Directive 2014/32/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments (recast) (Text with EEA relevance)

ANNEX V

SPECIFIC REQUIREMENTS

1. Accuracy

The manufacturer shall specify the class index of the meter. The class indices are defined as: Class A, B and C.

2. Rated operating conditions

The manufacturer shall specify the rated operating conditions of the meter; in particular:

The values of f_n, U_n, I_n, I_{st}, I_{min}, I_{tr} and I_{max} that apply to the meter. For the current values specified, the meter shall satisfy the conditions given in Table 1;

TABLE 1

	Class A	**Class B**	**Class C**
For direct-connected meters			
$\mathbf{I_{st}}$	$\leq 0{,}05 \times I_{tr}$	$\leq 0{,}04 \times I_{tr}$	$\leq 0{,}04 \times I_{tr}$
$\mathbf{I_{min}}$	$\leq 0{,}5 \times I_{tr}$	$\leq 0{,}5 \times I_{tr}$	$\leq 0{,}3 \times I_{tr}$
$\mathbf{I_{max}}$	$\geq 50 \times I_{tr}$	$\geq 50 \times I_{tr}$	$\geq 50 \times I_{tr}$
For transformer-operated meters			
$\mathbf{I_{st}}$	$\leq 0{,}06 \times I_{tr}$	$\leq 0{,}04 \times I_{tr}$	$\leq 0{,}02 \times I_{tr}$
$\mathbf{I_{min}}$	$\leq 0{,}4 \times I_{tr}$	$\leq 0{,}2 \times I_{tr}$ [a]	$\leq 0{,}2 \times I_{tr}$
$\mathbf{I_n}$	$= 20 \times I_{tr}$	$= 20 \times I_{tr}$	$= 20 \times I_{tr}$
$\mathbf{I_{max}}$	$\geq 1{,}2 \times I_n$	$\geq 1{,}2 \times I_n$	$\geq 1{,}2 \times I_n$

a For Class B electromechanical meters
$I_{min} \leq 0{,}4 \times I_{tr}$
shall apply.

The voltage, frequency and power factor ranges within which the meter shall satisfy the MPE requirements are specified in Table 2. These ranges shall recognise the typical characteristics of electricity supplied by public distribution systems.

The voltage and frequency ranges shall be at least:

$0{,}9 \times U_n \leq U \leq 1{,}1 \times U_n$

$0{,}98 \times f_n \leq f \leq 1{,}02 \times f_n$

power factor range at least from cosφ = 0,5 inductive to cosφ = 0,8 capacitive.

3. MPEs

The effects of the various measurands and influence quantities (a, b, c,…) are evaluated separately, all other measurands and influence quantities being kept relatively constant at their reference values. The error of measurement, that shall not exceed the MPE stated in Table 2, is calculated as:

$$\text{Error of measurement} = \sqrt{(a^2 + b^2 + c^2 \ldots)}$$

When the meter is operating under varying-load current, the percentage errors shall not exceed the limits given in Table 2.

TABLE 2

MPEs in percent at rated operating conditions and defined load current levels and operating temperature												
	Operating temperatures			**Operating temperatures**			**Operating temperatures**			**Operating temperatures**		
	+ 5 °C … + 30 °C			**– 10 °C … + 5 °Cor+ 30 °C … + 40 °C**			**– 25 °C … – 10 °Cor+ 40 °C … + 55 °C**			**– 40 °C … – 25 °Cor+ 55 °C … + 70 °C**		
Meter class	**A**	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**
Single phase meter; polyphase meter if operating with balanced loads												
$I_{min} \leq I < I_{tr}$	3,5	2	1	5	2,5	1,3	7	3,5	1,7	9	4	2
$I_{tr} \leq I \leq I_{max}$	3,5	2	0,7	4,5	2,5	1	7	3,5	1,3	9	4	1,5
Polyphase meter if operating with single phase load												
$I_{tr} \leq I \leq I_{max}$, see exception below	4	2,5	1	5	3	1,3	7	4	1,7	9	4,5	2
For electromechanical polyphase meters the current range for single-phase load is limited to $5I_{tr} \leq I \leq I_{max}$												

When a meter operates in different temperature ranges the relevant MPE values shall apply.

The meter shall not exploit the MPEs or systematically favour any party.

4. **Permissible effect of disturbances**

4.1. *General*

As electrical energy meters are directly connected to the mains supply and as mains current is also one of the measurands, a special electromagnetic environment is used for electricity meters.

The meter shall comply with the electromagnetic environment E2 and the additional requirements in points 4.2 and 4.3.

The electromagnetic environment and permissible effects reflect the situation that there are disturbances of long duration which shall not affect the accuracy beyond the critical change values and transient disturbances, which may cause a temporary degradation or loss of function or performance but from which the meter shall recover and shall not affect the accuracy beyond the critical change values.

When there is a foreseeable high risk due to lightning or where overhead supply networks are predominant, the metrological characteristics of the meter shall be protected.

4.2. *Effect of disturbances of long duration*

TABLE 3

Critical change values for disturbances of long duration			
Disturbance	**Critical change values in percent for meters of class**		
	A	**B**	**C**
Reversed phase sequence	1,5	1,5	0,3
Voltage unbalance (only applicable to polyphase meters)	4	2	1
Harmonic contents in the current circuits[a]	1	0,8	0,5
DC and harmonics in the current circuit[a]	6	3	1,5
Fast transient bursts	6	4	2
Magnetic fields; HF (radiated RF) electromagnetic field; Conducted disturbances introduced by radio-frequency fields; and Oscillatory waves immunity	3	2	1

a In the case of electromechanical electricity meters, no critical change values are defined for harmonic contents in the current circuits and for DC and harmonics in the current circuit.

4.3. *Permissible effect of transient electromagnetic phenomena*

4.3.1. The effect of an electromagnetic disturbance on an electrical energy meter shall be such that during and immediately after a disturbance:

— any output intended for testing the accuracy of the meter does not produce pulses or signals corresponding to an energy of more than the critical change value,

and in reasonable time after the disturbance the meter shall:

— recover to operate within the MPE limits, and
— have all measurement functions safeguarded, and
— allow recovery of all measurement data present prior to the disturbance, and
— not indicate a change in the registered energy of more than the critical change value.

The critical change value in kWh is

$$m \times U_n \times I_{max} \times 10^{-6}$$

(m being the number of measuring elements of the meter, U_n in Volts and I_{max} in Amps).

4.3.2. For overcurrent the critical change value is 1,5 %.

5. **Suitability**

5.1. Below the rated operating voltage the positive error of the meter shall not exceed 10 %.

5.2. The display of the total energy shall have a sufficient number of digits to ensure that when the meter is operated for 4 000 hours at full load ($I = I_{max}$, $U = U_n$ and PF = 1) the indication does not return to its initial value and shall not be able to be reset during use.

5.3. In the event of loss of electricity in the circuit, the amounts of electrical energy measured shall remain available for reading during a period of at least 4 months.

5.4. *Running with no load*

When the voltage is applied with no current flowing in the current circuit (current circuit shall be open circuit), the meter shall not register energy at any voltage between
$0{,}8 \times U_n$
and 1,1 U_n.

5.5. *Starting*

The meter shall start and continue to register at U_n, PF = 1 (polyphase meter with balanced loads) and a current which is equal to I_{st}.

6. **Units**

The electrical energy measured shall be displayed in kilowatt-hours or in megawatt-hours.

7. **Putting into use**

(a) Where a Member State imposes measurement of residential use, it shall allow such measurement to be performed by means of any Class A meter. For specified purposes the Member State is authorised to require any Class B meter.

(b) Where a Member State imposes measurement of commercial and/or light industrial use, it shall allow such measurement to be performed by any Class B meter. For specified purposes the Member State is authorised to require any Class C meter.

(c) The Member State shall ensure that the current range be determined by the utility or the person legally designated for installing the meter, so that the meter is appropriate for the accurate measurement of consumption that is foreseen or foreseeable.