - (b) they are designed and announced by the manufacturer for an identifiable civil use;
 - (c) they are not specially designed for any equipment specified elsewhere in this Schedule;
 - (d) they have a total processing data rate not exceeding 6.5 million bit per second;
 - (e) the total internal storage available to the user does not exceed 6.2 million bit; and
 - (f) they do not include a central processing unit implemented

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- with more than two
microprocessor
or microcomputer
micro-circuits other
than any dedicated
micro-processor
microcircuit;
- (g) they do not include
a microprocessor
or microcomputer
microcircuit with
more than 16 bit
word length or a
bus architecture
with more than 16
bit;
- (h) they do not include
analogue-to-digital
or digital-to-
analogue converter
microcircuits
specified in the
entry IL1568,
except in the case
of direct driven
video monitors for
normal commercial
television;
- (j) they do not include
related equipment
specified elsewhere
in this Schedule
other than input/
output control
unit-disk drive
combination having
all of the following
characteristics:
 - (xlii) total transfer rate
not exceeding 5.5
million bit per
second;
 - (2) total connected
net capacity not
exceeding 200
million bit;
 - (3) no more than one
independent drive;
and
 - (4) total access rate
not exceeding
40 accesses per
second; and

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- (k) they do not include equipment specified in sub-head (a)(2) of entry IL1519 in Group 3F or in entry IL1567 in this Group.
- (iv) peripheral equipment, provided it lacks user-accessible programmability, the following—
 - (a) card punches and readers;
 - (b) paper tape punches and readers;
 - (c) manually operated keyboards and teletype devices;
 - (d) manually operated graphic tablets not having more than 1,024 resolvable points along any axis;
 - (e) impact printers;
 - (f) non-impact printers, not specified in head (b) or (c) of entry IL1572 in this Group, which does not exceed:
 - (1) 2,000 lines (30 pages) per minute; or
 - (2) 600 characters per second;
 - (g) plotting equipment, not specified in head (b) or (c) of entry IL1572 in this Group, producing a physical record by ink, photographic, thermal, or electrostatic techniques, and which has:

- (1) a linear accuracy worse than or equal to $\pm 0.004\%$; and
- (2) an active plotting area less than or equal to 1,700mm by 1,300mm;
- (h) digitising equipment generating rectilinear co-ordinate data by manual or semi-automatic tracing of physical records, which has:
 - (1) a linear accuracy worse than or equal to ± 0.004 per cent; and
 - (2) an active digitising area less than or equal to 1,700mm by 1,300mm;
- (j) optical mark recognition (OMR) equipment;
- (k) optical character recognition (OCR) equipment which:
 - (1) does not contain signal processing or image enhancement equipment; and
 - (2) is only for:
 - (i) stylised OCR characters;
 - (ii) other internationally standardised stylized character fonts; or
 - (iii) other non-stylised or hand printed numerics and up to 10 hand printed alphabetic or other characters;
 - (l) displays or monitors having all of the following characteristics:

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- (1) not including equipment specified in sub-head (h)(2) above;
- (2) not containing cathode ray tubes specified in entry IL1541 in Group 4;
- (3) if capable of other than alpha-numeric characters, graphs and symbols in fixed formats having all of the following characteristics:
 - (i) not more than 1,024 resolvable elements along any axis;
 - (ii) (except in the case of direct driven video monitors), not more than 16 shades of grey or colour; and
 - (iii) (except in the case of direct driven video monitors) the maximum bit transfer rate from the electronic computer to the display does not exceed 19,200 bit per second,
 - (m) displays or monitors having all of the following characteristics:
 - (1) they do not contain cathode ray tubes;
 - (2) they are not capable of displaying more than 3 levels namely off, intermediate and full on; and
 - (3) they do not have as an integral part

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of the display
device:

- (a) circuitry; or
- (b) non-mechanical character generation devices;
- (n) displays having all of the following characteristics:
 - (1) not containing cathode ray tubes specified in the entry IL1541 in Group 3F;
 - (2) being part of industrial or medical equipment; and
 - (3) not specially designed for use with electronic computers;
- (o) graphic displays specially designed for signature or security checking having an active display area not exceeding 150 sq cm;
- (q) light gun devices or other manual graphic input devices which are:
 - (1) part of displays not specified elsewhere in this Schedule; and
 - (2) limited to 1,024 resolvable elements along any axis;
- (r) disk drives for non-rigid magnetic media (floppy disks) which do not exceed:
 - (1) a gross capacity of 17 million bit;
 - (2) a maximum bit transfer rate of 0.52 million bit per second; or

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- (3) an access rate of 12 accesses per second;
- (s) cassette/cartridge tape drives or magnetic tape drives which do not exceed:
 - (1) a maximum bit packing density of 131 bit per mm per track; or
 - (2) a maximum bit transfer rate of 2.66 million bit per second;
- (xcviii) input/output interface or control units, provided that they lack user-accessible programmability, the following—
 - (a) designed for use with peripheral equipment excluded from head (h) by exception (iv) above;
 - (b) designed for use with digital recording or reproducing equipment specially designed to use magnetic card, tag, label or bank cheque recording media, excluded by exception (ii) to head (a) of entry IL1572 in this Group; or
 - (c) designed to meet ANSI/IEEE Standard 488-1978 or IEC Publication 625-1;
- (vi) equipment for local area networks which do not have any of

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- the following characteristics—
- (a) interfaces and protocols exceeding layer 2 of the Open System Interconnection (OSI) reference model, that is ISO logical link control Draft International Standard (DIS) 8802/2, IEEE 802.2, 802.3, 802.4, 802.5, or equivalents;
 - (b) implementations that contain functions of, or equivalent to those provided by, CCITT X.25, Level 3, protocols or above;
 - (c) maximum data signalling rate on the common transmission medium of more than 2 million bits per second; or
 - (d) inter network gateways;
 - (vii) personal computers and related equipment therefor, not excluded by exclusions (i) to (vi) above, provided they meet all the following conditions—
 - (a) they are not specified in head (h) above;
 - (b) they are exported as complete systems;
 - (c) if they are stand-alone graphic workstations they do not have all

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of the following characteristics:

- (i) they are stand-alone graphics workstations designed or modified for the generation, transformation, and display of 2 or 3 dimensional vectors;
- (ii) they have a total processing data rate of the central processing unit exceeding 28 million bit per second;
- (iii) they have a central processing unit with a word length exceeding 16-bit; and

(NOTE:

Microprocessor based systems with 16-bit word-length and not more than a 32-bit architecture are regarded as 16-bit systems for the purpose of subparagraph (iii))

- (iv) they exceed either of the following limits:
 - (a) block move data rate- 800,000 pixels/sec; or
 - (b) maximum bit transfer rate of the channel for direct access to the main storage (Direct Memory Access or DMA channel)-11 million bit per second;

NOTE: subparagraph (c) does not apply to workstations

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designed for and limited to graphic arts (eg printing, publishing).

- (d) they are not ruggedized above the level required for a normal commercial/office environment;

- (j) Technology, the following—

- (1) technology applicable to the—

- (i) development, D
production or use of electronic computers or related equipment, even if these electronic computers or related equipment are not specified in this entry

except—

- (a) technology which is unique to related equipment excluded under sub-heads (h)(2)(iv)(a) to (c), (e), (f), (m), (n) or (q) above and which is not specified elsewhere in this Schedule;

- (b) the minimum technology necessary for the use of electronic computers or related equipment not specified elsewhere in this entry; or

- (ii) development, D
production or use of equipment or systems specified in head (b) or (g) of this entry

For the purpose of this subhead “use” means

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assembly, operation,
maintenance or repair.

(2) technology for the
integration of—

(i) electronic computers D
or related equipment
specified in this
entry into other
equipment or systems
whether or not the
other equipment or
systems are specified
in this Schedule;
except technology for
integration which is
unique to the other
equipment or systems
provided they are not
specified elsewhere in
this Schedule or

(ii) other electronic D
computers or related
equipment into
equipment or systems
specified in this
Schedule

In this entry—

“access rate”—

(a) of an input/output
control unit-drum
or disk drive
combination (R_{ad}),
means either the
access rate of
an input/output
control unit (R_{ac})
or the sum of
the individual
access rates of
all independent
seek mechanisms
(R_{as}), whichever is
smaller;
(Thus: $R_{ad} = (R_{ac};$
SUM $R_{as})$;))

(b) of an input/output
control unit (R_{ac})

(1) with
rotational
position

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- sensing (rps),
means the
sum of the
individual
access
rates of all
independent
seek
mechanisms
(R_{as})
connected to
the control
unit;
(Thus R_{ac}
= $\sum R_{as}$
(with rps);)
- (1) without
rotational
position
sensing (rps),
means the
number (c) of
independent
read/write
channels
connected to
the control
unit divided
by the least
latency time
(t_{lmin}) of any
connected
independent
seek
mechanism;
$$\left(\text{Thus: } R_{ac} = \frac{C}{t_{lmin}} (\text{without rps}) \right)$$
- (c) of a seek
mechanism
(R_{as}), means the
reciprocal of the
average access time
(t_{aa}) of the seek
mechanism;
$$\left(\text{Thus: } R_{as} = \frac{1}{t_{aa}} \right)$$

and for this purpose
average access time
of seek mechanism
(t_{aa})—

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the sum of the
average seek time
(t_{aa}) and the latency
time (t_l);

(Thus: $t_{aa} = t_{ss} + t_l$)

and for this purpose
average seek time
(t_{aa}) means

the sum of the
maximum seek
time (t_{smax}) and
twice the minimum
seek time (t_{smin}),
divided by three:

$$\left(\text{Thus: } t_{aa} = \frac{t_{smax} + 2t_{smin}}{3} \right)$$

and for this purpose
“the maximum seek
time” (t_{smax})—

- (1) for fixed head
devices, is
zero;
- (2) for moving
head or
moving media
devices, is
the rates
time to move
between
the two
most widely
separated
tracks;

“the minimum seek
time” (t_{smin})—

- (1) for fixed head
devices, is
zero;
- (2) for moving
head or
moving media
devices, is the
rated time to
move from
one track to
an adjacent
track;

“latency time” (t_l) means
the rotational period
divided by twice the
number of independent

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read/write heads per track;

“analogue computer”— means equipment which can, in the form of one or more continuous variables:

- (a) accept data;
- (b) process data; and
- (c) provide output of data;

goods which are “associated” with equipment or systems—

- (a) can feasibly be either:
 - (i) removed from such equipment or systems; or
 - (ii) used for other purposes; and
- (b) are not essential to the operation of such equipment or systems:

“block move data rate” — means the maximum number of pixels which can be moved per second from one location to another in the storage which functions as the frame buffer;

“communication channel” — means the transmission path or circuit including the terminating transmission and receiving equipment (modems) for transferring digital information between distant locations;

“computer operating area” — means the immediate contiguous and accessible area around the electronic computer where the normal operating,

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support and service functions take place; “computer using facility” — means the end-users contiguous and accessible facilities:

- (a) housing the computer operating area and those end-user functions which are being supported by the stated application of the electronic computer and its related equipment; and
- (b) not exceeding beyond 1,500 metres in any direction from the centre of the computer operating area;

“cumulative total processing data rate” — means the sum of all total processing data rates in a given transaction;

“data device” — means equipment capable of transmitting or receiving sequences of digital information;

“data (message) switching” — means the technique including store-and-forward or packet switching, for:

- (a) accepting data groups (including messages, packets, or other digital or telegraphic information groups which are transmitted as a composite whole);
- (b) storing (buffering) data groups as necessary;
- (c) processing part or all of the

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data groups, as necessary, for the purpose of:

- (1) control
(routing,
priority,
formatting,
code
conversion,
error control,
retransmission
or
journaling);
- (2) transmission;
or
- (3) mutliplexing;
and
- (d) retransmitting
(processed) data
groups when
transmission
or receiving or
receiving facilities
are available;

“data signalling rate” —
means the rate as defined
in ITU Recommendation
53-36, taking into
account that, for non-
binary modulation, baud
and bit per second are
not equal. Binary digits
for coding, checking,
and synchronization
functions are included.

It is the maximum
one-way rate, namely
the maximum rate in
either transmission or
reception;

“digital computer” —
means equipment which
can, in the form of one or
more discrete variables:

- (a) accept data;
- (b) store data or
instructions in
fixed or alterable
(writable) storage
devices;
- (c) process data
by means of a
stored sequence of

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- instructions which is modifiable; and
 - (d) provide output of data;
- and for this purpose modifications of a stored sequence of instructions include replacement of fixed storage devices, but not a physical change in wiring or interconnection; “embedded” in equipment or systems—means that the relevant item can feasibly be neither:
- (a) removed from such equipment or system; nor
 - (b) used for other purposes;
- “equivalent multiply rate” — means the maximally achievable number of multiplication operations which can be performed per second considering that, in the case of simultaneous multiplication operations, all multiplication rates have to be summed in order to arrive at the equivalent multiply rate:
- (a) assuming
 - (1) optional operand locations in the most immediate storage; and
 - (2) operand lengths at least 16 bit, or more if this allows for faster operation; and
 - (b) ignoring
 - (1) set-up operations;

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- (2) pipeline
filling
operations;
- (3) initialization;
- (4) interrupts;
and
- (5) data
reordering
times;

“fault tolerance” —
means the capability to
perform correctly without
human intervention after
failure of any assembly,
so that there is no single
point in the system
the failure of which
could cause catastrophic
failure of the system’s
functioning;

and for this purpose
“assembly” —
means a number
of components
(ie circuit
elements, discrete
components,
microcircuits)
connected together
to perform a
specific function
or functions,
replaceable as an
entity and normally
capable of being
disassembled;

“gateway” — means
the function, realised
by any combination
of equipment and
software to carry
out the conversion
of conventions for
representing, processing
or communicating
information used in
one system into the
corresponding but
different conventions
used in another system;

“gross capacity” —
means the product of:

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- (a) the maximum number of binary digit (bit) positions per unformatted track; and
 - (b) the total number of tracks including spare tracks and tracks not accessible to the user;
- “hybrid computer” — means equipment which can:
- (a) accept data;
 - (b) process data, in both analogue and digital representations; and
 - (c) provide output at a;
- “image digitiser” — means a device for directly converting an analogue representation of an image into a digital representation;
- “image enhancement” — means the processing of externally derived information-bearing images by algorithms such as time compression, filtering, extraction, selection, correlation, convolution or transformations between domains (eg Fast Fourier Transform or Walsh Transform). This does not include algorithms using only linear or rotational transformation of a single image, such as translation, feature extraction, registration or false colouration;
- “incorporated” in equipment or system means
- (a) can feasibly be either:

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- (i) removed from such equipment or systems; or
- (ii) used for other purposes; and
- (b) is essential to the operation of such equipment or systems;

“internetwork gateway” — means a gateway for two systems which are themselves local area networks, wide area networks or both;
“local area network” — means a data communication system which:

- (a) allows an arbitrary number of independent data devices to communicate directly with each other; and
- (b) is confined to a geographical area of moderate size including office building, plant, campus, warehouse;

“main storage” — means the primary storage for data or instructions for rapid access by a central procession unit. It consists of the internal storage of a digital computer and any hierarchical extension thereto, such as cache storage or non-sequentially accessed extended storage;

“maximum bit packing density” — means the density of recording specified in accordance with the appropriate ANSI or ISO Standard

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(eg ANSI X3.14-1979, ISO 1863-1975; ANSI X3.22-1973; ISO 1873-1976; ANSI X3.39-1973; ISO 3788-1976; ANSI X3.48-1977; ISO 3407-1976; ANSI X3.56-1977; ISO 4057-1979; ANSI X3.54-1976).

“maximum bit transfer rate”—

- (a) of a drum or disk drive (R_{tdmax}), is the product of:
 - (1) the maximum number of binary digit (bit) positions per unformatted track; and
 - (2) the number of tracks which simultaneously can be read or written, divided by the rotational period;
- (b) of a magnetic tape drive (R_{ttmax}), is the product of:
 - (1) the maximum bit packing density;
 - (2) the number of data bits per character (ANSI) or per row (ISO); and
 - (3) the maximum tape read/write speed;

“most immediate storage”— means the portion of the main storage, most directly accessible by the central processing unit;

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- (a) for single level main storage, this is the internal storage;
or
- (b) for hierarchical main storage, this is:
 - (1) the cache storage;
 - (2) the instruction stack; or
 - (3) the data stack;

“multi-data-stream processing” — means the microprogramme or equipment architecture technique which permits processing two or more data sequences under the control of one or more instruction sequences by means such as:

- (a) parallel processing;
- (b) structured arrays of processing elements;
- (c) single Instrumentation Multiple Data (SIMD) operations;
or
- (d) multiple Instruction Multiple Data (MIMD) operations;

“net capacity” — of a drum, disk or cartridge-type streamer tape drive, or a bubble memory, is the total capacity designed to be accessible to the digital computer excluding error control bits;

“non-volatile storage” — means a storage device the contents of which are not lost when power is removed;

“other peripheral device” — means a data device which is:

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- (a) peripheral to a central processing unit-main storage combination; and
- (b) not an input/output control unit-drum, disk or magnetic tape drive or bubble memory combination;

“personal computer” — means a microprocessor based digital computer that is:

- (1) designed for a commercial/office environment;
- (2) designed and announced by the manufacturer for personal, home or business use; *and*
- (3) available for purchase over the counter at retail stores;

“principal element” — means a digital computer or related equipment which is:

- (a) either embedded or incorporated in another piece of equipment or system; and
- (b) in value more than 35% of the replacement value of the total equipment or system, (including the digital computer or related equipment);

“real time processing” — means processing of data by an electronic computer in response to an external event according to time requirements imposed by the external event;

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“related equipment” —
means the following
equipment embedded
in, incorporated in or
associated with electronic
computers;

- (a) equipment for
interconnecting
analogue computers
with digital
computers;
- (b) equipment for
interconnecting
digital computers;
- (c) equipment for
interfacing
electronic
computers to local
area networks
or to wide area
networks;
- (d) communication
control unit;
- (e) other input/output
(I/O) control units;
- (f) recording or
reproducing
equipment
specified in entry
IL1572 in this
Group;
- (g) displays; or
- (h) other peripheral
equipment;

Note: related equipment
which contains
an embedded or
incorporated electronic
computer but which
lacks user-accessible
programmability does not
thereby fall within the
definition of electronic
computer.

“signal processing” —
means the processing
of externally
derived information-
bearing signals by
algorithms such as time
compression, filtering,
extraction, selection,
correlation, convolution

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or transformations
between domains
including Fast Fourier
Transform or Walsh
Transform;
“stored-programme-
controlled circuit
switching” — means
the technique for
establishing, on demand
and until released, a
direct (space division
switching) or logical
(time division switching)
connection between
circuits based on
switching control
information derived from
any source or circuit and
processed according to
the stored programme by
one or more electronic
computers;
“terminal device” —
means a data device
which:

- (a) does not include
process control
sensing and
actuating devices;
and
- (b) is capable of:
 - (1) accepting or
producing
a physical
record;
 - (2) accepting a
manual input;
or
 - (3) producing a
visual output;

“total access rate” (R_{atot})
—means the sum of the
individual access rates of
all input/output control
unit—drum or disk
drive combinations (R_{ad})
provided with the system
which can be sustained
simultaneously assuming
the configuration of
equipment which would

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maximize this total
access rate;

(Thus: $R_{\text{atot}} = \text{SUM } R_{\text{ad}}$)

“total connected
capacity” — means
the storage capacity
excluding error control
bits, word marker bits,
and flag bits;

“total data signalling
rate” — means the
sum of individual data
signalling rates of all
communication channels
which:

- (a) have been provided
with the system;
and
- (b) can be sustained
simultaneously; assuming
the configuration
of the equipment
which would
maximize this sum
of rates;

“total internal storage
available to the user” —
means the sum of the
individual capacities of
all internal user-alterable
or user-replaceable
storage devices which
maybe:

- (a) included in the
equipment at the
same time; and
- (b) used to store
software
instructions or data;

“total processing data
rate”—

- (a) of a single central
processing unit, is
its processing data
rate;
- (b) of multiple central
processing units
which do not
share direct access
to a common
main storage, is
the individual
processing data

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- rate of each central processing unit, (ie each unit is separately treated as a single central processing unit as in (a) above);
- (c) of multiple central processing units which partially or fully share direct access to a common main storage at any level, in the sum of:
- (1) the highest of the individual processing data rates of all central processing units; and
 - (2) 0.75 times the processing data rate of each remaining central processing unit sharing the same main storage;
- assuming the configuration of equipment which would maximize this sum of rates;

For the purpose of this definition:

- “processing data rate” — means the maximum of either:
- (a) the floating point processing data rate (R_f); or
 - (b) the fixed point processing data rate (R_x).

The processing data rate of a central processing unit implemented with two or more

microprocessor
microcircuits,
not including
any dedicated
microprocessor
microcircuit used
solely for display,
keyboard or input-
output control,
is the sum of
the individual
processing data
rates of all these
microprocessor
microcircuits;

“floating point
processing data rate” (R_f)
is the sum of:

- (1) 0.85 times the
number of bits
in a fixed point
instruction (n_{ix})
or 0.85 times the
number of bits in
a floating point
instruction (n_{if}),
if no fixed point
instructions are
implemented;
- (2) 0.15 times the
number of bits in
a floating point
instruction (n_{if});
- (3) 0.40 times the
number of bits in a
fixed point operand
(n_{ox}) or 0.40 times
the number of
bits in a floating
point operand (n_{of})
if no fixed point
instructions are
implemented; and
- (4) 0.15 times the
number of bits in
a floating point
operand (n_{of});

divided by the sum of:

- (1) 0.85 times the
execution time
for a fixed point
addition (t_{ax}) or

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- for a floating point addition (t_{af}) if no fixed point instructions are implemented;
- (2) 0.09 times the execution time for a floating point addition (t_{af}); and
- (3) 0.06 times the execution time for a floating point multiplication (t_{mf}) or for the fastest available subroutine (t_{msub}) to simulate a floating point multiplication instruction, if no floating point multiplication instructions are implemented;

(Thus:

$$R_f = \frac{(0.85)n_{ix} + (0.15)n_{if} + (0.40)n_{ox} + (0.15)n_{of}}{(0.85)t_{ax} + (0.09)t_{af} + (0.06)t_{mf}}$$

Or if no fixed point instructions are implemented, then:

$$R_f = \frac{(1.00)n_{if} + (0.55)n_{of}}{(0.94)t_{af} + (0.06)t_{mf}}$$

Or if no floating point multiplication instructions are implemented ($t_{mf} = t_{msub}$) then:

$$R_f = \frac{(0.85)n_{ix} + (0.15)n_{imf} + (0.40)n_{ox} + (0.15)n_{of}}{(0.85)t_{ax} + (0.09)t_{af} + (0.06)t_{msub}}$$

)

If a digital computer has neither floating point addition nor floating point multiplication instructions, then its floating point processing data rate is equal to zero.

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“fixed point processing data rate” (R_x) is the sum of:

- (1) 0.85 times the number of bits in a fixed point addition instruction (n_{iax});
- (2) 0.15 times the number of bits in a fixed point multiplication instruction (n_{imx}); and
- (3) 0.55 times the number of bits in a fixed point operand (n_{ox});

divided by the sum of:

- (1) 0.85 times the execution time for a fixed point addition (t_{ax}); and
- (2) 0.15 times the execution time for a fixed point multiplication (t_{mx}) or for the fastest available subroutine (t_{msub}) to simulate a fixed point multiplication instruction if no fixed point multiplication instructions are implemented;

(Thus

$$R_x = \frac{(0.85)n_{iax} + (0.15)n_{imx} + (0.55)n_{ox}}{(0.85)t_{ax} + (0.15)t_{mx}}$$

Or if no fixed point multiplication instructions are implemented ($t_{mx} = t_{msub}$) then:

$$R_x = \frac{(0.85)n_{iax} + (0.15)n_{imx} + (0.55)n_{ox}}{(0.85)t_{ax} + (0.15)t_{msub}}$$

)

If a digital computer has neither fixed point addition nor fixed point multiplication instructions, then its fixed point processing data rate is equal to zero;

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The number of bits in a:
‘fixed point addition
instruction (n_{iax})—
fixed point multiplication
instruction (n_{imx})—
floating point addition
instruction (n_{iaf})—
floating point
multiplication instruction
(n_{imf})—
is the appropriate shortest
single fixed or floating
point instruction length
which permits full direct
addressing of the main
storage;

NOTE:

1. When
multiple
instructions
are required
to simulate an
appropriate
single
instruction,
the number
of bits in
the above
instructions
shall be taken
to be 16
bits plus the
number of
bits (b_{iax} , b_{imx} ,
 b_{iaf} , b_{imf})
which permits
full direct
addressing
of the main
storage.

(Thus
 $n_{iax} = 16$
 $+ b_{iax}$;
 $n_{imx} =$
 $16 +$
 b_{imx} ;
 $n_{iaf} = 16$
 $+ b_{iaf}$;
 $n_{imf} =$
 $16 +$
 b_{imf} ;

2. If the addressing capability of an instruction is expanded by using a base register, then the number of bits in an instruction, fixed or floating point, addition or multiplication is the number of bits in the instruction with the standard address length including the number of bits necessary to use the base register;

The number of bits in a fixed point operand (n_{ox}) is

- (a) the shorted fixed point operand length; or
 - (b) 16 bit;
- whichever is greater;

The number of bits in a floating point operand (n_{ox}) is

- (a) the shortest floating point operand length; or
 - (b) 30 bit;
- whichever is greater;

“execution time” is

- (a) the time certified or published by the manufacture for the execution of the fastest appropriate instruction, under the following conditions;
 - (1) no indexing or indirect operations are included;

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- (2) the instruction is in the most immediate storage;
 - (3) one operand is in the accumulator or in a location of the most immediate storage which is acting as the accumulator;
 - (4) the second operand is in the most immediate storage; and
 - (5) the result is left in the accumulator or the same location in the most immediate storage which is acting as the accumulator;
- (b) if only the maximum and minimum execution times of the instructions are published, the sum of:
- (1) the maximum execution time of an instruction (t_{\max}); and
 - (2) twice the minimum execution time of this instruction (t_{\min}); divided by three

$$\text{(Thus; } t = \frac{t_{\max} + 2t_{\min}}{3}$$

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- (t stands for any of the values (t_{ax} , t_{af} , t_{mx} ,) or t_{mf}));
- (c) for central processing units which simultaneously fetch more than one instruction from one storage location, the average of the execution times when executing instructions fetched from all possible locations within the stored word;
- (d) if the longest fixed point operand length is smaller than 16-bit, the time required for the fastest available subroutine to simulate a 16 bit fixed point operation;

NOTES:

1. If the addressing capability of an instruction is expanded by using a base register, then the execution time shall include the time for adding the content of the base register to the address part of the instruction.
2. When calculating processing data rate for computers with cache sizes smaller than 64K Bytes, the execution time of the appropriate instructions will be calculated as follows:

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(cache hit
rate) \times
(execution
time when
both
instruction
and operand
are in cache
storage) +
(1 – cache
hit rate) \times
(execution
time when
neither
instruction
nor operand
are in cache
storage)

The cache hit rate
being:

1.00 for cache
size of 64k
Byte
0.95 for cache
size of 32k
Byte
0.90 for cache
size of 16k
Byte
0.85 for cache
size of 8K
Byte
0.75 for cache
size of 4K
Byte

“total transfer rate”—

- (a) of the input/output
control unit-drum,
disk or cartridge-
type streamer tape
drive combinations
(R_{tdtot}), means
the sum of the
individual transfer
rates of all input/
output control
unit-drum, disk
or cartridge-type
streamer tape drive
combinations (R_{td})
provided with
the system which

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- can be sustained
simultaneously
assuming the
configuration of
equipment which
would maximize
this sum of rates;
(Thus: $R_{tdto} = R_{td}$)
- (b) Of the input/
output control unit-
magnetic tape drive
combination (R_{ttot}),
means the sum
of the individual
transfer rates of all
input/output control
unit-magnetic tape
drive combinations
(R_{tt}) provided with
the system which
can be sustained
simultaneously
assuming the
configuration of
equipment which
would maximize
this sum of rates;
(Thus: $R_{ttot} = R_{tt}$)
- (c) of the input/output
or communication
control unit-
directly connected
data channel
combinations
means the sum
of the individual
transfer rates of
all data channels
provided with
the system which
can be sustained
simultaneously
assuming the
configuration of
equipment which
would maximize
this sum of rates;

For the purpose of this
definition—

- “transfer rate”—
- (1) of an input/output
control unit-drum

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or disk drive
combination (R_{td}),
is the smaller of
either:

- (i) the input/
output control
unit transfer
rate (R_{tc}); or
- (ii) the sum of
the individual
transfer
rates of all
independent
seek
mechanisms
(R_{ts});

(Thus: $R_{td} = \min (R_{tc};$
SUM $R_{ts})$)

- (1) of an input/output
control unit (R_{tc}):

- (i) with
rotational
position
sensing (rps),
is the product
of:
 - (a) the
number
of
independent
read/
write
channels
(C); and
 - (b) the
greatest
maximum
bit
transfer
rate
($R_{tsmaxmax}$)
of all
independent
seek
mechanisms;

- or
- (ii) without
rotational
position
sensing
(rps), is two

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thirds of this
product.

(Thus:

$$R_{tc} = C. R_{tsmaxmax}$$

(with rps); or

$$R_{tc} = C. R_{tsmaxmax} \text{ (with rps); or}$$

$$R_{tc} = \frac{2 C. R_{tsmaxmax}}{3} \text{ (without (rps))}$$

- (1) of an independent seek mechanism (R_{ts}), is the product of:
 - (i) the maximum bit transfer rate (R_{tsmax}); and
 - (ii) the rotational period (t_r); divided by the sum of:
 - (i) the rotational period (t_r);
 - (ii) the minimum seek time (t_{smin}); and
 - (iii) the latency time (t_l);

$$\text{(Thus: } R_{ts} = \frac{R_{tsmax} \times t_r}{t_r + t_{smin} + t_l} \text{)}$$

)

(For this purpose—
“minimum seek time” (t_{smin})
—

- (1) for fixed dead devices, is zero; or
- (2) for moving head or moving media devices, is the rated time to move from

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one
track
to an
adjacent
track;

“latency
time” (t_l)—
the rotational
period
divided by
twice the
number of
independent
read/write
heads per
track);

- (1) of an input/
output control
unit-cartridge-
type streamer or
magnetic tape drive
combination (R_{tt}) is

the product of:

- (1) the number of
independent read/
write channels (C);
and
- (2) the greatest
maximum bit
transfer rate
($R_{ttmaxmax}$) of all
tape drives;
(Thus: $R_{tt} =$
 $C \cdot R_{ttmaxmax}$.)

“transfer rate
of any data
channel” —
means the
sum of the
individual
bit transfer
rates of all
the other
peripheral
devices,
excluding
terminal
devices,
which can
be sustained
simultaneously

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on the data
channel;
“user-
accessible
microprogrammability” —
means the
facility
allowing
a user to
insert, modify
or replace
microprogrammes;
“user-
accessible
programmability” —
means the
facility
allowing
a user to
insert, modify
or replace
programmes
by means
other than:
(a) a
physical
change
in
wiring
or
interconnections;
or
(b) the
setting
of
function
controls
including
entry of
parameters;
“virtual
storage” —
means the
storage space
that may be
regarded as
addressable
main storage
by the user of
a computer
system in
which virtual
addresses

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are mapped
into real
addresses;
(The size of
virtual storage
is limited by
the addressing
scheme of
the computer
system
and not by
the actual
number of
main storage
locations.)
“wide area
network” —
means a data
communication
system which:
(a) allows
an
arbitrary
number
of
independent
data
devices
to
communicate
with
each
other;
(b) may
include
local
area
networks;
and
(c) is
designed
to
interconnect
geographically
dispersed
facilities;

IL1566

Software and technology
therefor, the following—

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NOTE:

Software for equipment described in entry IL1565 is dealt with in this entry. Specially designed ODMA software for the use of equipment described in other entries in this Schedule, except entry IL1565 is dealt with in the appropriate entry.

- (a) Software, the following—
- (1) software designed or modified for any computer that is part of a computer series designed and produced in any country specified in Part A of Schedule 2 to this Order except application software designed for and limited to— C
- (i) accounting, general ledger, inventory control, payroll, accounts receivable, personnel records, wages calculation or invoice control;
- (ii) data and text manipulation such as sort/merge, text editing, data entry or word processing;
- (iii) data retrieval from established data files for purposes of report generation or inquiry for the functions described in (i) or (ii) above; or
- (iv) the non real time processing of pollution sensor data at fixed sites or in civil vehicles for civil environmental monitoring purposes;

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(2) software designed or modified for the design, development or production of items specified in this Schedule C

(3) Software designed or modified for—

(i) computers specified in entry IL1565 in this Group C

(ii) one or more of the functions specified in sub-heads (h)(1)(i)(a) to (j) or (m) or excluded by exception (vi) to head (h) of entry IL1565 or for digital computers or related equipment designed or modified for such functions, C

except ODMA software in machine executable form for digital computers and related equipment therefor which are excluded by exception (i) or (ii) to head (h) of the entry IL1565 and only when supplied with the equipment or systems

NOTE:

Software for equipment excluded by exception (vi) to head (h) of entry IL1565 which may contain file server or printer server functions above Layer 2 of the Open System Interconnection (OSI) reference model provided the protocols do not contain level 3 of CCITT X25 or equivalent function.

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- (4) software for computer-aided design, manufacture, inspection or test of items specified in this Schedule C
- (5) software designed or modified to provide certifiable multilevel security or certifiable user-isolation applicable to government-classified material or to applications requiring an equivalent level of security, or software to certify such software C
- (b) (b) Categorized software, the following—
 - (1) development systems the following—
 - (i) development system employing high-level language and designed for or containing programmes or databases special to the development or production of:
- (a) specially designed software specified elsewhere in this Schedule C
- (b) software specified in sub-heads (a)(2) or (3) of this entry, including any subset designed or modified C

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for use as part of such
a development system

- (ii) development systems C
employing high-level
language and designed
for or containing
the software tools
and databases for
the development or
production of software
or any subset designed
or modified for use as
part of a development
system such as, or
equivalent to:

- (a) Ada Programming C
Support Environment
(APSE):

- (b) any subset of APSE,
the following:

- (1) Kernel APSE C

- (2) Minimal APSE C

- (3) Ada compilers C
specially designed as
an integrated subset of
APSE or

- (4) any other subset of C
APSE

- (c) any superset of APSE C
or

- (d) any derivative of C
APSE

- (2) programming systems,
the following—

- (i) cross-hosted C
compilers and cross-
hosted assemblers

- (ii) compilers or C
interpreters designed
or modified for use as
part of a development
system specified in
sub-head (1) above

- (iii) disassemblers, C
decompilers or other
software which

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convert programmes
in objects or assembly
language into a higher
level language, except
simple debugging
application software
such as mapping,
tracing, check-point/
restart, breakpoint,
dumping and the
display of the storage
contents or their
assembly language
equivalent

- (3) diagnostic systems or C
maintenance systems
designed or modified
for use as part of a
development system
specified in sub-head (1)
above

- (4) operating systems, the
following—

- (i) operating systems C
designed or modified
for digital computers
or related equipment
exceeding any of the
following limits:

- (a) central processing
unit—main storage
combinations:

- (1) total processing data
rate—48 million bit
per second;

- (2) total connected
capacity of main
storage—25.2 million
bit;

- (3) virtual storage
capability—512
MByte;

- (b) input/output control
unit—drum, disk
or cartridge-type
streamer tape drive
combinations:

- (1) total transfer rate 15
million bit per second;

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- (2) total access rate 320 accesses per second;
 - (3) total connected net capacity—7,000 million bit;
 - (4) maximum bit transfer rate of any drum or disk drive—10.3 million bit per second;
 - (c) input/output control unit—bubble memory combinations:
 - total connected net capacity—2.1 million bit;
 - (d) input/output control unit—magnetic tape drive combinations:
 - (1) total transfer rate—5.2 million bit per second;
 - (2) number of magnetic tape drives—twelve;
 - (3) maximum bit transfer of any magnetic tape drive—2.6 million bit per second;
 - (4) maximum bit packing density—63 bit per mm per track;
 - (5) maximum tape read/write speed—508 cm per second;
- except operating systems designed or modified for digital computers or related equipment:
- (a) not exceeding the above limits even when the operating systems can also be used on digital computers or related equipment exceeding the above limits; or
 - (b) belonging to a series containing models exceeding the above limits, if the operating

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systems are used on digital computers or related equipment of the series which do not exceed the above limits.

- (ii) operating systems providing on-line transaction data processing which permit integrated teleprocessing and on-line updating of databases C

(5) application software, the following—

- (i) software for cryptologic or cryptanalytic applications C

- (ii) artificial intelligence software, including software, normally classified as expert systems, which enables a digital computer to perform functions that are normally associated with human perception and reasoning or learning C

- (iii) database management systems which are designed to handle distributed databases for:

- (a) fault tolerance by using techniques such as maintenance of duplicated databases C

- (b) integrating data at a single site from independent remote databases C

- (iv) software designed to adapt software resident on one digital computer for use C

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on another digital
computer

- (c) (c) Technology D
applicable to the
development,
production or use
(namely installation,
operation and
maintenance) of
software, whether or
not such software
is specified in this
Schedule

except—

- (1) technology
generally available
to the public or
(2) the minimum
technology
necessary for the
use of software not
specified in this
Schedule
(NOTE: In this
head, technology
does not include
software)

There shall be excluded
from this entry

- (1) software not
exceeding 5,000
statements in
source language,
excluding data,
provided—
(a) the software
is neither
designed or
modified
for use as
a module
of a larger
software
module
or system
which in total
exceeds this
limit; and
(b) the software
is not
specified in

- sub-head (b)
(5) above.
- (2) software initially exported to a destination specified in Part A of Schedule 2 to this Order prior to 1st January, 1984, provided that—
 - (a) the software which is identical to and in the same language form (source or object) as initially exported, allowing minor updates for the correction of errors which do not modify the initially exported functions;
 - (b) the accompanying documentation does not exceed the level of the initial export; and
 - (c) the software is exported to the same destination as the initial export.
- (3) software specified in sub-head (a) or (b) above which is either—
 - (a) standard commercially available software:
 - (1) designed for installation

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- by the user
without
further
support by the
supplier;
- (2) designed for
use on digital
computers
which do not
exceed a total
processing
data rate of 15
million bit per
second; and
- (3) generally
available to
the public; or
(For this
purpose
“generally
available to
the public”
means:
 - (a) available at
retail selling
points, other
than those
specialized
in selling
electronic
computers to
the general
public in
model series
exceeding the
limit in (2)
above; and
 - (b) selling by
means of
over-the-
counter
transactions
from stock.)
 - (c) software in
the public
domain.

In this entry—

“application software” —
means software not
falling within any of the
other defined categories
of software that is to say,

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other than development systems, diagnostic systems, maintenance systems, operating systems or programming systems;

“cross-hosted” — means, for programming systems, those which produce programmes for a model of electronic computer different from those used to run the programming system, namely they have code generators for equipment different from the host computer;

“database” — means a collection of data, defined for one or more particular applications, which is physically located and maintained in one or more electronic computers or related equipments;

“database management systems” — means application software to manager and maintain a database in one or more prescribed logical structures for use by other application software independent of the specific methods used to store or retrieve the database;

“development systems” — means software to develop or produce software and software to manage those activities. Examples of a development system are programming support environments, software development environments, and programmer-productivity aids;

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“diagnostic systems” —
means software to isolate
or detect software or
equipment malfunctions;

“digital computer” —
means equipment which
can, in the form of one or
more discrete variables;

- (a) accept data;
- (b) store data or
instructions in
fixed or alterable
(writable) storage
devices;
- (c) process data
by means of a
stored sequence of
instructions which
is modifiable; and
- (d) provide output
data;

For this purpose
modification of a
stored sequence of
instructions include
replacement of fixed
storage devices, but not
physical change in wiring
or interconnections.

“distributed database” —
means a database which
is physically located
and maintained in part
or as a whole in two or
more interconnected
electronic computers
or related equipment,
such that inquiries from
one location can involve
database access in other
interconnected electronic
computers or related
equipment;

“high-level language” —
means a programming
language that does not
reflect the structure of
any one given electronic
computer or that of
any one given class of
electronic computers;

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- “maintenance systems” — means software to:
- (a) modify software or its associated documentation in order to correct faults, or for other updating purposes; or
 - (b) maintain equipment;
- “object code” or “object language”—see “programming system”;
- “on-line updating” — means processing in which the contents of a database can be amended within a period of time useful to interact with an external request;
- “operating systems” — means software to control;
- (a) the operation of a digital computer or of related equipment; or
 - (b) the loading or execution of programmes;
- “programming systems” — means software to convert a convenient expression of one or more processes (source code or source language) into equipment executable form (object code or object language);
- “related equipment” — means the following equipment embedded in, incorporated in or associated with electronic computers:
- (a) equipment for interconnecting analogue computers with digital computers;

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- (b) equipment for interconnecting digital computers;
- (c) equipment for interfacing electronic computers to local area networks or to wide area networks;
- (d) communication control units;
- (e) other input/output (I/O) control units;
- (f) recording or reproducing equipment referred to entry IL1565 by entry IL1572;
- (g) displays; or
- (h) other peripheral equipment;

“self-hosted” — means for programming systems, those which produce programmes for the same model of electronic computer as that used to run the programming system, that is they only have code generators for the host computer;

“source code” or

“source language”—see

“programming system”;

“standard commercially available” — means for software, that which is:

- (a) commonly supplied to general purchasers or users of equipment outside any country specified in Schedule 2 of this Order, but not precluding the personalization of certain parameters for individual customers wherever located;

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- (b) designed and produced for civil application;
- (c) not designed or modified for any digital computer which is part of a digital computer series designed and produced within any country specified in Schedule 2 of this Order; and
- (d) supplied in a commonly distributed form.

Any term used in this entry shall bear the meaning as it has in entry IL1565 in this Group.

IL1567

Stored-programme-controlled communication switching equipment or systems and technology therefor, the following: specially designed components therefor and specially designed software for the use of these equipment or systems—

- (a) (a)Communication C equipment or systems for data (message) switching, including those for local area networks or for wide area networks

except data (message switching equipment or systems provided that—

- (1) the equipment or systems are designed for fixed civil use according to the requirements of either—
 - (i) CCITT Recommendations F.1 to F.79 for store-and-forward

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- systems
(Volume II-
Fascicle II.4,
VIIth plenary
assembly,
10th—21st
November,
1980); or
 - (ii) ICAO
Recommendations
for store-
and-forward
civil aviation
communication
networks
(Annex
10 to the
Convention
on
International
Civil
Aviation,
including all
amendments
agreed up to
and including
14th
December
1981);
- (2) the number, type
and characteristics
of such equipment
or systems are
normal for the
application;
- (3) such equipment or
systems are limited
as follows—
 - (i) the maximum
data
signalling
rate of any
circuit does
not exceed
4,800 bit/s;
and
 - (ii) the sum of
the individual
data
signalling
rates of all
circuits does

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- not exceed
27,500 bit/s;
- (4) the equipment or
systems do not
contain digital
computers or
related equipment
specified by—
 - (i) head (f) to
entry IL1565
in this Group;
 - (ii) sub-heads (h)
(1)(a) to (j)
(inclusive),
(1) or (m) to
entry IL1565
in this Group;
 - (iii) sub-head (h)
(2) to entry
IL1565 in this
Group;
- (5) the software
supplied—
 - (i) is limited to:
 - (a) the minimum
specially
designed
software
necessary for
the use of the
equipment or
systems; and
 - (b) machine-
executable
form; and
 - (ii) does not
include
software:
 - (a) specified in
entry IL1527
in Group 3F,
sub-head (a)
(5) in entry
IL1566 in
this Group or
entry ML11
in Group 1, or
 - (b) to permit
user-
modification
of generic
software or

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its associated
documentation.

- (b) (b)Communication C
equipment or systems
for stored-
programme-
controlled circuit
switching

except—

- (1) key telephone
systems, provided
that—
 - (i) access to
an external
connection
is obtained
by pressing a
special button
(key) on a
telephone,
rather than
by dial or
key-pad as
on a private
automatic
branch
exchange
(PABX);
 - (ii) they are not
designed to
be upgraded
to PABXs;
 - (iii) the software
supplied:
 - (a) is limited to
the minimum
specially
designed
software
necessary for
the use of the
equipment or
systems; and
 - (b) does not
include
software:
 - (1) specified in
entry IL1527,
in Group
3F, sub-
head (a)(5)
of the entry

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- IL1566 in
this Group or
entry ML11
in Group 1, or
- (2) to permit
user-
modification
of generic
software or
its associated
documentation;
- (2) stored programme
controlled
circuit switching
equipment or
systems, provided
that—
 - (i) the equipment
or systems
are designed
for fixed civil
use in stored
programme
controlled
telegraph
circuit
switching the
data;
 - (ii) the number,
type and
characteristics
of such
equipment or
systems are
normal for the
application;
 - (iii) the equipment
or systems do
not contain
digital
computers
or related
equipment
specified in
head (f) of
entry IL1565
or sub-heads
(h)(1)(a) to
(k) or (m) of
entry IL1565
or sub-head
(h)(2) of entry

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- IL1565 in this Group;
- (iv) the equipment or systems do not have either of the following features:
 - (a) multi-level call pre-emption including over-riding or seizing of busy subscriber lines, trunk circuits or switches or;
 - (b) common channel signalling;
- (vii) the maximum internal bit rate per channel does not exceed 9,600 bit/s;
- (vi) the telegraph circuits, which may be telephone circuits, may carry any type of telegraph or telex signal compatible with a voice channel bandwidth of 3,100 Hz as defined in CCITT Recommendation G151; and
- (vii) the software supplied:
 - (a) is limited to:
 - (1) the minimum specially designed software

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- necessary for
the use (ie
installation,
operation and
maintenance)
of the
equipment or
systems; and
- (2) machine-
executable
form; and
- (b) does not
include
software:
 - (1) specified
in the entry
IL1527 in
Group 3F
or sub-head
(a)(5) of
the entry
IL1566 in
this Group or
entry ML11
in Group 1;
 - (2) to permit
user-
modification
of generic
software or
its associated
documentation;
- (3) stored programme
controlled
telephone circuit
switching
equipment or
systems, provided
that—
 - (i) the equipment
or systems
are designed
for fixed civil
use as space-
division
analogue
exchanges or
time-division
analogue
exchanges
which, in
either case
fulfil the

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- definition
of private
automatic
branch
exchanges
(PABXs);
- (ii) the equipment
or systems do
not contain
digital
computers
or related
equipment
specified in
head (f), sub-
heads (h)(1)
(a) to (k) or
(m) or sub-
head (h)(2) of
entry IL1565
in this Group;
- (iii) communication
channels
or terminal
devices
used for
administrative
and control
purposes:
 - (a) are fully
dedicated
to these
purposes; and
 - (b) do not
exceed a
maximum
data
signalling rate
of 9,600 bit
per second;
- (iv) voice
channels are
limited to
3,000 Hz
as defined
in CCITT
Recommendation
G151;
- (vi) the PABXs
do not have
either of the
following
features:

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- (a) multi-level
call pre-emption
including
overriding
or seizing
of busy
subscriber
lines, trunk
circuits or
switches; or
- (b) common
channel
signalling;
and
- (vii) the software
supplied:
 - (a) is limited to:
 - (1) the
minimum
specially
designed
software
necessary
for the use
(namely
installation,
operation and
maintenance)
of the
equipment or
systems; and
 - (2) machine-
executable
form; and
 - (b) does not
include
software:
 - (1) specified in
entry IL1527
in Group 3F,
sub-head (a)
(5) in entry
IL1566 in
this Group or
entry ML11
in Group 1; or
 - (2) to permit
user-
modification
of generic
software or

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its associated
documentation;

- (c) (c) Technology D
applicable to the
development,
production or use
(namely installation,
operation and
maintenance) of
stored-programme-
controlled
communication
switching equipment
or systems, even
if such equipment
or systems are not
specified in this entry

except—
the minimum technical
information necessary
for the use of stored-
programme-controlled
communication
switching equipment or
systems which are not
specified in this entry.

In this entry—

“affiliated equipment”
means the following
equipment:

- (a) input/output (I/O)
control units;
- (b) recording or
reproducing
equipment;
- (c) displays; or
- (d) other peripheral
equipment;

“common channel
signalling” — means
a signalling method in
which a single channel
between exchanges
conveys, by means
of labelled messages,
signalling information
relating to a multiplicity
of circuits or calls and
other information such
as that used for network
management;

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“communication channel” — means the transmission part or circuit including the terminating transmission and receiving equipment (modems) for transferring digital information between distant locations;

“data device” — means equipment capable of transmitting or receiving sequences of digital information;

“data (message) switching” — means the technique, including but not limited to store-and-forward or packet switching, for:

- (a) accepting data groups (including messages, packets, or other digital or telegraphic information groups which are transmitted as a composite whole);
- (b) storing (buffering) data groups as necessary;
- (c) processing part or all of the data groups, as necessary, for the purpose of:
 - (1) control (routing, priority, formatting, code conversion, error control, retransmission or journaling);
 - (2) transmission; or
 - (3) multiplexing; and

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- (d) retransmitting
(processed) data
groups when
transmission or
receiving facilities
are available;
- “a signalling rate” —
means the rate as defined
in ITU Recommendation
53-36, taking into
account that, for non-
binary modulation, baud
and bit per second are
not equal. Binary digits
for coding, checking,
and synchronization
functions are included;
(Note: It is the maximum
one-way rate, namely
the maximum rate in
either transmission or
reception.)
- “digital computer” —
means equipment which
can, in the form of one or
more discrete variables:
- (a) accept data;
 - (b) store data or
instructions in
fixed or alterable
(writable) storage
devices;
 - (c) process data
by means of a
stored sequence of
instructions which
is modifiable; and
 - (d) provide output of
data;
- “embedded” in
equipment or systems
means can feasibly be
neither:
- (a) removed from
such equipment or
systems; and
 - (b) used for other
purposes;
- “fast select” — means
a facility applicable
to virtual calls which
allows a data terminal
equipment to expand the

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possibility to transmit data in call set-up and clearing packets beyond the basic capabilities of a virtual call;

“local area network” — means a data communication system which:

- (a) allows an arbitrary number of independent data devices to communicate directly with each other; and
- (b) is confined to a geographical area of moderate size (eg office building, plant, campus, warehouse);

“PABX”—see “private automatic branch exchange”;

“packet” means a group of binary digits including data and call control signals which is switched as a composite whole. The data, call control signals and possibly error control information are arranged in a specified format;

“packet-mode operation” means the transmission of data by means of addressed packets whereby a transmission channel is occupied for the duration of the packet only. The channel is then available for use by packets being transferred between different data terminal equipments. In certain data communication networks the data may be formatted into a packet or divided and then formatted into

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a number of packets (either by the data terminal equipment or be equipment within the network) for transmission and multiplexing purposes;
“private automatic branch exchange” — means an automatic telephone exchange, typically incorporating a position for an attendant, designed to provide access to the public network and serving extensions in an institution such as a business, government, public-service or similar organization;
“space-division analogue exchange” — means a space-division exchange, using an analogue (including sampled analogue) signal within the switching matrix. Such exchanges can route digital signals, subject to the bandwidth limitations of the equipment. Thus, such exchanges in public networks commonly pass digital data at rates of several kilobit per second per voice channel of 3,100 Hz as defined in CCITT Recommendation G151;
“space-division digital exchange” — means a space-division exchange which accommodate the transmission through the switching matrix of digital signals requiring a bandwidth wider than a voice channel of 3,100 Hz as defined in CCITT Recommendation G151;

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“space-division exchange” — means an exchange in which different streams of data or voice signals are routed through the switching matrix along physically different paths. The signal being routed through the matrix can be analogue (eg conventional amplitude modulation, pulse amplitude modulation) or digital (eg pulse code modulation, delta modulation or data);

“stored programmed controlled circuit switching” — means the technique for establishing, on demand and until released, a direct (space-division switching) or logical (time-division switching) connection between circuits based on switching control information derived from any source or circuit and processed according to the stored programme by one or more electronic computers;

“stored programme controlled telegraph circuit switching” — means techniques essentially identical to those for stored-programme-controlled telephone circuit switching, for establishing connections between telegraph (eg telex) circuits based solely on a subscriber type of signalling information;

“stored programme controlled telephone circuit switching” —

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means the technique for establishing within an exchange, on demand and until released, an exclusive direct (space-division switching) or logical (time-division switching) connection between calling and called telephone circuits):

- (a) based solely on a subscriber-type of telephone signalling information, derived from the calling circuit; and
- (b) processed according to the stored programmes by one or more electronic computers.

The telephone circuits may carry any type of signal, eg telephone or telex, compatible with a voice channel bandwidth of 3,1000 Hz or less;

“terminal device” — means a data device which:

- (a) does not include process control sensing and actuating devices; and
 - (b) is capable of:
 - (1) accepting or producing a physical record;
 - (2) accepting a manual input; or
 - (3) producing a visual output;
- (Note: Normal groupings of such equipment (eg a combination of paper tape punch/

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reader and printer)
connected to a
single data channel
or communication
channel, shall be
considered as a
single terminal
device).

“terminal exchange” —
means

- (a) a local exchange
used for
terminating
subscribers' lines;
- (b) a remote switching
unit which
performs some
functions of a
local exchange and
operates under a
measure of control
from the parent
exchange;
- (c) a local exchange,
typically 2-
wire, used as a
switching point
for traffic between
subordinate local
exchanges, which
may also provide
4-wire connections
to and from the
national long-
distance network;
or
- (d) an exchange
which performs
any combination
of functions in
paragraphs (a), (b)
and (c) above;

“time-division analogue
exchange” — means a
time-division exchange
in which the parameter,
associated with an
individual segment
of a stream of data or
voice signals, varies
continuously;

“time-division digital
exchange” — means a

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time-division exchange in which the parameter, associated with an individual segment of a stream of data or voice signals, is one of the finite number of digitally coded values;

“time-division exchange” — means an exchange in which segments of different streams of data or voice signals are interleaved in time and routed through the switching matrix along a common physical path. The matrix may also include one or more stages of space-division switching. The signal being routed through the matrix can be analogue (eg pulse amplitude modulation) or digital (eg pulse code modulation, delta modulation or data);

“total data signalling rate” — means the sum of the individual data signalling rates of all communication channels which:

- (a) have been provided with the system;
- and
- (b) can be sustained simultaneously

assuming the configuration of the equipment which would maximize this sum of rates;

“transit exchange” — means

- (a) an exchange, typically 4-wire, used as a switching point for traffic between other exchanges in the national network

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- (historically known as a trunk exchange);
 - (b) a 4-wire exchange serving outgoing, incoming or transit international calls;
 - or
 - (c) an exchange which performs any combination of functions in paragraph (a) or (b) above or those of a terminal exchange;
- “trunk circuit” — means a circuit with associated equipment terminating in two exchanges;
- “trunk exchange”—see “transit exchange”;
- “wide area network” — means a data communication system which:
- (a) allows an arbitrary number of independent data devices to communicate with each other;
 - (b) may include local area networks; and
 - (c) is designed to interconnect geographically dispersed facilities.

IL1568

Analogue-to-digital and digital-to-analogue converters, position encoders and transducers, the following: and specially designed components and test equipment therefor—

- (a) Electrical input type analogue-to-digital converters having any of the following characteristics—
 - (1) a conversion rate of more than 200,000 complete conversions per second at rated accuracy

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- (2) an accuracy in excess of 1 part in more than 10,000 of full scale over the specified operating temperature range; C
- or
- (3) a figure of merit of 1×10^8 or more (being the number of complete conversions per second divided by the accuracy). C
- (b) (b) Electrical input type digital-to-analogue converters having any of the following characteristics—
- (1) a maximum settling time of less than 3 microseconds for voltage output devices and less than 250 ns for current output devices C
- (2) an accuracy in excess of 1 part in more than 10,000 of full scale over the specified operating temperature range or C
- (3) a figure of merit (being the reciprocal of the product of the maximum settling time in seconds and the accuracy) of more than 2×10^9 for voltage output converters or 1×10^{10} for current output converters C
- (c) (c) Solid-state synchro-to-digital or digital-to-synchro converters and resolver-to-digital or digital-to-resolver converters (including multipole resolvers) having a resolution of better than ± 1 part in C

40,000 for dual speed systems

- (d) (d) Mechanical input type position encoders and transducers, excluding complex servo-follower systems, the following—

(1) rotary types having—

- (i) a resolution of better than 1 part in 265,000 of full scale or C

- (ii) an accuracy better than ± 2.5 arc-seconds C

- (2) Linear displacement types having a resolution of better than 5 micrometres C

- (e) (e) Any equipment specified in heads (a) to (d) above (inclusive) which is designed to operate below 218 K (-55°C) or above 398 K ($+125^{\circ}\text{C}$);. C

In this entry—

“settling-time” means the time required for the output to come within one-half bit of the final value when switching between any two levels of the converters.

IL1570

Thermoelectric materials and devices, the following—

- (a) (a) Thermoelectric materials with a maximum product of the figure of merit (Z) and the temperature (T in degrees K) in excess of 0.75 C

- (b) (b) Junctions and combinations of C

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junctions using any of the materials in head (a) above

- (c) (c) Heat absorbing C or electrical power generating devices containing any of the junctions in head (b) above

- (d) (d) Other C power generating devices, and specially designed components therefor, which generate in excess of 22 W per kg or of 17.70kW per cubic metre of the device's basic thermoelectric components

In this entry the figure of merit (z) equals Seebeck coefficient squared divided by the product of electrical resistivity and thermal conductivity.

IL1571

Magnetometers, magnetometer systems and related equipment, the following and specially designed components therefor—

- (a) (a) Magnetometers C and magnetometer systems having or capable of having a sensitivity better than ± 1.0 gamma ($\pm 10^{-5}$ oersteds), except magnetometers having sensitivities not better than ± 0.1 gamma ($\pm 10^{-6}$ oersteds) where the reading rate capability is no faster than once per half-second
- (b) (b) Magnetometer C test facilities able to control magnetic

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field values to
an accuracy of
1.0 gamma (10^{-5}
oersteds) or less

- (c) (c) Magnetic C
compensation
systems utilizing
digital computers,
non-magnetic
platforms and
calibration systems

In this entry—

“sensitivity” means the
visually recognized
minimum sinusoidal
signal in the frequency
range of 0.025 Hz to 1.5
Hz when signal-to-noise
ratio is higher than 1;
“specially designed
components” includes
non-magnetic pumping
lamps and heating coils,
cryogenic magnetic
componentry, enhanced
resonance gases, and
any form of dynamic
signal-processing
gradient compensation
provided as part of, or
designed for use with,
magnetometers specified
in this entry. Enhanced
resonance gases are gases
of isotopes of cesium,
rubidium and other
metals which exhibit
very sharp bands of
response to pumping
frequencies in optically
pumped magnetometers;
“magnetometer
systems” use magnetic
sensors, including those
designed to operate at
cryogenic temperatures,
compensation systems,
displays, recorders and
associated electronics for
signal processing, target
parameter detection,
gradient compensation

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and dynamic range
control.

IL1572

Recording or reproducing
equipment, recording media
and technology, the following:
and specially designed
components, accessories and
software therefor—

- (a) (a) Recording or C
reproducing
equipment using
magnetic techniques

except—

- (i) equipment specially
designed for—
 - (1) audio
programmes
on tape or
disk;
 - (2) analogue
recording or
reproducing
of video
programmes
on tape or
disk, save
magnetic
heads
mounted
on servo-
mechanisms
which include
piezoelectric
transducers
and have a
gap width
less than 0.75
micrometre;
or
 - (3) digital
reproducing
(ie play-back
only) of video
programmes
from tape or
disk;
- (ii) equipment specially
designed to use
magnetic card,
tag, label or bank
cheque recording

- media with a magnetic surface area not exceeding 85 cmsup2;;
- (iii) analogue magnetic tape recorders, including equipment permitting the recording of digital signals (eg using a high density digital recording (HDDR) module), having all of the following characteristics—
 - (a) bandwidth at maximum speed not exceeding 300 kHz per track;
 - (b) recording density not exceeding 2,000 magnetic flux sine waves per linear cm per track;
 - (c) not including recording or reproducing heads designed for use in equipment with characteristics superior to those defined in (a) or (b) above;
 - (d) tape speed not exceeding 155 cm/s;
 - (e) number of recording tracks, excluding audio voice track, not exceeding 28;

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- (f) start-stop time
not less than
25 ms;
- (g) equipped with
tape-derived
(off-tape)
servo speed
control and
with a time
displacement
(base) error,
measured in
accordance
with
applicable
IRIG or EIA
documents
of, no less
than ± 5
microsecond;
- (h) using only
direct or FM
recording;
- (i) not
ruggedized
for military
use;
- (j) not rated for
continuous
operation
in ambient
temperatures
from below
233 K to
above 328
K (from
below -40°C
to above
 $+55^{\circ}\text{C}$); and
- (k) not specially
designed for
underwater
use;
- (iv) digital recording
or reproducing
equipment having
all of the following
characteristics—
 - (a) cassette/
cartridge
tape drives
or magnetic
tape drives

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- which do not exceed;
 - (1) a maximum bit packing density of 131 bit per mm per track; or
 - (2) a maximum bit transfer rate of 2.66 million bit per second;
 - (d) not ruggedized for military use;
 - (e) not specially designed for underwater use; and
 - (f) not rated for continuous operation in ambient temperatures from below 233 K to above 328 K (from below -40°C to above $+55^{\circ}\text{C}$).
- (b) (b) Recording or C reproducing equipment using laser beams which produce patterns or images directly on the recording surface or reproduce from such surfaces
- except—
- (i) equipment specially designed for the production of audio or video disk masters for the replication of entertainment- or education-type disks;

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- (ii) facsimile equipment such as used for commercial weather imagery and commercial wire photos and text;
 - (iii) consumer-type reproducers for audio or video disks employing non-erasable media;
 - (iv) when specially designed for gravure (printing plate) manufacturing.
- (c) (c) Graphics C instruments capable of continuous direct recording of sine waves at frequencies exceeding 20 kHz
- (d) (d) Recording C media used in equipment specified in head (a) or (b) above
- except—
- (i) magnetic tape having all of the following characteristics—
 - (a) specially designed for television recording and reproduction or for instrumentation;
 - (b) being a standard commercial product;
 - (c) not designed for use in satellite applications;

- (d) been in use in quantity for at least two years;
- (e) a tape width not exceeding 25.4 mm;
- (f) a magnetic coating thickness not less than:
 - (1) 2.0 micrometres (0.079 mil) if the tape length does not exceed 1,450 m; or
 - (2) 5.0 micrometres (0.1975 mil) if the tape length does not exceed 6,000m;
- (i) a magnetic coating material consisting of doped or undoped gamma-ferric oxide or chromium dioxide;
- (j) a base material consisting only of polyester;
- (k) a rated intrinsic coercivity not exceeding 64 kA/m (804 oersted); and
- (l) a retentivity not exceeding 0.16 T (1,600 gauss);
- (ii) magnetic tape having all of

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the following characteristics—

- (a) specially designed for television recording and reproduction or for instrumentation;
 - (b) being a standard commercial product;
 - (c) not designed for use in satellite applications;
 - (d) been in use in quantity for at least two years;
 - (e) a tape width not exceeding 50.8 mm;
 - (f) a magnetic coating material consisting of doped or undoped gamma-ferric oxide or chromium dioxide;
 - (g) a rated intrinsic coercivity not exceeding 64 kA/m (804 oersted); and
 - (h) a tape length not exceeding 1,096 m;
- (iii) video or audio magnetic tape in cassette having all of the following characteristics—
- (a) specially designed for television or audio

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- recording and reproduction;
 - (b) being a standard commercial product;
 - (c) a rated intrinsic coercivity not exceeding 1220 kA/m (1,500 oersted);
 - (d) a retentivity not exceeding 0.30 T (3,000 gauss);
 - (e) a tape length not exceeding 550 m; and
 - (f) a magnetic coating thickness not less than 2.0 micrometers;
 - (iv) computer magnetic tape having all of the following characteristics—
 - (a) designed for digital recording and reproduction;
 - (b) a magnetic coating certified for a maximum packing density of 2,460 bit per cm or 3,560 flux changes per cm along the length of the tape;
 - (c) a magnetic coating thickness not less than 3.6 micro-metres;
 - (d) a tape width not exceeding 25.4 mm;

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- (e) a tape length not exceeding 1,1000 m;
 - (f) been in civil use for at least two years; and
 - (g) the base material consists only of polyester;
- (v) computer flexible disk cartridges having both of the following characteristics—
 - (a) designed for digital recording and reproduction; and
 - (b) not exceeding a gross capacity of 17 million bit;
- (vi) rigid magnetic disk recording media having all of the following characteristics—
 - (a) being a standard commercial product;
 - (b) non servo-written;
 - (c) a packing density not exceeding 866 bit per cm;
 - (d) not exceeding 80 tracks per cm; and
 - (e) conforming to any of the following specifications:
 - (1) unrecorded single disk cartridges (from loading (2315-type))

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- designed to
meet ANSI
X3.52 1976);
 - (2) unrecorded
single disk
cartridges
(top loading
(5440-type))
designed
to meet
International
Standard ISO
3562-1976;
 - (3) unrecorded
six-disk packs
(2311 type)
designed to
meet ANSI
X3.46-1974)
or
International
Standard ISO
2864-1974(e);
or
 - (4) unrecorded
eleven-disk
packs (2316
type) de-
signed to
meet ANSI
X3.58-1977
or
International
Standard ISO
3564-1976.
 - (e) (e) Technology D
for the development,
production or use
of recording or
reproducing
equipment specified
in this entry
- except—
- (i) technology
which is unique
to equipment
excluded by
exceptions to head
(a)(i)(1), (i)(2) or
(ii), or specifically
excluded from
heads (b) or (c)

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of this entry other than technology for the design or production of—

- (a) cylindrical structures used to record or reproduce video signals in a helical scan system recorder or reproducer; or
- (b) recorded alignment tapes used in the production of recording or reproducing equipment;

- (ii) the minimum technology necessary for the use of equipment which is excluded under this entry.

- (f) (f) Technology for continuous coating of magnetic tape whether specified or not in this entry, the following—

- (1) technology for the formulation of coating material D

- (2) technology for the application of coating material to the backing D

- (g) (g) Technology for the manufacture of flexible disk recording media whether specified or not in this entry, the following—

- (1) technology for the formulation of coating material D

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(2) technology for the application of coating material to the flexible backing D

(h) (h) Technology for the development or production of rigid disk recording media described whether specified or not in this entry D

In this entry—

“recording media” — means all types and forms of specialised media used in recording techniques, including but not limited to tapes, drums, disks and matrices;

“recording density” for direct recorders—means the recording bandwidth divided by the tape speed;

“recording density” for FM recorders—means the sum of the carrier frequency and the deviation divided by the tape speed;

“packing density” for digital recorders—means the number of bits per second per track divided by the tape speed.

IL1573

Superconductive electromagnets and solenoids, the following—

(a) (a) Those which have a non-uniform distribution of current-carrying windings, measured along the axis of symmetry when specially designed for gyrotron application C

except those rated for both—

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- (1) magnetic induction of less than 1 tesla; and
- (2) overall current density in the windings of less than 10,000 A/cm²;
- (b) (b) Those C which are specially designed to be fully charged or discharged in less than one minute, provided that
 - (1) the maximum energy delivered during discharge divided by the duration of the discharge is more than 500 kJ per minute;
 - (2) the inner diameter of the current-carrying windings is more than 6 cm; and
 - (3) they are rated for magnetic induction of more than 8 tesla or overall current density in the windings of more than 10,000 A/cm².

In this entry “overall current density” means the total number of ampere-turns in the coil (ie the sum of the number of turns multiplied by the maximum current carried by each turn) divided by the total cross-section of the coil (comprising the superconducting filaments, the

	metallic matrix in which the superconducting filaments are embedded, the encapsulating material, any cooling channels, etc.).	
IL1574	<p>Electronic devices, circuits and systems specially designed for or capable of operation at temperatures below 103 K (−170°C) and containing components manufactured from superconducting materials which perform functions such as electromagnetic sensing and amplification, current switching, frequency selection or electromagnetic energy storage at resonant frequencies above 1 MHz, including the following</p> <ul style="list-style-type: none">(a) (a) Josephson-effect devices(b) Dayem bridges(c) Weak-link devices(d) Proximity-effect devices(e) Phase slip devices(f) SNS (super-normal-super) bridges(g) SIS (Superconductor-insulator-superconductor) devices(h) Quasiparticle devices or detectors <p>In this entry—</p> <p>“Dayem bridges” are superconducting thin film devices with a reduced section area which acts as a conductive weak link. This weak link has a much lower critical current than the areas it joins. Dayem bridges can act as superconducting</p>	C

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quantum interference devices (squids); “proximity-effect devices” are superconducting weak link devices whose low critical current is due to an overlay of normal metal rather than a small area. These devices can be used for the same purpose as Dayem bridges.

IL1584

Cathode-ray oscilloscopes and specially designed components therefor, including associated plug-in units, external amplifiers, pre-amplifiers and sampling devices, having any of the following characteristics—

- (a) (a) An amplifier C or system bandwidth greater than 250 MHz, where the band of frequencies over which the deflection on the cathode-ray tube does not fall below 70.7 per cent of that at maximum point measured with a constant input voltage to the amplifier
- (b) (b) A horizontal C sweep speed faster than 1 nanosecond per cm with an accuracy (linearity) better than 2 per cent
- (c) (c) Containing C or designed for use with cathode-ray tubes specified in head (c) of the entry IL1541 in Group 3F
- (d) (d) Ruggedized C to meet a military specification

(e) (e) Rated for C
operation over an
ambient temperature
range of from below
−25°C to above
+55°C

(f) (f) Using C
sampling techniques
for the analysis of
recurring phenomena
which increases the
effective bandwidth
of an oscilloscope
or time-domain
reflectometer to a
frequency greater
than 4 GHz

(g) (g) Digital C
oscilloscopes with
sequential sampling
of the input signal
at an interval of less
than 50 nanoseconds

(h) (h) Technology,
other than for
maintenance, repair
and operation,
relating to
oscilloscopes not
specified in subhead
(a) above which—

(1) Use cathode-ray tubes D
specified in head (b) of
entry IL1541 in Group F,
or

(2) Exceed an amplifier D
bandwidth of 200 MHz

IL1585

Photographic equipment and
film, the following—

(a) High speed cinema
recording cameras
and equipment the
following—

(1) cameras in which the C
film is continuously
advanced through-out
the recording period,
and which are capable
of recording at framing

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rates exceeding 13,150 frames per second, using any camera and film combination from the standard 8mm to the 90mm size inclusive

- (2) special optical or electronic devices which supplement, replace or are interchangeable with standard camera components for the purpose of increasing the number of frames per second C

(b) (b) High speed cameras in which the film does not move, and which are capable of recording at rates exceeding 1,000,000 frames per second for the full framing height of standard 35mm wide photographic film, or at proportionately higher rates for lesser frame heights or at proportionately lower rates for greater frame heights C

(c) (c) Cameras incorporating electron tubes specified in head (a) to the entry IL1555 in Group 3F C

(d) (d) Streak cameras having writing speeds of 10mm/microsecond and above C

(e) (e) Camera shutters with speeds of 50 nanoseconds or less per operation, and specialized parts and accessories therefor C

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(f) (f) Film, the following—

(1) having an intensity dynamic range of 1,000,000:1 or more C

(2) having a speed of ASA 10,000 (or its equivalent) or better or C

(3) colour film having a spectral sensitivity extending beyond 7,200 Angstroms or below 2,000 Angstroms C

(g) (g) High speed plates having an intensity dynamic range of 1,000,000:1 or more C

IL1586

Acoustic wave devices, the following: and specially designed components therefor—

(a) Surface acoustic wave and surface skimming (shallow bulk) acoustic wave devices (namely signal-processing devices employing elastic waves in materials, including but not limited to lithium niobate, lithium tantalate, bismuth germanium oxide, silicon, quartz, zinc oxide, aluminium oxide (sapphire), gallium arsenide and alpha-aluminium phosphate (berlinite)), which permit direct processing of signals, (including but not limited to convolvers, correlators (fixed, programmable and memory), oscillators, bandpass filters, delay lines (fixed and tapped) and non-linear devices) having either of the following characteristics—

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- (1) a carrier frequency of greater than 400 MHz C
- (2) a carrier frequency of 400 MHz or less (except those specially designed for home electronics and entertainment type applications) having any of the following characteristics— C
 - (i) a side-lobe rejection of greater than 45 dB;
 - (ii) a product of the maximum delay time and the bandwidth (time in microseconds and bandwidth in MHz) greater than 100;
 - (iii) a dispersive delay of greater than 10 microseconds
 - (iv) an insertion loss of less than 10 dB;
- (b) (b) Bulk (volume) acoustic wave devices (i.e. signal processing devices employing elastic waves in the various materials described in head (a) above which permit direct processing of signals at frequencies over 1GHz), including fixed delay lines, non-linear and pulse compression devices C
- (c) (c) Acousto-optic signal-processing devices employing an interaction between acoustic waves (bulk wave or surface wave) and light waves which permit the direct processing of signals or images, C

including but not
limited to spectral
analysis, correlation
and convolution

In this entry “acoustic wave
devices” means signal
processing devices employing
elastic waves made from
acousto-optic materials,
including lithium niobate,
bismuth germanium oxide,
bismuth silicon oxide, gallium
arsenide, gallium phosphide,
tellurium oxide and lead
molybdenate.

IL1587

Quartz crystals and assemblies
thereof, in worked, semi-
finished or mounted form,
except optical grade quartz
crystals, the following—

(a) Those for use as filter
elements, and having
either of the following
characteristics—

(1) designed for operation C
over a temperature range
wider than 125°C

or

(2) crystals or assemblies C
of crystals which use
the trapped energy
phenomenon and
which have more than
three series or parallel
resonances on a single
quartz element

except quartz crystals for
use as filter elements which
have either of the following
characteristics—

- (i) designed for operation as
intermediate frequency
filters operating from
10.5 to 11 MHz or from
21 to 22 MHz with
3 dB bandwidths not
exceeding 40 kHz; or
- (ii) designed for operation
as single side-band
filters operating at from

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1 to 10 mHz with 3 dB bandwidths not exceeding 4 kHz.

(b) (b) For use C as oscillator elements specially designed for temperature-controlled crystal ovens of for TCXO's specified in head (c) below, and having an average ageing rate of $\pm 1 \times 10^{-9}$ per day or better (less)

(c) (c) Temperature-compensated crystal oscillators (TCXO) having any of the following characteristics—

(1) a stability with respect C to temperature of better than ± 0.00015 per cent over their operating temperature range

(2) an operating temperature C range wider than 120°C

(3) capable of reaching to C within 1×10^{-7} of normal operating frequency or better in 3 minutes or less from switch-on at an ambient temperature of 25°C

(4) rated to have an C acceleration sensitivity of less than 1×10^{-9} of the operating frequency per g (where g = 981 cm/sec²) over a vibration test frequency range from 10 to 2,000 Hz sine wave and with a maximum level of acceleration not exceeding 20 g

(5) designed to withstand a C shock greater than 10,000 g (where g = 981 cm/

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sec²) over a period of 1
millisecond

- (6) radiation hardened to C
better than 10^{-10} of the
operating frequency per
gray (1 rad = 10^{-2} gray)

For the purpose of this entry
“quartz crystals” means quartz
crystals having piezoelectric
qualities.

Ageing rate shall be measured
over a longer period than 1
 $\times 10^{-9}$ per day at a constant
temperature of +60°C or
higher +2°C.

IL1588

Materials composed of crystals
having spinel, hexagonal,
orthorhombic, or garnet crystal
structures, thin film devices,
assemblies of the foregoing
and devices containing them,
the following—

- (a) (a) Monocrystals C
of ferrites and
garnets, synthetic
only
- (b) (b) Single
aperture forms
having either of the
following
characteristics—
- (1) switching rate of 0.3 C
microsecond or faster
at the minimum field
strength required for
switching at 40°C, or
- (2) a maximum dimension C
less than 0.45mm
except single aperture
forms which have—
- (a) a switching
time equal to or
more than 0.24
microsecond; and
- (b) a maximum
dimension of 0.30
mm or more.

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- (c) (c) Multi-aperture forms with fewer than 10 apertures having either of the following characteristics—
 - (1) switching rate of 1 microsecond or faster at the minimum field strength required for switching at 40°C, or C
 - (2) a maximum dimension less than 2.54 mm C
- (d) (d) Multi-aperture forms having 10 or more apertures C
- (e) (e) Memory storage or switching devices, the following—
 - (1) thin film, including plated wire and plated rods C
 - (2) single crystal or amorphous film magnetic bubble C
 - (3) moving domain or C
 - (4) crosstie C
- (f) (f) Magnetic ferrite materials having square loop characteristics, suitable for operations above 1 GHz and having all of the following characteristics— C
 - (1) a saturation magnetization of greater than—
 - (i) 0.2 T (2,000 gauss) for lithium-based ferrites
 - (ii) 0.3 T (3,000 gauss) for other

	than lithium-based ferrites;	
	(2) a dielectric loss tangent of less than 0.001 measured at a frequency of 1 GHz or greater;	
	(3) a ratio of the remanent magnetization (B_r) to the saturation magnetization ($4\pi M_s$) equal to or greater than 0.7.	
	(g) (g) Rod forms having any of the following characteristics—	
	(1) switching rate of 0.3 microsecond or faster at the minimum field strength required for switching at 40°C	C
	(2) a minimum dimension less than 0.254 mm	C
IL1595	Gravity meters (gravimeters), gravity gradiometers and specially designed components therefor	C
	except—	
	(a) Gravity meters for land use having either of the following characteristics—	
	(1) static accuracies of not less than 100 microgal; or	
	(2) being of the Worden type;	
	(b) Marine gravimetric systems having either of the following characteristics—	
	(1) static accuracy of 1 milligal or more; or	
	(2) an in-service (operational) accuracy of 1 milligal or more with a time to steady state registration of	

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two minutes or
greater under any
combination of
attendant corrective
compensations
and motional
influences.

GROUP 3H

Metals, Minerals and their Manufactures

In this Group, the following
definitions apply—

“Crude forms” means
anodes, balls, bars
(including notched bars
and wire bars), billets,
blocks, blooms, brickets,
cakes, cathodes, crystals,
cubes, dice, grains,
granules, ingots, lumps,
pellets, pigs, powder,
rondelles, shot, slabs,
slugs, sponge, sticks.

“Semi-fabricated forms”
means (whether or not
coated, plated, drilled or
punched)—

- (i) in the form of
wrought or worked
materials fabricated
by rolling, drawing,
extruding or
grinding, (i.e.
angles, channels,
circles, discs, dust,
flakes, foils and
leaf, forging, plate,
powder, pressings
and stampings,
ribbons, rings,
rods (including
bare welding
rods, wire rods,
and rolled wire).
Sections, shapes,
sheets, strip,
pipe and tubes
(including tube
rounds, squares,
and hollows),

	drawn or extruded wire);	
	(ii) cast material produced by casting in sand, die, metal, plaster or other types of moulds, including high pressure castings, sintered forms and forms made by powder metallurgy.	
IL1601	Inert gas and vacuum atomizing technology to achieve sphericity and uniform size of particles in metal powders regardless of the type of metal and regardless of whether or not this powder is specified in this Schedule	D
IL1602	Pyrolitic deposition technology and specially designed components related thereto the following—	
	(a) (a) Technology for producing pyrolitically derived materials formed on a mould, mandrel or other substrate from precursor gases which decompose in the 1,573 K (1,300°C) to 3,173 K (2,900°C) temperature range at pressures of 133.3 Pa to 19.995 kPa (including the composition of precursor gases, flow rates, and process control schedules and parameters)	D
	(b) (b) Specially designed nozzles for the above processes	C
IL1631	Magnetic metals of all types and of whatever form	

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having any of the following characteristics—

- (a) (a) Initial C
permeability: 0.15
henry/m (120,000
gauss/oersteds) or
more calculated
at induction 0
and magnetic field
strength 0 or the
equivalent.

Note: Measurement
of initial permeability
must be carried out on
materials which:

- (a) have a thickness between
0.076 mm and 2.54 mm;
and
(b) are fully annealed.
- (b) (b) Remanence: C
98.5% or over of
maximum magnetic
flux for materials
having magnetic
permeability
- (c) (c) Capable of C
an energy product
of 200,000 J/m³ (25
× 10⁶ gauss-oersteds)
or more
- (d) (d) Grain-oriented C
iron alloy sheets or
strips of a thickness
of 0.1mm or less
- (e) (e) Magnetostrictive
alloy having either
of the following
characteristics—
- (1) saturation C
magnetostriction more
than 5×10^{-4} or
- (2) magnetomechanical C
coupling factor (k) more
than 0.8
- (f) (f) Amorphous C
alloy strips having

both of the following characteristics

- (1) composition having a minimum 75 weight per cent of one or more of the elements iron, cobalt and nickel; and
- (2) saturation magnetic induction (Bs) of 1.6 tesla or more, and either—
 - (i) strip thickness of 0.020 mm or less; or
 - (ii) electrical resistivity of 2×10^{-4} ohm —cm or more.

IL1635

Steel alloys in crude or semi-fabricated form, which contain all of the following major alloy elements in the amounts listed by weight— C

- (a) (a) 4.5 to 5.95% nickel;
- (b) 0.3 to 1.0% chromium;
- (c) 0.2 to 0.75% molybdenum;
- (d) 0.04 to 0.15% vanadium;
- (e) Less than 0.19% carbon.

IL1648

Cobalt-based alloys (i.e. containing a higher percentage by weight of cobalt than of any other element), the following—

- (a) (a) Those C which are dispersion strengthened and contain more than 1% of oxides of thorium, aluminium, yttrium zirconium or cerium

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- (b) (b) Those C
containing 0.05% or
more of scandium,
yttrium, didymium,
cerium, lanthanum,
neodymium, or
praseodymium
- IL1661 Nickel-based alloys (i.e.
containing a higher percentage
by weight of nickel than
of any other element), the
following—
- (a) (a) Those C
which are dispersion
strengthened and
contain more than 1%
of oxides of thorium,
aluminium, yttrium,
zirconium, cerium, or
lanthanum
- (b) (b) Those C
containing 0.05%
or more scandium,
yttrium, didymium,
cerium, lanthanum,
neodymium, or
praseodymium
- (c) (c) Those C
containing 10% or
more by weight
of aluminium in
the form of nickel
aluminide, in crude
or semi-fabricated
forms, and scrap
thereof
- IL1672 Titanium-based alloys C
containing 12% or more by
weight of aluminium in the
forms of titanium aluminide, in
crude or semi-fabricated forms,
and scrap thereof
- IL1675 Superconductive materials C
of all types and processed
conductors containing at
least one superconducting
constituent, which are designed
for operation at temperatures
below 103 K (−170°C)

except

Processed conductors having
superconducting filaments
embedded in a copper or
copper-based mixture matrix
and either of the following sets
of characteristics—

either:

- (a) (i) the
superconducting
constituent, when
evaluated in sample
lengths of less than
one metre, does
not remain in the
superconducting
state when exposed
to a magnetic
induction in
excess of 12T at a
temperature of 4.2
K (-268°C);
- (ii) the
superconducting
constituent or
filament has a
cross-section
area greater than
 $3.14 \times 10^{-4} \text{ mm}^2$
(20-micrometre
diameter for
circular filaments);
and
- (iii) the conductor is
either non-coated
or insulated with
varnish, glass
fibre, polyamide or
polyimide;

or

- (b) (i) containing
niobium-titanium
wire;
- (ii) having a filament
cross-sectional
area of more than
 $9.5 \times 10^{-5} \text{ mm}^2$
(11-micrometre
diameter for

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- circular filaments)
or greater; and
(iii) a mass of each
processed
conductor including
the matrix not
exceeding 10 kg.

(Note: Superconductive materials are metals, alloys and compounds which lose electrical resistance near absolute zero of temperature, i.e. they have infinite electrical conductivity and can carry very large electrical currents without Joule heating. The superconducting state for each material is individually characterised by a critical temperature, a critical magnetic field (which is a function of temperature) and a critical current density (which is a function of both magnetic field and temperature). Materials remain in the superconducting state provided temperature, magnetic field and current density are all less than the critical values.)

PL7001	Aluminium alloys, the following: tubes, bars or forged forms having an outside diameter greater than 75mm and less than 400mm and a tensile strength of 460×10^6 N/m ² or greater	W
PL7002	Maraging steel alloy capable of ultimate tensile strength of 2.050×10^9 N/m ² or greater, whether or not finally heat treated, in crude, semi-fabricated or fabricated form	W
PL7012	Tantalum (or Tantalum lined) crucibles for casting actinide metals	W

GROUP 3I

Chemicals, Metalloids and Petroleum Products

IL1702	<p>Hydraulic fluids which contain C as the principal ingredient petroleum (mineral) oils, synthetic hydrocarbon oils, non-fluorinated silicones or fluorocarbons and which have all of the following characteristics—</p> <ul style="list-style-type: none">(a) (a) a flash point of greater than 477 K (204°C);(b) a pour point of 239 K (−34°C) or lower;(c) a viscosity index of 75 or greater; and(d) thermally stable at 616 K (343°C).
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Notes

“Flash point” is determined using the “Cleveland Open Cup Method” as shown in ASTM D—92 or national equivalents.

The following is the test procedure for determining thermal stability:

Twenty cc of the fluid under test shall be placed in a 46 cc type 317 stainless steel chamber containing one each of 0.25 cm (nominal) diameter balls of M—10 tool steel, 52100 steel and naval bronze (60% Cu, 39% Zn, 0.75% Sn). The chamber shall be purged with nitrogen, sealed at atmospheric pressure and

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the temperature raised to 644 ± 6 K ($371 \pm 6^\circ\text{C}$), and maintained at this temperature for six hours.

The specimen will be considered thermally stable if at the completion of the above procedure all of the following conditions are met:

- (1) the loss in weight of each ball is less than 0.1 mg/sq cm of ball surface;
- (2) the change in original viscosity as determined at 38°C is less than 25% when measured in the centistokes system of units;
- (3) the total acid or base number is less than 0.40.

The viscosity index is a term used to express the ratio of the viscosity values measured at 311 K (37.8°C) and 372 K (98.9°C) in accordance with ASTM Standard 168.

IL1715

Boron, the following—

- (a) (a) Boron element C (metal) in all forms
- (b) (b) Boron compounds, mixtures, and composites

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	containing 5% or more of boron (except pharmaceutical preparations packaged for retail sale), the following—	
	(1) non-ceramic boron-nitrogen compounds (e.g. borazanes, borazines and boropyrazoyls)	C
	(2) boron hydrides (e.g. boranes), except sodium boron hydride, potassium boron hydride, monoborane, diborane and triborane	C
	(3) organoboron compounds, including metallo-organoboron compounds	C
PL7006	Boron compounds and mixtures in which the boron —10 isotope comprises more than 20% of the total boron content	W
IL1733	Base materials, non-composite ceramic materials, ceramic-ceramic composite materials and precursor materials for the manufacture of high temperature fine technical ceramic products, the following—	
	(a) (a) Base materials having all the following characteristics—	C
	(1) any of the following compositions—	
	(i) single or complex oxides of zirconium, and complex oxides of silicon and aluminium;	
	(ii) single or complex borides of zirconium;	

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- (iii) single or complex carbides of silicon or boron; or
 - (iv) single or complex nitrides of silicon, boron, aluminium, or zirconium;
- (2) total metallic impurities, excluding intentional additions, of less than—
 - (i) 1,000 ppm for single oxides or carbides;
 - (ii) 5,000 ppm for complex compounds, single borides or single nitrides; and
- (3) average particle size less than or equal to 5 micrometers and no more than 10% of the particles larger than 10 micrometers except for zirconia where these limits are 1 micrometre and 5 micrometres respectively.
- (b) (b) Non- C composite ceramic materials, in crude or semi-fabricated form, composed of any material specified in head (a) above, except abrasives
- (c) (c) Ceramic-ceramic composite materials containing finely dispersed particles or phases or any non-metallic fibrous or whisker-like materials, whether externally introduced or grown

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in situ during
processing, where the
following materials
form the host
matrix—

- | | |
|--|---|
| (1) all oxides, including glasses | C |
| (2) carbides or nitrides of silicon or boron | C |
| (3) borides or nitrides of zirconium or borides, carbides or nitrides of hafnium | C |
| (4) any combination of the materials specified in subheads (c)(1) to (3) above | C |

except manufactured products
or components not specified
elsewhere in this Schedule

(d) Precursor materials,
(i.e., special-purpose
polymeric or metallo-
organic materials for
producing any base or
phases of the materials
specified in heads
(b) or (c) above), the
following—

- | | |
|--|---|
| (1) polycarbosilanes and polydiorganosilanes (for producing silicon carbide) | C |
| (2) polysilazanes (for producing silicon nitride) | C |
| (3) polycarbosilazines for producing ceramics with silicon, carbon and nitrogen components | C |

In this entry—

- | | |
|---|--|
| (a) a “matrix” means a substantially continuous phase that fills the space between particles, whiskers or fibres; | |
| (b) a “composite” means a matrix and an additional phase or additional | |

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- phases consisting of particles, whiskers, fibres or any combination thereof, present for a specific purpose or purposes.
- IL1734 Low density rigid, carbon-bonded, fibrous or non-fibrous carbon thermal insulating materials having all of the following characteristics— C
- (a) (a) a capability of operating at temperatures greater than 2273 K (2000°C);
 - (b) a density greater than 100 kg/m³ and less than 300 kg/m³;
 - (c) a compressive strength greater than 0.1Mpa and less than 1.0 Mpa;
 - (d) a flexural strength greater than 1.0 Mpa; and
 - (e) a carbon content of greater than 99.9% of total solids.
- IL1746 Polymeric substances, the following: and manufactures thereof—
- (a) (a) Polyimides C (including maleimides)
- except in the following forms—
- fully cured polyimide or polyimide-based film, sheet, tape or ribbon having a maximum thickness of 0.254mm whether or not coated or laminated with heat or pressure-sensitive resinous

substances of an adhesive nature, which contain no fibrous reinforcing materials and which have not been coated or laminated with carbon, graphite, metals or magnetic substances.

(b) (b) Polybenzimidazoles

(c) (c) Aromatic C polyamides, including heterocyclic aromatic polyamides characterised as aromatic due to the presence of a benzene ring

except—

(i) filament yarns, staple fibres, chopped fibres, spun yarns or threads, having both of the following characteristics—

(1) a fibre modulus of 22.075 N per tex or less; and

(2) a tenacity of 0.970 N per tex or less;

(ii) pulp made from materials described under exception (i) above.

(d) (d) Polyabenzothiazoles

(e) (e) Polyoxadiazoles

(f) (f) Polyphosphazenes C (Polyphosphonitriles)

(g) (g) Polystyrylpyridine C (PSP)

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- (h) (h) Thermoplastic liquid crystal copolyesters, the following—
- (1) ethylene copolyesters of terephthalic acid and parahydroxy-benzoic acid C
except manufactures thereof, having both of the following characteristics—
 - (i) a tensile modulus of less than 15 Gpa; and
 - (ii) specially designed for non-aerospace, non-electronic civil applications;
- (2) phenylene or biphenylene copolyesters of terephthalic acid and parahydroxybenzoic acid C
 - (i) (i) Polybenzoxozoles
 - (j) (j) Aromatic polyether ether ketones (PEEK) C
 - (k) (k) Butadiene polymers, the following—
- (1) carboxyl terminated polybutadienes (CTPB); C
hydroxyl terminated polybutadienes (HTPB);
thiol terminated polybutadienes (TTPB);
vinyl terminated polybutadiene (VTPB) cyclised 1-2 polybutadiene
- (2) mouldable copolymers of butadiene and acrylic acids C
- (3) mouldable terpolymers of butadiene, acrylonitrile, acrylic acid or any of the homologues of acrylic acid C

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- (l) (l) Carboxyl C
terminated
polyisoprene

There shall be excluded from this entry manufactured articles where the value of the polymeric component together with materials specified elsewhere in this Schedule is less than 50% of the total.

In this entry—

“tenacity” means tensile stress expressed as force per unit linear density of the unstrained specimen, namely, Newton per tex; “fibre modulus” (secant modulus) means the ratio of change in stress to change in strain between two points on a stress-strain curve, particularly the points of zero stress and breaking stress, and is express in Newton per tex and tex is the number of grams in 1,000 metres of material.

IL1749

Polycarbonate sheet of 1.5 mm C
to 25.4 mm thickness, having
no major defects and having
all of the following optical
characteristics—

- (a) (a) less than 2%
haze as determined
by method ASTM
D1003;
- (b) an angular deviation,
as determined by
method ASTM
D637, as follows—
 - (1) not more than
12 minutes at
any location
more than 25.4
mm from the
edge of the
sheet for sheet
thickness of 1.5

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mm to 9.5 mm;
or

(2) not more than
20 minutes at
any location
more than 25.4
mm from the
edge of the
sheet for sheet
thickness over
9.5 mm to 25.4
mm;

(c) total number of
minor optical defects
(excluding those
within 25.4 mm of
the sheet edge) as
follows—

(1) not exceeding
1 per 0.368
 m^2 for sheet
which is 12.7
mm or less in
thickness; or

(2) not exceeding
2 per 0.092 m^2
for sheet over
12.7 mm in
thickness.

In this entry—

“major defects” means
variations in the material
which cause angular
deviations either side of
the undeviated position
in excess of those listed
in (b) above. “Minor
defects” include any
embedded particles,
bubbles, scratches or
internal inhomogeneity
with a major dimension
of at least 0.250 mm,
and those localized
imperfections which
cause a variation in
angular deviation of
more than 5 minutes
within a distance of not
more than 508 mm on

IL1754

the screen when tested by
method ASTM D637.

Fluorinated compounds,
materials and manufactures
thereof, the following—

- (a) Compounds, the following—
 - (1) dibromotetrafluoroethane, C
except when having
a purity of 99.8% or
less and containing at
least 25 particles, of 200
micrometres or larger in
size per 100 ml
 - (2) perfluoroalkylamines C
 - (b) (b) Polymeric
materials and
intermediates,
unprocessed, the
following—
 - (1) polychlorotrifluoroethyleneC
oily and waxy
modifications only

except
polychlorotrifluoroethylene-
based lubricating oils in
quantities of 19 litres or
less;
 - (2) fluoroelastomeric C
compounds composed
of at least 95% of
a combination of
two or more of the
following monomers:
tetrafluoroethylene,
chlorotrifluoroethylene
vinylidene fluoride,
hexafluoropropylene,
bromotrifluoroethylene,
iodotrifluoroethylene,
perfluoromethylvinylether
and perfluoropro-
poxypropylvinylether
 - (3) polybromotrifluoroethyleneC
 - (4) copolymers of vinylidene C
fluoride having 75% or
more beta crystalline

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structure without
stretching

- (5) fluorinated silicone C
rubber and intermediates
for their production
containing 10% or more
of combined fluorine

(c) (c) Manufactures,
the following—

- (1) greases, lubricants and C
dielectric, damping and
flotation fluids made of
at least 85% of any of
the materials specified in
head (a) or (b) above

- (2) electric wire and cable C
coated with or insulated
with any of the materials
specified in sub head (b)
(2) above, except oil well
logging cable

- (3) seals, gaskets, rods, C
sheets, sealants or fuel
bladders made of more
than 50% of any of the
materials specified in
subhead (b)(2) above and
specially designed for
aerospace and aircraft
use

- (4) piezoelectric polymers C
and copolymers made
from vinylidene
fluoride having both
of the following
characteristics—

(i) in sheet or film form;
and

(ii) with a thickness
of more than 200
micrometres.

IL1755

Silicone fluids and greases, the
following—

- (a) (a) Fluorinated C
silicone fluids, except
those with kinematic
viscosity of 5,000

centistokes or higher
measured at 25°C

- (b) (b) Silicone and C
fluorinated silicone
lubricating greases
capable of operating
at temperature of 478
K (205°C) or higher
and having a drop
point (method of test
being ASTM D2265)
of 493 K (220°C) or
higher

IL1757

Compounds and materials, the
following—

- (a) (a) Monocrystalline C
silicon

except—

- (i) metallurgical-grade
monocrystalline
silicon having a
purity not better
than 99.97%; or
- (ii) monocrystalline
silicon having a
purity not better
than 99.999%
and containing at
least 0.5 part in
 10^6 each of iron,
carbon, boron and
phosphorus, plus
other impurities.

- (b) (b) Gallium C
of a purity equal
to or greater
than 99.9999% and
gallium III/V
compounds of any
purity level

except—

- (i) gallium phosphide;
or
- (ii) other gallium III/V
compounds having
a dislocation
density (etch pit
density-EPD)

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greater than
500,000 per cm².

- (c) (c) Indium of a C
purity greater than
99.9995% and III-
V indium compounds
containing more than
1% indium
- (d) (d) Hetero- C
epitaxial materials
consisting of a
monocrystalline
insulating substrate
epitaxially layered
with silicon,
compounds of
gallium or
compounds of indium
- (e) (e) Elemental Cd C
and Te of purity
levels equal to or
more than 99.9995%
CdTe compounds of a
purity level equal to
or more than 99.99%
and single crystals of
CdTe of any purity
level
- (f) (f) Polycrystalline C
silicon, (except
polycrystalline
silicon having a
purity not better
than 99.99% and
containing at least 0.5
part in 10⁶ each of
iron, carbon, boron
and phosphorus, plus
other impurities)
- (g) (g) SiCl₂H₂ with C
a purity level of 97.0
per cent or better and
compounds having a
purity level based
upon the amount
of the primary
constituents of 99.5%
or better and used in
the synthesis of the
materials specified

in head (f) above,
or used as the
silicon source in
the deposition of
epitaxial layers of
silicon, silicon oxide
or silicon nitride

(h) (h) Single crystals C
sapphire substrates

(i) (i) B_2O_3 with C
a purity of 99.9%
or greater, containing
1,000 parts per
million of H_2O or
less, in powder or cast
form

(j) (j) Monocrystalline C
germanium with a
resistivity greater
than 100 ohm cm

(k) (k) Resist,
materials, the
following—

(1) negative resists whose C
spectral response has
been adjusted for use
below 350 nanometres

(2) all positive resists C

(3) all resists for use with C
E-beams or ion beams
with a sensitivity of 100
microcoulomb/cm² or
better

(4) all resists for use with X- C
rays with a sensitivity of
500 millijoules/cm² or
better

(5) all resists specified C
or optimized for dry
development

(l) (l) Single-crystal C
forms of bismuth
germanium oxide
having piezoelectric
properties and single-
crystal forms of
lithium niobate, of

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- lithium tantalate
and of aluminium
phosphate
- (m) (m) Metal- C
organic or hydride
compounds of
beryllium and
magnesium (Group
IIA), zinc, cadmium
and mercury (Group
IIB), aluminium,
gallium and indium
(Group IIIA),
phosphorus, arsenic
and antimony (Group
VA) and selenium
and tellurium (Group
VIA) having a purity
(metal basis) of
99.999% or better
- IL1759 Syntactic foam for under water C
use formulated for applications
at depths greater than 1000
metres or with a density of
 0.561g/cm^3 (specific gravity
0.561) or less
- In this entry—
“syntactic foam” consists
of hollow plastic or glass
spheres less than 100
micrometers in diameter
uniformly embedded in a
resin matrix
- IL1760 Tantalates and niobates having C
a purity of 99% or better
except fluorotantalates
- IL1763 Fibrous and filamentary
materials which may be used
in organic matrix, metallic
matrix or carbon matrix
composite structures or
laminates, and such composite
structures and laminates
and technology therefor,
the following and specially
ODMA software therefor—
- (a) (a) Fibrous and C
filamentary materials
with specific
modulus greater than

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3.18×10^6 m
and specific tensile
strength greater than
 7.62×10^4 m except
silicate glass fibres

(b) (b) Fibrous C
and filamentary
materials having both
of the following
characteristics—

- (1) specific modulus greater
than 2.54×10^6 m and;
- (2) melting or sublimation
point higher than 1,992
K (1.649°C) in an inert
environment;

except—

- (i) carbon fibres
having a specific
modulus less than
 5.08×10^6 m and
a specific tensile
strength less than
 2.54×10^4 m;
- (ii) discontinuous,
multiphase,
polycrystalline
alumina fibres in
chopped fibre or
random mat form,
containing 3% by
weight or more
silica, having a
specific modulus
less than 10×10^6 m
- (iii) molybdenum and
molybdenum alloy
fibres;

There shall be excluded from
heads (a) and (b) carbon fibres
having both of the following
characteristics:

- (a) specific modulus less
than 11.43×10^6 m and
- (b) specific tensile strength
less than 10.16×10^4 m.
- (c) (c) Resin or pitch- C
impregnated fibres

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(prepregs), metal
or carbon-coated
fibres (preforms) or
carbon fibre preforms
made with materials
specified in head (a)
or (b) above

- (d) (d) Composite C
structures, laminates
and manufactures
thereof for products
and components
made either with an
organic matrix, a
carbon matrix or a
metal matrix utilising
materials specified in
head (a), (b) or (c)
above

except
manufactured products
or composites not
specified elsewhere in
this Schedule.

- (e) (e) Technology
for fibrous and
filamentary materials
and for composite
structures and
laminates, the
following—

- (1) technology which is D
unique to the spinning
and subsequent treatment
of precursor materials
into fibres specially
designed for processing
into carbon filamentary
materials specified in
head (a) or (b) above
- (2) technology for the D
production of fibrous and
filamentary materials
specified in head (a) or
(b) above
- (3) technology for the D
production of prepregs
specified in head (c)
above using pressure
impregnation or chemical

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vapour deposition, and
for preforms specified
in head (c) above using
vacuum or pressure
impregnation of chemical
vapour deposition

(4) technology for the D
development and
production of composite
structures, laminates and
manufactures specified in
head (d) above

(5) technology for
rigidisation and
densification processes
specially designed
for the manufacture
of carbon-carbon
composite materials, the
following—

(i) for impregnation, D
infiltration or
deposition into carbon
fibre preforms

(ii) for carbonisation D

(iii) for graphitisation D

(iv) for hot isostatic D
pressing

In this entry—

the term “fibrous and
filamentary materials”
includes:

(a) continuous
monofilaments;

(b) continuous yarns
and rovings;

(c) tapes, fabrics,
random mats and
braids;

(d) chopped fibres,
staple fibres and
coherent fibre
blankets;

(e) whiskers, either
monocrystalline or
polycrystalline, of
any length;

“specific modulus”

is Young’s modulus

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in pascals, equivalent to N/m^2 divided by specific weight in N/m^3 measured at a temperature of $(296 \pm 2) \text{ K}$ ($(23 \pm 2) \text{ C}$) and a relative humidity of $(50 \pm 5)\%$;

“specific tensile” strength is ultimate tensile strength in pascals, equivalent to N/m^2 divided by specific weight in N/m^3 measured at a temperature of $(296 \pm 2) \text{ K}$ ($(23 \pm 2) \text{ C}$) and a relative humidity of $(50 \pm 5)\%$;

“carbon fibre preform” means an ordered arrangement of uncoated or coated fibres intended to constitute a framework of a part before the matrix is introduced to form a composite;

“matrix” means a substantially continuous phase that fills the space between particles, whiskers or fibres;

“composite” means a matrix and an additional phase or additional phases consisting of particles, whiskers, fibres or any combination thereof, present for a specific purpose or purposes.

IL1767

Preforms of glass or of any other material specially designed for the fabrication of optical fibres specified in heads (b) or (c) in entry IL1526 in Group 3F relating to cable and wire C

In this entry “optical fibre preforms” means bars, ingots, or rods of glass, plastic or

other materials which have been specially processed for use in fabricating optical fibres.

IL1781

Synthetic lubricating oils and greases which are or which contain, as their principal ingredient, the following—

- (a) (a) Monomeric C and polymeric forms of perfluorotriazines, perfluoroaromatic ethers and esters, and perfluoroaliphatic ethers and esters
- (b) (b) Polyphenyl C ethers or thio ethers containing more than three phenyl or alkyl phenyl groups

PL7007

Chemicals, the following—

- (a) (a) Chloroethanol W, L, I, Y
- (b) (b) Dimethylamine W, L, I, Y
- (c) (c) Dimethylamine W, L, I, Y hydrochloride
- (d) (d) Dimethyl W, L, I, Y methylphosphate
- (e) (e) Dimethylphosphine W, L, I, Y
- (f) (f) Hydrogen L, I, Y fluoride
- (g) (g) Methyl W, L, I, Y phosphonyl dichloride
- (h) (h) Methyl W, L, I, Y phosphonyl difluoride
- (i) (i) Phosphorus W, L, I, Y oxychloride
- (j) (j) Phosphorus W, L, I, Y trichloride
- (k) (k) Potassium W, L, I, Y fluoride
- (l) (l) Thiodiglycol W, L, I, Y

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(m)	(m)	Thionyl chloride	W, L, I, Y
(n)	(n)	Trimethylphosphite	W, L, I, Y
(o)	(o)	Tris-ethanolamine	W, L, I, Y

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Cold cathode tubes	IL 1542
Colombium compounds	IL 1760
Combustion system testing	IL 1361
Communication equipment	IL 1519 and IL 1567
Comparators	IL 1564 d
Compass manufacture	IL 1385
Compasses	IL 1485
Compilers	IL 1529 b
Components, electronic	IL 1564
Compound semiconductor processing	IL 1355 b 1
Computer disc cartridges	IL 1572 d

Computer disc packs	IL 1572 d
Computer tape	IL 1572 d
Computer-aided design for PCB	IL 1354 b
Computer-aided design of semiconductors	IL 1355 b 2
Computer-aided design software	IL 1566 a
Computer-aided inspection software	IL 1566 a
Computer-aided manufacture software	IL 1566 a
Computer-aided test software	IL 1566 a
Computers	IL 1565
Controllers, robot	IL 1391 b
Converter integrated circuits	IL 1564 d
Converters	IL 1568
Copolyesters	IL 1746 h
Crossed-field amplifier tubes	IL 1558 b
Crossed-field oscillator tubes	IL 1558 b
Crucibles	IL 1355 b 1
Cryopump systems	IL 1129
Cryptographic equipment	IL 1527
Crystal materials	IL 1588
Crystals materials, multi aperture forms	IL 1588 c, d
Crystal materials, single aperture forms	IL 1588 b
Crystal pullers	IL 1355 b 1
Crystals	IL 1588
Cyclic voltametric stripping equipment	IL 1354 g
D to A converters	IL 1564 d and IL 1568
DAC	IL 1564 d and IL 1568
DNC	IL 1091 c
DRAM	IL 1564 d
DVM	IL 1529 f
Data (message) switching	IL 1565 h 1 and IL 1567
Dayem bridges	IL 1574
Deep submergence vehicles	IL 1418
Definitions, SPC communication switching	IL 1567
Densitometers	IL 1534
Degaussing, vessel	IL 1416 d

Status: This is the original version (as it was originally made). This item of legislation is currently only available in its original format.

Depth sounders	IL 1510
Desmear equipment	IL 1354 a
Detection equipment	IL 1502
Detector diodes	IL 1544 b
Development systems	IL 1565 h 1 and IL 1566 b
Device testers	IL 1355 b 7
Diagnostic systems	IL 1566 b
Die bonders	IL 1355 b 5
Die mounters	IL 1355 b 5
Diffraction type optical elements	IL 1556 d
Diffusion furnaces	IL 1355 b 1
Digital circuit testers	IL 1529 b
Digital computer definition	IL 1565
Digital computers	IL 1565 e, f and h
Digital computers (free from control)	IL 1565 h 2
Digital counters	IL 1529 c
Digital exchanges	IL 1567
Digital instruments	IL 1529 b
Digital oscilloscopes	IL 1584
Digital tape recorders	IL 1565 h and IL 1572 a
Digital to analogue converters	IL 1564 d and IL 1568
Digital voltage measuring apparatus	IL 1529 f
Digital word generators	IL 1529 b
Digitally controlled radio receivers	IL 1531 d
Digitizers	IL 1565 h
Dimensional inspection machine (components)	IL 1093
Dimensional inspection machines	IL 1091 b
Dimethylamine	PL 7007
Dimethylamine hydrochloride	PL 7007
Dimethyl methylphosphonate	PL 7007
Dimethylphosphite	PL 7007
Diodes	IL 1544
Direct numerical control (DNC) systems	IL 1091 c
Direction finding equipment	IL 1501 b
Directional couplers	IL 1537 c

Disc cartridges	IL 1572 d
Disc drives	IL 1565 h and IL 1572a
Disc packs	IL 1572 d
Display drivers	IL 1564 d
Displays	IL 1564 c and d
Doping profile analysis	IL 1355 b 4
Doppler systems	IL 1501 b and c
Drills (PCB)	IL 1354 f
Drivers	IL 1564 d
Dry etchers	IL 1355 b 1
Dynamic random access memories	IL 1564 d
Electrical, electronic equipment	PL 7004
Electric arc devices	IL 1206
Electro-chemical devices	IL 1205 a
Electrolyte cells	IL 1205 a
Electron beam deposition systems	IL 1355 b 1 and IL 1388 c
Electron beam microfabrication systems	IL 1355 b 1
Electron tubes	IL 1555
Electron tubes for electron streak cameras	IL 1555
Electron tubes for framing cameras	IL 1555
Electron tubes for image conversion	IL 1555 a
Electron tubes for image intensification	IL 1555 a
Electron tubes for television cameras	IL 1555 b
Electron tubes for video cameras	IL 1555 b
Electronic assemblies	IL 1564
Electronic components	IL 1564
Electronic components, manufacture and test	IL 1355
Electronic equipment (with certificate concerned with the limitation of compromising electromagnetic radiation)	PL 7004
Electronic instruments	IL 1529
Electronic material, manufacture and test	IL 1355
Electronic vacuum tubes	IL 1558
Elements for optical tubes	IL 1556
Embedded digital computers	IL 1565 h 2
Encapsulated passive networks	IL 1564 d

Status: This is the original version (as it was originally made). This item of legislation is currently only available in its original format.

Encoders	IL 1568 d
Encryption	IL 1527, IL 1565, IL 1566 and PL 7003
End effectors, robot	IL 1391 c
Epitaxial growth equipment	IL 1355 b 1
Etchers, plasma	IL 1355 b 1
Etching equipment (PCB)	IL 1354 a
Exchanges	IL 1567
Expert systems	IL 1566 b
FET	IL 1545 a
FFT analysers	IL 1533
Facsimile equipment	IL 1519 and IL 1572
Fast fourier transform analysers	IL 1533
Fast recovery diodes	IL 1544 e
Fault tolerance	IL 1565 h 1
Fibre-optic bundles	IL 1556 a
Fibre-optic cable	IL 1526 c and d
Fibre-optic connector manufacture	IL 1359
Fibre-optic connectors	IL 1526 e
Fibre-optic couplers	IL 1526 e
Fibre-optic manufacturing equipment	IL 1353
Fibre-optic plates	IL 1556 a
Fibre-optics	IL 1526 b and c
Fibrous and filamentary production	IL 1357
Fibrous and filamentary materials	IL 1763
Field-effect transistors	IL 1545 a
Filament winding machines	IL 1357
Film type integrated circuits	IL 1564
Flash discharge type X-ray systems	IL 1553
Flash discharge type X-ray tubes	IL 1553
Flatbed microdensitometers	IL 1534
Flatbed measurement instruments	IL 1355 b 4
Flexible disc drives	IL 1565 h and IL 1572 a
Flexible disc media	IL 1572 d
Flight data recorders	IL 1572 a
Flight instrument systems	IL 1485

Floating docks	IL 1425
Floppy disc drives	IL 1565 h and IL 1572 a
Floppy disc media	IL 1572 d
Flow-forming machines	IL 1075
Fluorinated silicone fluids	IL 1755 a
Fluorinated silicon lubricating greases	IL 1755 b
Fluorine production equipment	IL 1110
Fluorine, containers for	IL 1145
Fluorocarbon coated electric wire and cable	IL 1754 c
Fluorocarbon compounds and manufacturers	IL 1754
Fluorocarbon greases, lubricants and dielectric	IL 1754 c
Fluorocarbon processing equipment	IL 1352
Fluorocarbon tubing	IL 1142
Focal plane array	IL 1548 d
Frequency agile radio systems	IL 1516 c
Frequency generators	IL 1529 b
Frequency network analysers	IL 1529 b
Frequency standards	IL 1529 a
Frequency synthesizers	IL 1531
Frequency (heterodyne) converters	IL 1529 b
Fuel cells	IL 1205 a
Function generators	IL 1529 b
Functional testers	IL 1355 b 7
Furnaces, electric vacuum	IL 1203
Gallium	IL 1757 b
Gas turbine blade manufacture	IL 1080
Gas turbine engine inspection	IL 1086
Gas turbine engine manufacture	IL 1086
Gas turbine engine technology	IL 1372
Gas turbine engines	IL 1431
Gate arrays	IL 1564
Gear making machinery	IL 1088
Geodetic equipment	IL 1502
Geophones	IL 1510
Germanium	IL 1757 j

Status: This is the original version (as it was originally made). This item of legislation is currently only available in its original format.

Glass preforms for optical fibres	IL 1767
Graphic displays	IL 1565 h
Graphic instruments	IL 1572 c
Gravimeters	IL 1595
Gravity gradiometers	IL 1595
Gravity meters	IL 1595
Grinding machines	PL 7005
Gunn diodes	IL 1544 c
Gyro manufacture	IL 1385
Gyro-stabilizers	IL 1485
Gyros	IL 1485
Gyrotrons	IL 1558 e and IL 1573
Helicopters	IL 1460 and PL 7010
Helicopter components	PL 7011
Hetero-epitaxial materials	IL 1757 d
High speed cameras	IL 1585
High speed shutters	IL 1585
Hot cap sealers	IL 1355 g 5
Hovercraft	IL 1416 b
Hovercraft manufacture	IL 1364
Hulls	IL 1416 h
Hybrid computers	IL 1565 d
Hybrid integrated circuits	IL 1564
Hydraulic fluids	IL 1702
Hydrofoil manufacture	IL 1364
Hydrofoil vessels	IL 1416 a
Hydrogen fluoride	PL 7007
Hydrogen isotope thyratrons	IL 1559
Hydrogen thyratrons	IL 1559
Hydrophones	IL 1510
IC	IL 1564
Image enhancement	IL 1565 h 1
Image transfer equipment	IL 1355 b 2
Impatt diodes	IL 1544 c
In-circuit testers	IL 1355 b 7

Incorporated digital computers	IL 1565 h 2
Incremental recorders	IL 1572 a
Indium	IL 1757 c
Induction furnaces	IL 1203
Inert gas and vacuum atomizing technology	IL 1601
Inertial equipment	IL 1485
Inertial equipment manufacture	IL 1385
Infrared systems	IL 1502
Inspection equipment, PCB	IL 1354 d
Instrument frequency synthesizers	IL 1531 b
Instrumentation amplifiers	IL 1564 d
Instrumentation recorders	IL 1572 a
Instrumentation tape	IL 1572 d
Instruments, electronic	IL 1529
Integrated circuit testers	IL 1355 b 7
Integrated circuits	IL 1564
Interlacing machines	IL 1357
Ion implantation	IL 1355 b1 and IL 1388 B
Iron and steel alloys	IL 1635
Isolation amplifiers	IL 1564 d
Isostatic presses	IL 1312
Josephson-effect devices	IL 1574
Key telephone systems	IL 1567 b
Klystrons	IL 1558 c and d
Krytron tubes	IL 1542
LED	IL 1544 g, IL 1564 c and d
LPE	IL 1355 b 1
LVDT	IL 1532 a
Laser equipment	IL 1522 b
Laser measuring systems	IL 1522 c
Laser systems	IL 1522 b
Lasers	IL 1522 a
Launch vehicles	IL 1465 b
Lidar equipment	IL 1522 b
Light emitting alphanumeric displays	IL 1564 d

Status: This is the original version (as it was originally made). This item of legislation is currently only available in its original format.

Light emitting diodes	IL 1544 g, IL 1564 c and d
Line drivers	IL 1564 d
Line receivers	IL 1564 d
Line-width measurement equipment	IL 1355 b 4
Linear array	IL 1548 d
Linear measuring machines	IL 1532 b
Linear measuring systems	IL 1532
Linear synchros	IL 1568 c
Linear type voltage regulators	IL 1564 d
Linear voltage differential transformers	IL 1532 a
Liquid phase epitaxy (LPE)	IL 1355 b 1
Lithographic equipment, semiconductor	IL 1355 b 2
Local area networks	IL 1565 h 1 and IL 1567 a
Logic analysers	IL 1529 b
Low temperature devices	IL 1574
Low temperature superconductive materials	IL 1675
Lubricating oils	IL 1781
MOS-DRAM	IL 1564 d
MOS-SRAM	IL 1564 d
Machine tools	IL 1091 b
Machine tools (components)	IL 1093
Machining centres	IL 1091 b
Magnetic disc coating equipment	IL 1358
Magnetic disc media	IL 1572 d
Magnetic ferrite materials	IL 1588 f
Magnetic metals	IL 1631
Magnetic recording media, manufacture and test	IL 1358
Magnetic tape	IL 1572 d
Magnetic tape coating equipment	IL 1356
Magnetic tape recorders	IL 1565 h and IL 1572 a
Magnetometer systems	IL 1571
Magnetometers	IL 1571
Magnetrons	IL 1558 b
Maintenance systems	IL 1566 b

Maleimides	IL 1746 a
Maraging steel alloy	PL 7002
Marine systems	IL 1510
Mask aligners	IL 1355 b 2
Mask fabrication equipment	IL 1355 b 2
Mask inspection equipment	IL 1355 b 2
Masks, semiconductor	IL 1355 b 2
Measuring equipment	IL 1529
Memory integrated circuits	IL 1564 d
Memory storage or switching devices	IL 1588 e
Metal oxide semiconductor memories	IL 1564 d
Metal rolling mills	IL 1305
Metal-organic chemical vapour deposition (MOCVD)	IL 1355 b 1
Metal-working technology	IL 1001
Metallo-organic materials	IL 1733 d
Methyl phosphonyl dichloride	PL 7007
Methyl phosphonyl difluoride	PL 7007
Microchannel plates	IL 1556 b
Microcomputer development systems	IL 1529 b and IL 1565 h 1
Microcomputer microcircuits	IL 1564
Microdensitometers	IL 1534
Microprocessor development systems	IL 1529 b and IL 1565 h 1
Microprocessor microcircuits	IL 1564
Microprocessor support integrated circuits	IL 1564 d
Microwave amplifiers	IL 1537 k
Microwave assemblies	IL 1537
Microwave equipment	IL 1537
Microwave instrumentation receivers	IL 1529 b
Microwave radio links	IL 1520 a
Millimetric wave equipment	IL 1537
Milling machines	IL 1091 b
Mixer diodes	IL 1544 b
MOCVD	IL 1355 b 1
Modems	IL 1519 a

Status: This is the original version (as it was originally made). This item of legislation is currently only available in its original format.

Modules	IL 1564
Modules with mounted components	IL 1564 c
Molecular beam epitaxy (MBE)	IL 1355 b 1
Monocrystalline germanium	IL 1757 j
Monocrystalline silicon	IL 1757 a
Monolithic ceramic capacitors	IL 1560 a
Monolithic integrated circuits	IL 1564
Multi-data-stream processing	IL 1565 h 1
Multichip integrated circuits	IL 1564
Multiplex equipment	IL 1519
NMOS monolithic integrated circuits	IL 1564 d
Navigation equipment	IL 1501 b
Network analysers	IL 1529 b
Networking equipment	IL 1565 h
Nickel-based alloys	IL 1661
Niobates	IL 1760
Non-composite ceramic materials	IL 1733
Numerical control (NC) units	IL 1091 a
OCR	IL 1565 h
OMR	IL 1565 h
Ocean cable	IL 1526 a
Operating systems	IL 1566 b
Operational amplifiers	IL 1564 d
Optical character readers	IL 1565 h
Optical elements	IL 1556
Optical elements, diffractive type	IL 1556 d
Optical fibre cable	IL 1526 c
Optical fibre characterisation equipment	IL 1353
Optical fibre connectors	IL 1526 e
Optical fibre couplers	IL 1526 e
Optical fibre manufacturing equipment	IL 1353
Optical fibre sensors	IL 1526 d
Optical fibres	IL 1526 c and d
Optical integrated circuits	IL 1564
Optical mark recognition	IL 1565 h

Optical quality surface manufacture	IL 1370
Optical Spectrum Analysers	IL 1533
Oscillators, crystal	IL 1587
Oscilloscopes	IL 1584
Oxidation furnaces	IL 1355 b 1
Oxygen/carbon content measuring equipment	IL 1355 b 4
PABX	IL 1567 b
PCB	IL 1354 b
PCB CAD	IL 1354 b
PCB manufacture and test	IL 1354
PCM testers	IL 1519 d
PIN diodes	IL 1544 f
PIN modulators	IL 1537 l
PLA	IL 1537 l
PMOS monolithic integrated circuits	IL 1564 d
PROM	IL 1564 d
PROM programmers	IL 1529 b
Packages	IL 1564
Packet switching	IL 1567
Panel processors, PCB	IL 1354 c
Panoramix radio receivers	IL 1516 a
Parametric amplifiers	IL 1537
Pattern generators	IL 1355 b 2
Pellicles	IL 1355 b 2
Peniotrons	IL 1558 e
Peripheral drivers	IL 1564 d
Peripheral equipment	IL 1565 h 2
Phase slip devices	IL 1574
Phased array antenna	IL 1537 g
Phosphorus oxychloride	PL 7007
Phosphorus trichloride	PL 7007
Photo-enhanced reactors	IL 1355 b 1
Photo-voltaic cells	IL 1205 b
Photocathodes	IL 1556 c
Photoconductive cells	IL 1548

Status: This is the original version (as it was originally made). This item of legislation is currently only available in its original format.

Photocouplers	IL 1564 c and d
Photodiodes	IL 1548
Photographic equipment	IL 1585
Photographic film	IL 1585
Photographic plates	IL 1585
Photolithography	IL 1355 b 2
Photomultiplier tubes	IL 1549
Photosensitive components	IL 1548
Phototransistors	IL 1548
Plasma etchers, semiconductors	IL 1355 b 1
Plasma etching, PCB	IL 1354 a
Plasma spraying	IL 1388 d
Plasma torches	IL 1206
Plasma-enhanced reactors	IL 1355 b 1
Plating equipment, PCB	IL 1354 c
Plotters	IL 1565 h
Polybenzimidazoles	IL 1746 b
Polybenzothiazoles	IL 1746 d
Polybenzoxozoles	IL 1746 i
Polycarbonate sheet	IL 1749
Polycrystalline silicon	IL 1757 f
Polycrystalline silicon production	IL 1355 b 1
Polyimides	IL 1746 a
Polymeric materials	IL 1733 d and IL 1754 b
Polymeric substances	IL 1746
Polyoxadiazoles	IL 1746 e
Polyphosphazenes	IL 1746 f
Polyphosphonitriles	IL 1746 f
Polystyrlpyridine	IL 1746 g
Positioning equipment	IL 1501 b
Positioning systems, acoustic	IL 1510
Potassium fluoride	PL 7007
Power sources, radio-active	IL 1205 c
Precursor materials	IL 1733
Preform characterisation equipment	IL 1353

Preforms of glass	IL 1767
Presses, isostatic	IL 1312
Primary cells	IL 1205 a
Printed circuit board manufacture and test	IL 1354
Printed circuit board testers	IL 1354 e
Printed circuit boards	IL 1564
Printed circuit boards with mounted components	IL 1564 c
Printers	IL 1565 h
Private automatic exchanges	IL 1567 b
Programmable logic arrays	IL 1564
Programmable read only memories	IL 1564 d
Programming systems	IL 1566 b
Propellors	IL 1416
Propulsion systems, spacecraft	IL 1465 c
Proximity-effect devices	IL 1574
Pullers, semiconductor crystal	IL 1355 b 1
Pulse modulators	IL 1514
Pumps	IL 1131
Pyrolitic deposition technology	IL 1602
Pyrolitic detectors	IL 1548
Quartz crystal manufacture	IL 1360
Quartz crystals	IL 1587
Quasiparticle devices or detectors	IL 1574
RAM	IL 1564 d
ROM	IL 1564 d
Radar equipment	IL 1501 c
Radio equipment	IL 1520 a, IL 1516, IL 1517 and IL 1531
Radio receivers	IL 1516 and IL 1531 d
Radio relay communication equipment	IL 1520
Radio transmitters	IL 1517 and IL 1531 e
Random access memories	IL 1564 d
Random ion etchers (RIE)	IL 1355 b 1
Read only memories	IL 1564 d
Real time processing	IL 1565 h 1

Status: This is the original version (as it was originally made). This item of legislation is currently only available in its original format.

Rechargeable batteries	IL 1205 a
Recording equipment	IL 1572
Recording media	IL 1572 d
Regulators	IL 1564 d
Reproducing equipment	IL 1572
Reserve batteries	IL 1205 a
Resist materials	IL 1757 k
Resist removal, PCB	IL 1354 a
Reticles	IL 1355 b 2
Robot controllers	IL 1391 b
Robots	IL 1391 a
Rolling mills	IL 1305
Routers, PCB	IL 1354 f
Ruggedized computers	IL 1565 f
SAWs	IL 1586
SAWs	IL 1586
SEM's	IL 1355
SIS devices	IL 1574
SNS bridges	IL 1574
SPS circuit switching	IL 1565 h 1 and IL 1567
SPC communication switching	IL 1567
SPC communication switching technology	IL 1567 c
SPC telegraph circuit switching	IL 1567 b
SPC telephone circuit switching	IL 1567 b
SPC telephone circuit switching exchange	IL 1567
SRAM	IL 1564 d
SWATH vessel manufacture	IL 1364
SWATH vessels	IL 1416 c
Sample and hold integrated circuits	IL 1564 d
Sapphire substrates	IL 1757 h
Satellite communications equipment	IL 1520
Satellite navigation equipment	IL 1501 b
Scanning electron microscopes	IL 1355 b 1
Secondary cells	IL 1205 a
Seismic/geophysical recorders	IL 1572 a

Semiconductor CAD	IL 1355 b 2
Semiconductor diodes	IL 1544
Semiconductor photodiodes	IL 1548 b
Semiconductor phototransistors	IL 1548 b
Semiconductor processing equipment	IL 1355 b 1
Semiconductor profilers	IL 1355 b 4
Sense amplifiers	IL 1564 d
Sensors, robot	IL 1391 c
Separator systems, vessel	IL 1416
Serial data analysers	IL 1529 b
Ships, craft	IL 1416 and PL 7009
Signal analysers	IL 1533
Signal generators	IL 1529 and IL 1531
Signal processing	IL 1565 h 1
Signal processing devices	IL 1586
Silicon	IL 1757
Silicon microcomputer microcircuits	IL 1564 d
Silicon microprocessor microcircuits	IL 1564 d
Silicone fluids	IL 1755
Silicone greases	IL 1755
Silicon lubricating greases	IL 1755 b
Simulators, EMI/EMP	IL 1361
Single crystal sapphire substrates	IL 1757 h
Skull furnaces	IL 1203
Software	IL 1566
Software definitions	IL 1566
Software for industrial systems	IL 1399
Software, technology	IL 1566 c
Solar cells	IL 1205 b
Sonar systems	IL 1510
Space-division analogue exchanges	IL 1567 b
Space-division digital exchange	IL 1567
Spacecraft	IL 1465 a
Spectrum analysers	IL 1533
Spin-forming machines	IL 1075

Status: This is the original version (as it was originally made). This item of legislation is currently only available in its original format.

Spread spectrum receivers	IL 1516 c
Sputtering equipment	IL 1355 b 1 and IL 1388 e
Static random access memories	IL 1564 d
Statistical multiplexers	IL 1519 and IL 1567
Steel and iron alloys	IL 1635
Step and repeat cameras	IL 1355 b 2
Storage drivers	IL 1564 d
Storage integrated circuits	IL 1564 d
Store and forward	IL 1567
Stored programme controlled circuit switching	IL 1565 h 1 and IL 1567
Stored programme controlled communications	IL 1567
Streak cameras	IL 1585
Streamer tape drives	IL 1565 h and IL 1572 a
Submersible systems	IL 1417
Submersibles	IL 1418
Substrates	IL 1564
Substrates for printed circuit board	IL 1564 a
Superalloy production equipment	IL 1301 a
Superalloy production technology	IL 1301 b
Superconducting materials	IL 1574
Superconductive electromagnets	IL 1573
Superconductive materials	IL 1675
Superconductive solenoids	IL 1573
Support integrated circuits	IL 1564 d
Surface acoustic wave devices	IL 1586
Surface-effect vehicle manufacture	IL 1364
Surface-effect vehicles	IL 1416 b
Switches, electronic	IL 1564 d
Switching type voltage regulators	IL 1564 d
Syntactic foam	IL 1759
Synthesized signal generators	IL 1531 b
Synthetic lubricating oils	IL 1781
TCXOs	IL 1587
TEM mode devices	IL 1537 d
TR) tubes	IL 1537 e

TVRO	IL 1520
Tantalates	IL 1760
Tantalum	PL 7012
Tantalum capacitors	IL 1560 b
Tantalum compounds	IL 1760
Tape drives	IL 1565 h and IL 1572 a
Tape-laying machines	IL 1357
Technology (computers)	IL 1565 j
Technology for industrial systems	IL 1399
Technology, coating	IL 1389
Technology, communication switching	IL 1567 c
Technology, inert gas and vacuum atomizing	IL 1601
Technology, pyrolitic deposition	IL 1602
Technology, software	IL 1566 c
Telecommunication transmission equipment	IL 1519
Telecontrol equipment	IL 1518
Telegraph circuit switching	IL 1567 b
Telemetering equipment	IL 1518
Telephone circuit switching	IL 1567 b
Tellurium	IL 1757 e
Temperature compensated oscillators	IL 1587
Terminal exchange	IL 1567
Testing equipment	IL 1529
Tetrodes	IL 1558 a
Thermoelectric materials and devices	IL 1570
Thermoplastic liquid crystal copolyesters	IL 1746 h
Thin film devices	IL 1588
Thin film manufacture	IL 1358
Thiodiglycol	PL 7007
Thionyl chloride	PL 7007
Thrusters	IL 1362 a
Thyratrons	IL 1559
Thyristors	IL 1547
Time interval measuring equipment	IL 1529 d
Time-division analogue exchanges	IL 1567 b

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Time-division digital exchange	IL 1567
Timing integrated circuits	IL 1564 d
Titanium aluminides	IL 1672
Titanium-based alloys	IL 1672
Towed hydrophone arrays	IL 1510
Tracking equipment	IL 1502
Transducers	IL 1510 and IL 1568
Transfer oscillators	IL 1529 b
Transient recorders	IL 1529 g
Transistors	IL 1545
Transit exchange	IL 1567
Transmission equipment	IL 1519
Transmission media simulators	IL 1520 b
Transmitter-amplifiers	IL 1517
Transmitters	IL 1517
Transopters	IL 1564 c and d
Trappatt diodes	IL 1544 c
Travelling wave tubes	IL 1558 c
Triggered spark gaps	IL 1542
Trimethylphosphite	PL 7007
Tris-ethanolamine	PL 7007
Triodes	IL 1558 a
Tropospheric scatter communication equipment	PL 7008
Tubes	IL 1558
Tubing, fluorocarbon	IL 1142
Ubitrons	IL 1558 e
Ultrasonic equipment	IL 1502
Underwater cameras	IL 1417 e
Underwater communication Cable	IL 1526 e
Underwater vehicles	IL 1418
Underwater vision systems	IL 1417 c
Unencapsulated integrated circuits	IL 1564 d
Untuned alternating current amplifiers	IL 1564 d
Vacuum photodiodes	IL 1548 a
Vacuum pump systems	IL 1129

Varactor diodes	IL 1544 d
Vessels models	IL 1363
Vessels	IL 1416
Vibration test equipment	IL 1362
Video recorders	IL 1572 a
Video tape	IL 1572 a and d
Vision systems, robot	IL 1391
Voltage (rms-to-DC) converters	IL 1564 d
Voltage comparators	IL 1564 d
Voltage references	IL 1564 d
Voltage to frequency converters	IL 1564 d
Voltage variable capacitance diodes	IL 1544 d
Wafer defect inspection equipment	IL 1355 b 3
Wafer polishers	IL 1355 b 1
Wafer probers	IL 1355 b 6
Water tunnels	IL 1363
Waveguides	IL 1537 a
Weak-link devices	IL 1574
Weaving machines	IL 1357
Wide area networks	IL 1565 h 1 and IL 1567 a
Wideband amplifiers	IL 1521
Winchester disc drives	IL 1565 h and IL 1572 a
Wind tunnel, instrumentation	IL 1361
Wind tunnel, models	IL 1361
Wind tunnels	IL 1361
Wire bonders	IL 1355 b 5
X-ray systems	IL 1553
X-ray tubes	IL 1553
Zone-refining equipment	IL 1355 b 1

SCHEDULE 2

List of countries referred to in Article 2:–

Afghanistan
Albania

Status: This is the original version (as it was originally made). This item of legislation is currently only available in its original format.

Bulgaria
China
Czechoslovakia
German Democratic Republic
Hungary
North Korea
People's Republic of Mongolia
Poland
Romania
Socialist Republic of Vietnam
Union of Socialist Soviet Republics

SCHEDULE 3

Export of Goods (Control) Order 1987 (S.I. [1987/2070](#))
Export of Goods (Control) (Amendment) Order 1988 (S.I. [1988/1487](#))
Export of Goods (Control) (Amendment No. 2) Order 1989 (S.I. [1989/246](#))
Export of Goods (Control) (Amendment No. 3) Order 1989 (S.I. [1989/354](#))
Export of Goods (Control) (Amendment No. 4) Order 1989 (S.I. [1989/1270](#))
Export of Goods (Control) (Amendment No. 5) Order 1989 (S.I. [1989/1914](#))
Export of Goods (Control) (Amendment No. 6) Order 1989 (S.I. [1989/2327](#))

EXPLANATORY NOTE

(This note is not part of the Order)

This Order revokes and replaces the Export of Goods (Control) Order 1987 and the subsequent amendment thereto. The changes (apart from minor or drafting changes) it effects are as follows:—

1. Export control is

- (a) lifted on certain jig grinders, certain floor-type horizontal boring mills, certain pumps, valves, cocks and pressure regulators, unreinforced tubing, manufacturing and testing equipment for coaxial cable, certain wind tunnels for educational purposes or not specially designed or fitted with means for preheating the air, general purpose acoustic emission equipment for discriminating acoustic emissions related to crack growth, certain integrated flight instrument systems, certain gyrostabilisers, certain specially designed test calibration and diagnostic equipment for compasses, gyros, accelerometers and inertial equipment, certain airborne communication equipment, certain Doppler navigation equipment, certain radio altimeters, certain Loran-C navigation equipment, certain ground and marine navigation equipment, certain airborne civil weather radar,

certain global positioning satellite receivers, certain specialised testing or calibrating equipment for navigation direction finding, radar and airborne communication equipment, certain infrared thermal equipment and infrared viewing equipment, telecommunication transmission equipment using analogue techniques, certain equipment for radio relay transmission of television signals, certain communication satellite earth station equipment, certain industrial radio relay communication equipment, certain semiconductor lasers, reversed-twist double-armoured underwater communication cable, coaxial cables, certain programmable electronic instruments, certain programmable signal analysers (spectrum analysers), certain flatbed microdensitometers, certain parametric or paramagnetic amplifiers, certain cathode ray tubes, certain cold cathode tubes, non-coherent light emitting diodes, field effect transistors designed for audio frequency applications, certain semiconductor photodiodes, certain magnets and klystrons, certain electronic or magnetic amplifiers, induction potentiometers, induction rate (tachometer) generators, servo-motors, precision potentiometers, direct current and alternating current torquers, electro-optical devices designed to monitor relative rotation of remote surfaces, synchronous motors, semiconductor Hall field probes, cylindrical structures for analogue video recording and reproducing equipment, certain single aperture forms, seamless tube and pipe, cobalt-based alloys containing 5% or more tantalum, niobium (columbium), molybdenum alloys, tantalum and tantalum alloys, vanadium and vanadium alloys, certain superconductive alloys, certain lubricating oils, and where the exportation was prohibited only by virtue of an import certificate having been issued;

- (b) reduced in scope on equipment for milling aircraft skins or spars, numerical control units, crystal pullers, robots and robot controllers, passive acoustic hydrophones or transducers, telecommunication transmission equipment using digital techniques, electronic measuring and test equipment for telecommunication transmission equipment, digital microwave radio links, equipment containing Nd: YAG or Nd: Glass lasers, Nd: YAG lasers, optical fibre communication cable or optical fibre, optical fibres for sensing purposes, frequency standards for fixed ground use, portable (personal) or mobile radio telephones, microwave assemblies and sub-assemblies, encapsulated integrated circuits having hermetically sealed dual-in-line cases, silicon microcomputers microcircuits, embedded electronic computers, disc drives, displays for electronic computers, local area networks, software, communication equipment for data (message) switching, stored programme controlled telegraph circuit switching, analogue private automatic branch exchanges, mechanical input type position encoders and transducers, gravity meters, iron and steels, nickel-based alloys, titanium-based alloys, tantalates and niobates, certain carbon fibres, nuclear power generating equipment, tantalum, and on a range of personal computer systems up to specified levels;
- (c) extended in scope on toxicological agents and tear gas, and directed energy weapons;
- (d) amended in scope on technical data and procedures for the production of fibrous and filamentary materials, weaving and interlacing machines, robot controllers and end-effectors, technology for reciprocating diesel engines, cryptographic equipment, instrument frequency synthesizers and synthesized signal generators, stored programme controlled communication switching equipment or systems, technology for the design and production of cylindrical structures for analogue video recording and reproducing equipment, base materials, non-composite ceramic materials, ceramic-ceramic composite materials and precursor materials, polymeric substances, fibrous and filamentary materials, nuclear materials;
- (e) introduced on equipment for the deposition, processing and in-process control of inorganic overlays, coatings and surface modifications, technology for the application of coatings to non-electronic devices, biocatalysts for decontamination and degradation of chemical

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warfare agents, thionyl chloride, dimethylamine hydrochloride and riot control vehicles specially designed to be electrified to repel boarders.

2 The structural drafting of each entry has been amended and updated to reflect the format used in other publications pertaining to export controls published nationally and internationally to simplify the correlation for UK exporters. This has resulted in a number of minor changes to the coverage of various entries throughout the Order.

3 Non COCOM items are prefixed PL and allocated an identification number. They have been included in Schedule 1 where they relate to COCOM items or in the most appropriate place in the Group and are not necessarily in numerical sequence.

They are as follows:

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4 Whenever goods are indicated in Schedule 1 by more than one letter each prohibition in article 2 relates to the relevant letter applying to the export of the goods.

5 Any particular goods may fall within more than one description in Schedule 1 to the Order. In such a case each prohibition (taking effect by such inclusion in that Schedule and the related provisions of Article 2) applies to the export of the goods. This may mean that different entries prohibit the export of the goods to different countries.

6 Copies of the British Standards referred to in these Regulations may be obtained from any of the sales outlets operated by the British Standards Institution (BSI), or by post from the BSI at 3 Lindford Wood, Milton Keynes, MK14 6LE.

7 Copies of the economic and control rules of the International Cocoa Agreement can be obtained from the International Cocoa Organisation, 22 Berners Street, London W7.