

SCHEDULE 1

Regulations 2, 4, 5, 6 and 11

TABLES OF ACTION LEVELS AND EXPOSURE LIMIT VALUES

PART 1

INTRODUCTION TO PARTS 2 AND 3

1. In this Schedule—
 - “contact current (I_C)” is the current created when a person comes into contact with an object in an electromagnetic field, expressed in ampères (A);
 - “external electric field strength (E)” is a vector quantity corresponding to the force exerted on a charged particle in the environment, irrespective of its motion in space, expressed in volts per metre (Vm^{-1});
 - “internal electric field strength (E)” is a vector quantity corresponding to the force exerted on a charged particle inside the human body, irrespective of its motion in space, expressed in volts per metre (Vm^{-1});
 - “limb current (I_L)” is the current induced in the limbs of a person exposed to electromagnetic fields in the frequency range from 10 MHz to 110 MHz, expressed in ampères (A);
 - “magnetic flux density (B)” is a vector quantity resulting in a force that acts on moving charges, expressed in tesla (T);
 - “power density (S)” is the radiant power incident perpendicular to a surface, divided by the area of the surface, expressed in watts per square metre (Wm^{-2});
 - “specific energy absorption (SA)” is the energy absorbed per unit mass of biological tissue, expressed in joules per kilogram (Jkg^{-1});
 - “specific energy absorption rate (SAR)” is the rate at which energy is absorbed per unit mass of body tissue, expressed in watts per kilogram (Wkg^{-1}).
2. The ALs and ELVs are set out in tables and grouped according to their potential effects, being—
 - (a) thermal effects, related to the heating of tissue due to its absorption of electromagnetic fields; and
 - (b) non-thermal effects, related to the stimulation of nerves or sensory organs due to the presence of electromagnetic fields.
3. The Low ALs in Table AL1 of Part 2, and the ALs in Part 3, specify the electromagnetic field levels above which specific indirect effects may occur.
4. The remaining ALs in Part 2 are defined physical quantities related to the direct biophysical effects of exposure to electromagnetic fields. Employers may, as part of their exposure assessment, assess electromagnetic field levels against these ALs. Each AL table states which ELV or ELVs will be complied with if electromagnetic field levels at a particular frequency do not exceed that AL. Exposures to electromagnetic field levels in excess of the AL may still be below the relevant ELV but the employer will have to undertake further assessment to determine this under regulation 5.
5. Except where otherwise indicated—
 - (a) “f” is the frequency expressed in hertz;
 - (b) the ALs and ELVs relate to exposure in any part of the body; and
 - (c) notes to the tables apply only to the table under which they appear.

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6. The applicable safety measures referred to in regulation 4(2) are those required by the notes to the table or tables containing the sensory effect ELV which is to be exceeded, being—

- (a) the note to Table ELV1; and
- (b) note 2 to Tables ELV3 and ELV5.

PART 2

DIRECT BIOPHYSICAL EFFECTS OF EXPOSURE

Action Levels – non-thermal effects

Table AL1 - ALs for exposure to electromagnetic fields from 1 Hz to 10 MHz

<i>Frequency range</i>	<i>External electric field strength Low ALs (E) [Vm^{-1}]</i>	<i>External electric field strength High ALs (E) [Vm^{-1}]</i>
$1 \leq f < 25$ Hz	2.0×10^4	2.0×10^4
$25 \leq f < 50$ Hz	$5.0 \times 10^5/f$	2.0×10^4
$50 \text{ Hz} \leq f < 1.64$ kHz	$5.0 \times 10^5/f$	$1.0 \times 10^6/f$
$1.64 \leq f < 3$ kHz	$5.0 \times 10^5/f$	6.1×10^2
$3 \text{ kHz} \leq f \leq 10$ MHz	1.7×10^2	6.1×10^2
Exposure levels not exceeding the ALs will be compliant with:	Tables ELV2 and ELV3	

Notes

1. Between the Low and High ALs, exposure will be below the ELVs but spark discharges may occur. These can be prevented through the provision of information and training under regulation 10 and the use of suitable technical and personal protection measures.

2. The ALs in Tables AL1 and AL2 are root mean square (RMS) values of the field strength. These RMS values are equal to the peak values divided by $\sqrt{2}$ for sinusoidal fields. The corresponding ELVs in Tables ELV2 and ELV3 are peak values in time, which are equal to the RMS values multiplied by $\sqrt{2}$ for sinusoidal fields. In the case of non-sinusoidal fields the exposure assessment under regulation 5 shall be based on the weighted peak method (filtering in time domain) or on a scientifically proven and validated exposure evaluation procedure which produces comparable results to the weighted peak method.

3. The ALs represent the maximum field values at any place where an employee may be working, before the entry of any person into the field. In the case of an electromagnetic field source in the immediate vicinity of the body, compliance with the ELVs shall be determined dosimetrically, case by case.

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Table AL2 - ALs for exposure to electromagnetic fields from 1 Hz to 10 MHz

<i>Frequency range</i>	<i>Magnetic flux density Low ALs (B) [μT]</i>	<i>Magnetic flux density High ALs (B) [μT]</i>	<i>Magnetic flux density ALs for exposure of limbs to a localised magnetic field (B) [μT]</i>
$1 \leq f < 8 \text{ Hz}$	$2.0 \times 10^5/f^2$	$3.0 \times 10^5/f$	$9.0 \times 10^5/f$
$8 \leq f < 25 \text{ Hz}$	$2.5 \times 10^4/f$	$3.0 \times 10^5/f$	$9.0 \times 10^5/f$
$25 \leq f < 300 \text{ Hz}$	1.0×10^3	$3.0 \times 10^5/f$	$9.0 \times 10^5/f$
$300 \text{ Hz} \leq f < 3 \text{ kHz}$	$3.0 \times 10^5/f$	$3.0 \times 10^5/f$	$9.0 \times 10^5/f$
$3 \text{ kHz} \leq f \leq 10 \text{ MHz}$	1.0×10^2	1.0×10^2	3.0×10^2
Exposure levels not exceeding the ALs will be compliant with:	At and below 400 Hz: the sensory effect ELVs in Table ELV3	The health effect ELVs in Table ELV2	
	Above 400 Hz: the health effect ELVs in Table ELV2		

Notes

1. Between the Low and High ALs for exposure up to 400 Hz, exposure in the head of the employee will be below the health effect ELVs but may exceed the sensory effect ELVs in Table ELV3.

2. Notes 2 and 3 to Table AL1 apply.

Action Levels – thermal effects

Table AL3 - ALs for exposure to electromagnetic fields from 100 kHz to 300 GHz

<i>Frequency Range</i>	<i>External electric field strength ALs (E) [Vm^{-1}]</i>	<i>Magnetic flux density ALs (B) [μT]</i>	<i>Power density AL (S) [Wm^{-2}]</i>
$100 \text{ kHz} \leq f < 1 \text{ MHz}$	6.1×10^2	$2.0 \times 10^6/f$	
$1 \leq f < 10 \text{ MHz}$	$6.1 \times 10^8/f$	$2.0 \times 10^6/f$	
$10 \leq f < 400 \text{ MHz}$	61	0.2	
$400 \text{ MHz} \leq f < 2 \text{ GHz}$	$3 \times 10^{-3} f^{1/2}$	$1.0 \times 10^{-5} f^{1/2}$	
$2 \leq f < 6 \text{ GHz}$	1.4×10^2	4.5×10^{-1}	
$6 \leq f \leq 300 \text{ GHz}$	1.4×10^2	4.5×10^{-1}	50
Exposure levels not exceeding the ALs will be compliant with:	Up to 6 GHz: the health effect ELVs in Table ELV4	The health effect ELV in Table ELV6	
	6 – 300 GHz: the health effect ELV in Table ELV6		

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Notes

1. The electric field strength and magnetic flux density ALs are root mean square values.
2. For radiofrequency pulses, the peak power density averaged over the pulse width shall not exceed 1000 times the respective AL (S) value. For multi-frequency fields, the analysis shall be based on summation.
3. Note 3 to Table AL1 applies in relation to the ALs for external electric field strength and magnetic flux density.
4. The power density is the maximum level averaged over any 20cm² of exposed area. Spatial maximum power densities averaged over 1cm² shall not exceed 20 times the value of 50 Wm⁻².
5. From 6 to 10 GHz, power density shall be averaged over a six minute period. Above 10 GHz, it shall be averaged over a 68/f^{1.05}-minute period (where “f” is the frequency in GHz).

Table AL4 – AL for exposure to electromagnetic fields from 10 to 110MHz

Frequency range	Limb current AL (I _L) [mA]
10 ≤ f ≤ 110 MHz	100
Exposure levels not exceeding the ALs will be compliant with:	The health effect ELV in Table ELV4 - localised SAR in the limbs

Note

The AL is a root mean square value.

Exposure Limit Values – non-thermal effects

Table ELV1 - ELVs for exposure to electromagnetic fields from 0 to 1 Hz

	<i>Sensory effect ELVs – magnetic flux density (B₀) [T]</i>
Head and trunk	2
Limbs	8
	<i>Health effect ELV – magnetic flux density (B₀) [T]</i>
Any part of the body	8

Note

The sensory effect ELVs may be exceeded during an employee’s shift where the employer ensures that—

- (a) they are only exceeded temporarily;
- (b) protection measures have been adopted which minimise, so far as is reasonably practicable, the sensory effects related to movement in static magnetic fields, including nausea and vertigo;
- (c) adequate information is provided to the employee on the possibility of those sensory effects; and

- (d) where any of those sensory effects are reported to the employer, the exposure assessment under regulation 5, and the protection measures, are updated where necessary.

Table ELV2 - Health effect ELVs for exposure to electromagnetic fields from 1 Hz to 10 MHz

<i>Frequency range</i>	<i>Health effect ELVs – internal electric field strength (E) [Vm^{-1}]</i>
1 Hz \leq f < 3 kHz	1.1
3 kHz \leq f \leq 10 MHz	3.8×10^{-4} f

Notes

1. The ELVs are limits for electric fields induced in the body from exposure to time-varying electric and magnetic fields.
2. The ELVs are spatial peak values in the entire body of the employee.
3. Note 2 to Table AL1 applies in relation to methods of determining exposure.

Table ELV3 - Sensory effect ELVs for exposure to electromagnetic fields from 1 to 400 Hz

<i>Frequency range</i>	<i>Sensory effect ELVs – internal electric field strength in the head (E) [Vm^{-1}]</i>
1 \leq f < 10 Hz	0.7/f
10 \leq f < 25 Hz	0.07
25 \leq f \leq 400 Hz	0.0028 f

Notes

1. The ELVs are spatial peak values induced in the head of the exposed employee, and can arise from exposure to either external electric or external magnetic fields.
2. The ELVs may be exceeded during an employee's shift where the employer ensures that—
 - (a) they are only exceeded temporarily;
 - (b) hazardous spark discharges, and contact currents in excess of those in Table AL5, are prevented through the provision of information and training under regulation 10 and the use of suitable technical and personal protection measures;
 - (c) adequate information is provided to the employee on the possibility of sensory effects related to time-varying magnetic fields, including retinal phosphenes; and
 - (d) where any of those sensory effects are reported to the employer, the risk assessment is updated where necessary.
3. Note 2 to Table AL1 applies in relation to methods of determining exposure.

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Exposure Limit Values – thermal effects

Table ELV4 – Health effect ELVs for exposure to electromagnetic fields from 100 kHz to 6 GHz

<i>Area of exposure</i>	<i>Health effect ELVs – specific energy absorption rate (SAR) [Wkg^{-1}]</i>
Whole body	0.4 (averaged SAR in the body)
Head and trunk	10 (localised SAR in the head and trunk)
Limbs	20 (localised SAR in the limbs)

Notes

1. The ELVs correspond to the SAR values averaged over a six minute period.
2. Localised SAR in the body and limbs can be assessed by either computational dosimetry or physical measurement of 10 grams of tissue. For computational dosimetry, 10 grams of contiguous tissue with approximately homogeneous electrical properties shall be used for the SAR average. For direct physical measurements a simple geometry, such as cubic or spherical tissue mass, may be used. The maximum value obtained shall be assessed against the ELVs.

Table ELV5 - Sensory effect ELV for exposure to electromagnetic fields from 300 MHz to 6 GHz

<i>Frequency range</i>	<i>Sensory effect ELV – specific energy absorption in the head (SA) [$mJkg^{-1}$]</i>
$300 \text{ MHz} \leq f \leq 6 \text{ GHz}$	10

Notes

1. When determining SA, energy absorption shall be averaged over 10 grams of tissue.
2. The ELV may be exceeded during an employee’s shift where the employer ensures that—
 - (a) it is only exceeded temporarily;
 - (b) adequate information is provided to the employee on the possibility of sensory effects related to pulsed microwave radiation, including auditory sensations; and
 - (c) where any of those sensory effects are reported to the employer, the risk assessment is updated where necessary.

Table ELV6 - Health effect ELV for exposure to electromagnetic fields from 6 to 300 GHz

<i>Frequency range</i>	<i>Health effect ELV – power density (S) [Wm^{-2}]</i>
$6 \text{ GHz} \leq f \leq 300 \text{ GHz}$	50

Notes

1. The power density is the maximum level averaged over any 20cm^2 of exposed area. Spatial maximum power densities averaged over 1cm^2 shall not exceed 20 times the value of 50 Wm^{-2} .

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2. From 6 to 10 GHz, power density shall be averaged over a six minute period. Above 10 GHz, it shall be averaged over a $68/f^{1.05}$ -minute period (where “f” is the frequency in GHz).

PART 3

INDIRECT EFFECTS OF EXPOSURE

Action Levels – non-thermal effects

Table AL5 - ALs for contact currents

<i>Frequency of electromagnetic field in which an object is present</i>	<i>Contact current ALs (I_C) [mA]</i>
up to 2.5 kHz	1.0
$2.5 \leq f < 100$ kHz	0.4 f
$100 \leq f \leq 10,000$ kHz	40

Notes

1. “f” is the frequency expressed in kHz.
2. The ALs are root mean square values.
3. The ALs represent the maximum steady state current created during a continuous contact with an object in an electromagnetic field.

Table AL6 - ALs for static magnetic fields

<i>Potential indirect effect</i>	<i>Magnetic flux density ALs (B_0) [mT]</i>
Interference with active implanted medical devices	0.5
Attraction and projectile risk in the fringe field of high field strength sources (> 100 mT)	3

Note

The AL for interference with active implanted medical devices represents the maximum field value at any place where an employee may be working.

Action Levels – thermal effects

Table AL7 - AL for contact currents

<i>Frequency of electromagnetic field in which an object is present</i>	<i>Contact current ALs (I_C) [mA]</i>
$100 \text{ kHz} \leq f < 110 \text{ MHz}$	40

Notes

1. The AL is a root mean square value.

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2. The AL represents the maximum steady state current created during a continuous contact with an object in an electromagnetic field.

SCHEDULE 2

Regulation 14

PREMISES AND ACTIVITIES WITHIN THE TERRITORIAL SEA OR A DESIGNATED AREA

Interpretation

1.—(1) In this Schedule—

“activity” includes a diving project and standing a vessel by;

“diving project” has the meaning assigned to it by regulation 2(1) of the Diving at Work Regulations (Northern Ireland) 2005(1) save that it includes an activity in which a person takes part as a diver wearing an atmospheric pressure suit and without breathing in air or other gas at a pressure greater than atmospheric pressure;

“offshore installation” shall be construed in accordance with paragraph 2(2) and (3);

“supplementary unit” means a fixed or floating structure, other than a vessel, for providing energy, information or substances to an offshore installation;

“vessel” includes a hovercraft and any floating structure which is capable of being navigated.

(2) For the purposes of this Schedule, any structures and devices on top of a well shall be treated as forming part of the well.

(3) Any reference in this Schedule to premises and activities includes a reference to any person, article or substance on those premises or engaged in, or, as the case may be, used or for use in connection with any such activity, but does not include a reference to an aircraft which is airborne.

Offshore installations

2.—(1) This paragraph shall apply within the territorial sea or a designated area to and in relation to—

(a) any offshore installation and any activity on it;

(b) any activity in connection with, or any activity immediately preparatory to an activity in connection with, an offshore installation, whether carried on from the installation itself, in or from a vessel or in any manner, other than an activity falling within sub-paragraph (4);

(c) a diving project involving—

(i) the survey and preparation of the sea bed for an offshore installation;

(ii) the survey and restoration of the sea bed consequent on the removal of an offshore installation.

(2) Subject to sub-paragraph (3), in this Schedule, “offshore installation” means a structure which is, or is to be, or has been, used while standing or stationed in water, or on the foreshore or other land intermittently covered with water—

(a) for the exploitation, or exploration with a view to exploitation, of mineral resources by means of a well;

(b) for undertaking activities falling within paragraph 6(2);

(1) [S.R. 2005 No. 45](#), as amended by [S.R. 2007 No. 247](#)

- (c) for the conveyance of things by means of a pipe;
- (d) for undertaking activities that involve mechanically entering the pressure containment boundary of a well; or
- (e) primarily for the provision of accommodation for persons who work on or from a structure falling within any of the provisions of heads (a) to (d),

together with any supplementary unit which is ordinarily connected to it, and all the connections.

- (3) Any reference in sub-paragraph (2) to a structure or supplementary unit does not include—
 - (a) a structure which is connected with dry land by a permanent structure providing access at all times and for all purposes;
 - (b) a well;
 - (c) a mobile structure which has been taken out of use and is not yet being moved with a view to its being used for any of the purposes specified in sub-paragraph (2);
 - (d) any part of a pipeline; and
 - (e) a structure falling within paragraph 8(c).
- (4) Subject to sub-paragraph (5), the following activities fall within this paragraph—
 - (a) transporting, towing or navigating an installation;
 - (b) any of the following activities carried on in or from a vessel—
 - (i) giving assistance in the event of an emergency;
 - (ii) training in relation to the giving of assistance in the event of an emergency;
 - (iii) testing equipment for use in giving assistance in the event of an emergency;
 - (iv) putting or maintaining a vessel on stand-by ready for an activity referred to in any of sub-heads (i) to (iii).

(5) Sub-paragraph (4)(b) does not apply in respect of a vessel in or from which an activity is carried on in connection with, or any activity that is immediately preparatory to an activity in connection with, an offshore installation other than an activity falling within sub-paragraph 4(b).

Wells

3.—(1) Subject to sub-paragraph (2), this paragraph applies within the territorial sea or a designated area to and in relation to—

- (a) a well and any activity in connection with it; and
- (b) an activity which is immediately preparatory to any activity in head (a).

(2) Sub-paragraph (1) includes keeping a vessel on station for the purpose of working on a well but otherwise does not include navigation or an activity connected with navigation.

Pipelines

- 4.—(1) This paragraph applies within the territorial sea or a designated area to and in relation to—
 - (a) any pipeline;
 - (b) any pipeline works;
 - (c) the following activities in connection with pipeline works—
 - (i) the loading, unloading, fuelling or provisioning of a vessel;
 - (ii) the loading, unloading, fuelling, repair and maintenance of an aircraft on a vessel, being in either case a vessel which is engaged in pipeline works; or

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- (iii) the moving, supporting, laying or retrieving of anchors attached to a pipe-laying vessel including the supervision of those activities and giving of instruction in connection with them.

(2) In this paragraph—

“pipeline” means a pipe or system of pipes for the conveyance of any thing, together with—

- (a) any apparatus for inducing or facilitating the flow of any thing through, or through part of, the pipe or system;
- (b) any apparatus for treating or cooling any thing which is to flow through, or through part of, the pipe or system;
- (c) valves, valve chambers and similar works which are annexed to, or incorporated in the course of, the pipe or system;
- (d) apparatus for supplying energy for the operation of any such apparatus or works as are mentioned in heads (a) to (c);
- (e) apparatus for the transmission of information for the operation of the pipe or system;
- (f) apparatus for the cathodic protection of the pipe or system; and
- (g) a structure used or to be used solely for the support of a part of the pipe or system;

but not including a pipeline of which no initial or terminal point is situated in the United Kingdom, within the territorial sea adjacent to the United Kingdom, or within a designated area;

“pipeline works” means—

- (a) assembling or placing a pipeline or length of pipeline including the provision of internal or external protection for it;
- (b) inspecting, testing, maintaining, adjusting, repairing, altering or renewing a pipeline or length of pipeline;
- (c) changing the position of or dismantling or removing a pipeline or length of pipeline;
- (d) opening the bed of the sea for the purposes of the works mentioned in heads (a) to (c), and tunnelling or boring for those purposes;
- (e) any activities incidental to the activities described in heads (a) to (d);
- (f) a diving project in connection with any of the works mentioned in heads (a) to (e) or for the purpose of determining whether a place is suitable as part of the site of a proposed pipeline and the carrying out of surveying operations for settling the route of a proposed pipeline.

Mines

5.—(1) This paragraph applies to and in relation to a mine within the territorial sea, and any activity in connection with it, while it is being worked.

(2) In this paragraph “mine” has the same meaning as in the Mines Act (Northern Ireland) 1969(2).

Gas Importation and Storage

6.—(1) Subject to sub-paragraph (3), this paragraph applies within the territorial sea to and in relation to any activities connected with or immediately preparatory to the activities set out in sub-paragraph (2).

(2) 1969 c. 6 (N.I.)

(2) The activities are—

- (a) the unloading of gas to an installation or pipeline;
- (b) the storage of gas, whether temporary or permanent, in or under the shore or bed of any water;
- (c) the conversion of any natural feature for the purpose of storing gas, whether temporarily or permanently;
- (d) the recovery of gas stored;
- (e) exploration with a view to, or in connection with, the carrying on of activities within heads (a) to (d).

(3) Sub-paragraph (1) does not apply to an activity falling within sub-paragraph (2) if the provisions of this Schedule apply to or in relation to that activity by virtue of paragraph 2(1).

(4) In this paragraph—

“gas” means any substance which is gaseous at a temperature of 15°C and a pressure of 101.325 kPa (1013.25 mb); and

“installation” includes any floating structure or device maintained on a station by whatever means.

(5) For the purposes of sub-paragraphs (2) and (4), references to gas include any substance which consists wholly or mainly of gas.

Production of Energy from Water or Wind

7.—(1) This paragraph applies within the territorial sea to and in relation to any energy structure or activities connected with or preparatory to—

- (a) the exploitation of those areas for the production of energy from water or wind,
- (b) the exploration of such areas with a view to, or in connection with, the production of energy from water or wind, or
- (c) the operation of a cable for transmitting electricity from an energy structure.

(2) In this paragraph “energy structure” means a fixed or floating structure or machine, other than a vessel, which is, or is to be, or has been, used for producing energy from water or wind.

Underground Coal Gasification

8. This paragraph applies within the territorial sea or a designated area to and in relation to—

- (a) underground coal gasification and any activity in connection with it;
- (b) any activity which is immediately preparatory to any activity in sub-paragraph (a); and
- (c) any fixed or floating structure which is, or is to be, or has been, used in connection with the carrying on of activities within sub-paragraphs (a) and (b).

Other activities

9.—(1) Subject to sub-paragraph (2), this paragraph applies within the territorial sea to and in relation to—

- (a) the construction, reconstruction, alteration, repair, maintenance, cleaning, use, operation, demolition and dismantling of any building, or other structure, not being in any case a vessel, or any preparation for any such activity;
- (b) the transfer of people or goods between a vessel or aircraft and a structure (including a building) mentioned in head (a);

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- (c) the loading, unloading, fuelling or provisioning of a vessel;
 - (d) a diving project;
 - (e) the laying, installation, inspection, maintenance, operation, recovery or repair of a cable;
 - (f) the construction, reconstruction, finishing, refitting, repair, maintenance, cleaning or breaking up of a vessel except when carried out by the master or any officer or member of the crew of that vessel;
 - (g) the maintaining on a station of a vessel which would be an offshore installation were it not a structure to which paragraph 2(3)(c) applies;
 - (h) the transfer of people or goods between a vessel or aircraft and a structure mentioned in head (g).
- (2) This paragraph does not apply—
- (a) to a case where paragraph 2, 3, 4, 5, 6, 7 or 8 applies; or
 - (b) to vessels which are registered outside the United Kingdom and are on passage through the territorial sea.