EUROPEAN
COMMISSION

Brussels, XXX
[…](2014) XXX draft

ANNEXES 1 to 12

ANNEXES

to the Commission Regulation (EU) No .../...

of

implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for professional storage cabinets, blast cabinets, condensing units and process chillers

ANNEX I

Definitions applicable for Annexes II to XII

For the purposes of Annexes II to XII the following definitions shall apply:

Definitions related to professional refrigerated storage cabinets and blast cabinets

(1) 'net volume' means the volume containing foodstuffs within the load limit;

(2) 'chilled operating temperature' means that the temperature of foodstuffs stored in the cabinet is continuously maintained at a temperature between -1 °C and 5 °C;

(3) 'frozen operating temperature' means that the temperature of foodstuffs stored in the cabinet is continuously maintained at a temperature lower than -15 °C, which is understood as the highest temperature of the warmest package test;

(4) 'multi-use cabinet' means that a professional refrigerated storage cabinet or separate compartment of the same cabinet may be set at different temperatures for chilled or frozen foodstuffs;

(5) 'combined cabinet' means a professional refrigerated storage cabinet including two or more compartments with different temperatures for the refrigeration and storage of foodstuffs;

(6) 'refrigerator-freezer' means a type of combined cabinet including at least one compartment exclusively intended for chilled operating temperature and one compartment exclusively intended for frozen operating temperature;

(7) 'vertical cabinet' means a professional refrigerated storage cabinet of overall height equal to or higher than 1 050 mm with one or more front doors or drawers accessing the same compartment;

(8) 'counter cabinet' means a professional refrigerated storage cabinet of overall height lower than 1 050 mm with one or more front doors or drawers accessing the same compartment;

(9) 'light-duty cabinet', also known as 'semi-professional cabinet', means a professional refrigerated storage cabinet only capable of continuously maintaining chilled or frozen operating temperature in all its compartment(s) in ambient conditions corresponding to climate class 3, as detailed in Table 3 of Annex IV; if the cabinet is able to maintain temperature in ambient conditions corresponding to climate class 4, it shall not be considered a light-duty cabinet;

(10) 'equivalent professional refrigerated storage cabinet' means a professional refrigerated storage cabinet model placed on the market with the same net volume, same technical, efficiency and performance characteristics, and same compartment types and volumes as another professional refrigerated storage cabinet model placed on the market under a different commercial code number by the same manufacturer;

(11) 'equivalent blast cabinet' means a blast cabinet model placed on the market with the same technical, efficiency and performance characteristics, as another blast cabinet model placed on the market under a different commercial code number by the same manufacturer;

Definitions related to condensing units

(12) 'rated cooling capacity' (P_A) means the cooling capacity that the condensing unit enables the vapour compression cycle to reach, once connected to an evaporator and an expansion device, when operating at full load, and measured at standard rating

conditions with the reference ambient temperature set at 32 °C, expressed in kW to two decimal places;

(13) ‘rated power input’ (D_A) means the electrical power input needed by the condensing unit (including the compressor, the condenser fan(s) and possible auxiliaries) to reach the rated cooling capacity, expressed in kW to two decimal places;

(14) ‘rated coefficient of performance’ (COP_A) means the rated cooling capacity, expressed in kW, divided by the rated power input, expressed in kW, expressed to two decimal places;

(15) ‘coefficients of performance COP_B, COP_C and COP_D’ mean the cooling capacity, expressed in kW, divided by the power input, expressed in kW, expressed to two decimal places at rating points B, C and D;

(16) ‘seasonal energy performance ratio’ (*SEPR*) is the efficiency ratio of a condensing unit for providing cooling at standard rating conditions, representative of the variations in load and ambient temperature throughout the year, and calculated as the ratio between annual cooling demand and annual electricity consumption, expressed to two decimal places;

(17) ‘annual cooling demand’ means the sum of each bin-specific cooling demand multiplied by the corresponding number of bin hours;

(18) ‘bin-specific cooling demand’ means the cooling demand for every bin in the year, calculated as the rated cooling capacity multiplied by the part load ratio, expressed in kW to two decimal places;

(19) ‘part load’ ($Pc(T_j)$) means the cooling load at a specific ambient temperature T_j, calculated as the full load multiplied by the part load ratio corresponding to the same ambient temperature T_j and expressed in kW at two decimal places;

(20) ‘part load ratio’ ($PR(T_j)$) at a specific ambient temperature T_j means the ambient temperature T_j minus 5 ºC divided by the reference ambient temperature minus 5 ºC, and — for medium temperature — multiplied by 0.4 and added to 0.6, and — for low temperature — multiplied by 0.2 and added to 0.8. For ambient temperatures higher than the reference ambient temperature, the part load ratio shall be 1. For ambient temperatures lower than 5 °C, the part load ratio shall be 0.6 for medium temperature and 0.8 for low temperature. The part load ratio can be expressed at three decimal places or in percentage, after multiplying by 100, at one decimal place;

(21) ‘annual electricity consumption’ is calculated as the sum of the ratios between each bin-specific cooling demand and the corresponding bin-specific coefficient of performance, multiplied by the corresponding number of bin hours;

(22) ‘ambient temperature’ means the dry bulb air temperature, expressed in degrees Celsius;

(23) ‘bin’ (bin_j) means a combination of an ambient temperature T_j and bin hours h_j, as set out in Table 6 of Annex VI;

(24) ‘bin hours’ (h_j) means the hours per year at which an ambient temperature occurs for each bin, as set out in Table 6 of Annex VI;

(25) ‘reference ambient temperature’ means the ambient temperature, expressed in degrees Celsius, at which the part load ratio is equal to 1. It is set at 32 °C;

(26) ‘bin-specific coefficient of performance’ (COP_j) means the coefficient of performance for every bin in the year, derived from the part load, the declared cooling demand and declared coefficient of performance for specified bins, and calculated for other bins by linear interpolation, corrected where necessary by the degradation coefficient;

(27) ‘declared cooling demand’ means the cooling demand at a limited number of specified bins, and calculated as the rated cooling capacity multiplied by the corresponding part load ratio;

(28) ‘declared coefficient of performance’ means the coefficient of performance at a limited number of specified bins, and calculated as the declared cooling capacity divided by the declared power input;

(29) ‘declared cooling capacity’ means the cooling capacity which the unit delivers to meet the specific cooling demand at a limited number of specified bins, expressed in kW to two decimal places;

(30) ‘declared power input’ means the electrical power input needed by the condensing unit to meet the declared cooling capacity, expressed in kW to two decimal places;

(31) ‘degradation coefficient’ (*Cdc*) is set at 0.25 and means the measure of efficiency loss due to the possible on/off cycling of condensing units necessary to satisfy the required part load in case the unit’s capacity control cannot unload to the required part load;

(32) ‘capacity control’ means the ability of a condensing unit to change its capacity by changing the volumetric flow rate of the refrigerant, to be indicated as ‘fixed’ if the unit cannot change its volumetric flow rate, ‘staged’ if the volumetric flow rate is changed or varied in series of not more than two steps, or ‘variable’ if the volumetric flow rate is changed or varied in series of three or more steps;

Definitions related to process chillers

(33) ‘rated cooling capacity’ (P_A), expressed in kW to two decimal places, means the cooling capacity that the process chiller is able to reach, when operating at full load, and measured at standard rating conditions with the reference ambient temperature at 35 °C for air-cooled chillers and 30 °C water inlet temperature at the condenser for water-cooled chillers;

(34) ‘rated power input’ (D_A) means the electrical power input needed by the process chiller (including the compressor, the condenser fan(s) or pumps(s), the evaporator pump(s) and possible auxiliaries) to reach the rated cooling capacity, expressed in kW to two decimal places;

(35) ‘rated energy efficiency ratio’ (EER_A) means the rated cooling capacity, expressed in kW, divided by the rated power input, expressed in kW, expressed to two decimal places;

(36) ‘seasonal energy performance ratio’ (*SEPR*) is the efficiency ratio of a process chiller for providing cooling at standard rating conditions, representative of variations in load and ambient temperature throughout the year, and calculated as the ratio between annual cooling demand and annual electricity consumption, expressed to two decimal places;

(37) ‘annual cooling demand’ means the sum of each bin-specific cooling demand multiplied by the corresponding number of bin hours;

(38) ‘bin-specific cooling demand’ means the rated cooling capacity multiplied by the part load ratio, for every bin in the year, expressed in kW to two decimal places;

(39) ‘part load’ ($Pc(T_j)$) means the cooling load at a specific ambient temperature T_j, calculated as the full load multiplied by the part load ratio corresponding to the same ambient temperature T_j and expressed in kW at two decimal places;

(40) ‘part load ratio’ ($PR(T_j)$) at a specific ambient temperature T_j means:

(a) for process chillers using an air-cooled condenser, the ambient temperature T_j minus 5ºC divided by the reference ambient temperature minus 5ºC, and multiplied by 0.2 and added to 0,8. For ambient temperatures higher than the reference ambient temperature, the part load ratio shall be 1. For ambient temperatures lower than 5 °C, the part load ratio shall be 0.8;

(b) for process chillers using a water-cooled condenser, the water inlet temperature T_j minus 9 °C divided by the reference water inlet temperature (30°C) minus 9 °C, and multiplied by 0.2 and added to 0,8. For ambient temperatures higher than the reference ambient temperature, the part load ratio shall be 1. For ambient temperatures lower than 5 °C (9 °C water inlet temperature at the condenser), the part load ratio shall be 0.8;

The part load ratio can be expressed at three decimal places or in percentage, after multiplying by 100, at one decimal place

(41) ‘annual electricity consumption’ is calculated as the sum of the ratios between each bin-specific cooling demand and the corresponding bin-specific energy efficiency ratio, multiplied by the corresponding number of bin hours;

(42) ‘ambient temperature’ means:

(a) for process chillers using an air-cooled condenser, the air dry bulb temperature, expressed in degrees Celsius

(b) for process chillers using a water-cooled condenser, the water inlet temperature at the condenser, expressed in degrees Celsius;

(43) ‘bin’ (bin_j) means a combination of an ambient temperature T_j and bin hours h_j, as set out in Annex VIII;

(44) ‘bin hours’ (h_j) means the hours per year at which an ambient temperature occurs for each bin, as set out in Annex VIII;

(45) ‘reference ambient temperature’ means the ambient temperature, expressed in degrees Celsius, at which the part load ratio is equal to 1. It shall be set at 35 °C. For air-cooled process chillers, the air inlet temperature to the condenser is then defined as 35 °C while for water-cooled process chillers the water inlet temperature to the condenser is defined as 30 °C;

(46) ‘bin-specific energy efficiency ratio’ (EER_j) means the energy efficiency ratio for every bin in the year, derived from the part load, the declared cooling demand and declared energy efficiency ratio for specified bins, and calculated for other bins by linear interpolation, corrected where necessary by the degradation coefficient;

(47) ‘declared cooling demand’ means the cooling demand at a limited number of specified bins, and calculated as the rated cooling capacity multiplied by the corresponding part load ratio;

(48) ‘declared energy efficiency ratio’ means the energy efficiency ratio at a limited number of specified bins;

(49) ‘declared power input’ means the electrical power input needed by the process chiller to meet the declared cooling capacity;

(50) ‘declared cooling capacity’ means the cooling capacity delivered by the chiller to meet the declared cooling demand;

(51) ‘degradation coefficient’ (*Cc*) means the measure of efficiency loss due to cycling of process chillers at part load; if *Cc* is not determined by measurement, then the default degradation coefficient is *Cc* = 0.9;

(52) ‘capacity control’ means the ability of a process chiller to change its capacity by changing the volumetric flow rate of the refrigerant, to be indicated as ‘fixed’ if the process chiller cannot change its volumetric flow rate, ‘staged’ if the volumetric flow rate is changed or varied in series of not more than two steps, or ‘variable’ if the volumetric flow rate is changed or varied in series of three or more steps;

Common definitions:

(53) ‘global warming potential’ (GWP) means the measure of how much 1 kg of the refrigerant applied in the vapour compression cycle is estimated to contribute to global warming, expressed in kg CO_2 equivalents over a 100-year time horizon;

(54) for fluorinated refrigerants, the GWP values shall be those published in the Fourth Assessment Report adopted by the Intergovernmental Panel on Climate Change[1] (2007 IPCC GWP values for a 100-year period);

(55) for non-fluorinated gases, the GWP values are those published in the first IPCC assessment over a 100-year period;

(56) GWP values for mixtures of refrigerants shall be based on the formula stated in Annex I to Regulation (EC) No 842/2006[2], with the values of the Fourth Assessment Report adopted by the Intergovernmental Panel on Climate Change[1] (2007 IPCC GWP values for a 100-year period);

(57) for refrigerants not included in the above references, the Report of the 2010 Assessment of the Scientific Assessment Panel[3] (SAP) under the Montreal Protocol and the UNEP 2010 report on Refrigeration, Air Conditioning and Heat Pumps[4], or newer if available before the date of entry into force, shall be used as references.

---

1 IPCC Fourth Assessment Climate Change 2007, Report of the Intergovernmental Panel on Climate Change: http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml.

2 OJ L 161, 14.6.2006, p. 1.

3 http://ozone.unep.org/Assessment_Panels/SAP/Scientific_Assessment_2010/index.shtml.

4 http://ozone.unep.org/teap/Reports/RTOC/.

ANNEX II

Ecodesign requirements for professional refrigerated storage cabinets and blast cabinets

1. REQUIREMENTS FOR ENERGY EFFICIENCY

(a) Professional refrigerated storage cabinets within the scope of this Regulation, with the exception of heavy-duty cabinets and refrigerator-freezers, shall comply with the following energy efficiency index (EEI) limits:

(i) From 1 July 2016: EEI < 115

(ii) From 1 January 2018: EEI < 95

(iii) From 1 July 2019: EEI < 85

The EEI of a professional refrigerated storage cabinet shall be calculated in accordance with the procedure described in Annex III.

(b) From 1 July 2016, heavy-duty cabinets shall have an EEI lower than 115.

2. REQUIREMENTS FOR PRODUCT INFORMATION

(a) From 1 July 2016, the following product information on professional refrigerated storage cabinets shall be provided, in the instruction booklet for installers and end-users, and in the free access websites of manufacturers, their authorised representatives and importers:

(i) the category of the appliance, namely whether it is vertical or counter;

(ii) where applicable, whether the cabinet is heavy-duty, light-duty or refrigerator-freezer;

(iii) the intended operating temperature(s) of the cabinet – chilled, frozen or multi-use;

(iv) the net volume of each compartment, expressed in litres and rounded to one decimal place;

(v) the annual energy consumption of the cabinet, expressed in kWh per year;

(vi) the energy efficiency index of the cabinet, except for refrigerator-freezers, where the indicative daily energy consumption shall be declared, by testing the compartments exclusively intended for chilled operating temperature, at chilled operating temperature, and the ones exclusively intended for frozen operating temperature, at frozen operating temperature;

(vii) for light-duty cabinets, it shall be indicated that 'This appliance is intended for use in ambient temperatures up to 25 °C and therefore is not suitable for use in hot professional kitchens';

(viii) for heavy-duty cabinets, it shall be indicated that ‘This appliance is intended for use in ambient temperatures up to 40°C’;

(ix) any specific precautions which are to be taken when the cabinet is used and maintained in order to optimise its energy efficiency;

(x) the type, name and global warming potential (GWP) of the refrigerant fluid contained in the cabinet;

(xi) the refrigerant charge, expressed in kg and rounded to two decimal places;

(xii) information relevant for recycling or disposal at end-of-life.

Table 1 below provides an indicative layout for the requested information

Table 1 — Information requirements for professional refrigerated storage cabinets			
Model(s): [information identifying the model(s) to which the information relates]			
Intended use		**storage**	
Operating temperature(s)		chilled / frozen / multi-use	
Category		Vertical / counter	
(where applicable) Heavy-duty/light-duty			
Refrigerant fluid(s):[information to identify the refrigerant fluid(s), including GWP]			
Item	**Symbol**	**Value**	**Unit**
Annual Energy Consumption	*AEC*	x.xx	kWh
Energy Efficiency Index	*EEI*	x.xx	
Net volume	V_N	**x.x**	**litre**
(where applicable)			
Chilled volume	V_{NRef}	x.x	litre
Frozen volume	V_{NFrz}	x.x	litre
Refrigerant charge		x.xx	kg
Contact details	Name and address of the manufacturer or its authorised representative.		

(b) From 1 July 2016, for professional refrigerated storage cabinets a section of the free access websites of manufacturers for installers and other professionals, their authorised representatives, or importers shall be provided, containing information relevant for:

(i) installation in order to optimise energy efficiency of the appliances;

(ii) non-destructive disassembly for maintenance purposes;

(iii) disassembly and dismantling for disposal at end-of life.

(c) From 1 July 2016 the following indicative product information on blast cabinets shall be provided in the instruction booklet for installers and end-users, and in the free access websites of manufacturers, their authorised representatives and importers:

(i) Full load capacity of the cabinet expressed in kg of foodstuffs, and rounded to two decimal places;

(ii) The standard temperature cycle, meaning from which temperature in °C down to which temperature in °C foodstuffs are intended to be cooled and in how many minutes;

(iii) The energy consumption, in kWh per kg of foodstuffs per standard temperature cycle and rounded to two decimal places;

(iv) In the case of integral equipment, type, name and GWP of the refrigerant fluid contained in the cabinet and refrigerant charge (kg) rounded to two decimal places. In the case of equipment designed to be used with a remote condensing unit (not supplied with the blast cabinet itself), the intended refrigerant charge when used with a recommended condensing unit and the intended refrigerant fluid type, name and GWP;

(d) The technical documentation for the purposes of conformity assessment pursuant to Article 4 shall contain the following elements:

(i) elements specified in points (a) and (c) for professional refrigerated storage cabinets and blast cabinets respectively;

(ii) where the information included in the technical documentation file for a particular model has been obtained by calculation on the basis of design, or extrapolation from other equivalent refrigerating appliances, or both, the documentation shall include details of such calculations or extrapolations, or both, and of tests undertaken by suppliers to verify the accuracy of the calculations undertaken. The information shall also include a list of all other equivalent models where the information was obtained on the same basis;

(iii) the information contained in this technical documentation may be merged with the technical documentation provided in accordance with measures under Directive 2010/30/EU.

ANNEX III
Method for calculating the energy efficiency index for professional refrigerated storage cabinets

For the calculation of the energy efficiency index (EEI) of a professional refrigerated storage cabinet model, the annual energy consumption of the cabinet is compared to its standard annual energy consumption.

The EEI is calculated as:

- EEI = (AEC/SAEC) ×100

Where:

- AEC=E24h x*af* ×365

  AEC = annual energy consumption of the cabinet in kWh/year

  E24h = energy consumption of the cabinet over 24 hours

  af = *adjustment factor* to be applied only for light-duty cabinets, according to Annex IV, point 2(b)

- SAEC= M × Vn +N

  SAEC = standard annual energy consumption of the cabinet in kWh/year

  Vn = net volume of the appliance, which is the sum of net volumes of all compartments of the cabinet, expressed in litres.

M and N are given in the Table 2.

Table 2 – M and N coefficient values

Category	Value for M	Value for N
Vertical Chilled	1.643	609
Vertical Frozen	4.928	1472
Counter Chilled	2.555	1790
Counter Frozen	5.840	2380

ANNEX IV
Measurements and calculations for professional refrigerated storage cabinets

1. For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements and calculations shall be made using harmonised standards the reference numbers of which have been published for that purpose in the *Official Journal of the European Union*, or using other reliable, accurate and reproducible methods that take into account the generally recognised state-of-the-art methods. In the case of professional refrigerated storage cabinets, they shall meet the conditions and technical parameters set out in points (2) and (3).

2. For establishing the values of annual energy consumption and energy efficiency index for professional refrigerated storage cabinets, measurements shall be made under the following conditions:

   (a) The temperature of test packages shall be between -1 °C and 5 °C for chilled cabinets and lower than -15 °C for frozen cabinets;

   (b) The ambient conditions shall correspond to climate class 4 as detailed in Table 3, except for light-duty cabinets which shall be tested in ambient conditions corresponding to climate class 3. Adjustment factors of 1.2 for light-duty cabinets at chilled operating temperature and 1.1 for light-duty cabinets at frozen operating temperature should then be applied to the testing results thus obtained for light-duty cabinets for the purpose of information declaration according to Annex II, point 2(a);

   (c) Professional refrigerated storage cabinets shall be tested:

   - at chilled operating temperature in the case of a combined cabinet containing at least one compartment exclusively intended for chilled operating temperature;
   - at chilled operating temperature in the case of a professional refrigerated storage cabinet which has solely one compartment exclusively intended for chilled operating temperature;
   - at frozen operating temperature in all other cases.

3. The ambient conditions of climate classes 3, 4 and 5 are shown in Table 3.

Table 3 — Ambient conditions of climate classes 3, 4 and 5

Test room climate class	Dry bulb temperature, °C	Relative humidity, %	Dew point, °C	Water vapour mass in dry air, g/kg
3	25	60	16.7	12.0
4	30	55	20.0	14.8
5	40	40	23.9	18.8

ANNEX V
Ecodesign requirements for condensing units

1. REQUIREMENTS FOR ENERGY EFFICIENCY

(a) From 1 July 2016, the coefficient of performance (*COP*) and the seasonal energy performance ratio (*SEPR*) of condensing units shall not fall below the following values:

Operating temperature	Rated capacity P_A	Applicable ratio	Value
Medium	0.2kW≤ P_A ≤ 1kW	COP	1.20
	1kW< P_A ≤ 5kW	COP	1.40
	5kW < P_A ≤ 20kW	SEPR	2.25
	20kW < P_A ≤ 50kW	SEPR	2.35
Low	0.1kW≤ P_A ≤ 0.4kW	COP	0.75
	0.4kW< P_A ≤ 2kW	COP	0.85
	2kW < P_A ≤ 8kW	SEPR	1.50
	8kW < P_A ≤ 20kW	SEPR	1.60

(b) From 1 July 2018, the coefficient of performance (*COP*) and the seasonal energy performance ratio (*SEPR*) of condensing units shall not fall below the following values:

Operating temperature	Rated capacity P_A	Applicable ratio	Value
Medium	0.2kW≤ P_A ≤ 1kW	COP	1.40
	1kW< P_A ≤ 5kW	COP	1.60
	5kW < P_A ≤	SEPR	2.55

	20kW		
	20kW < P_A ≤ 50kW	SEPR	2.65
Low	0.1kW≤ P_A ≤ 0.4kW	COP	0.80
	0.4kW< P_A ≤ 2kW	COP	0.95
	2kW < P_A ≤ 8kW	SEPR	1.60
	8kW < P_A ≤ 20kW	SEPR	1.70

(c) For condensing units intended to be charged with a refrigerant fluid with a global warming potential lower than 150, COP and SEPR values can be lower than the values indicated in point 1(a) by a maximum of 15 % and in point 1(b) by a maximum of 10 %

(d) Condensing units capable of operating both at medium and low temperature shall comply with the requirements of each category for which they are declared.

2. REQUIREMENTS FOR PRODUCT INFORMATION

From 1 July 2016, the following product information on condensing units shall be provided:

(a) the instruction manuals for installers and end-users, and free access websites of manufacturers, their authorised representatives and importers, shall contain the following elements:

(i) intended evaporating temperature, expressed in degrees Celsius (medium temperature -10 °C, low temperature -35 °C);

(ii) for condensing units with a rated cooling capacity lower than 5kW and 2kW for medium and low temperatures respectively:

- the rated COP, at full load and 32 °C ambient temperature, rounded to two decimal places, and rated cooling capacity and power input, expressed in kW and rounded to two decimal places;
- the COP value, at full load and 25 °C ambient temperature, rounded to two decimal places, and corresponding cooling capacity and power input, expressed in kW and rounded to two decimal places;

(iii) for condensing units with a rated cooling capacity higher than 5kW and 2kW for medium and low operating temperatures respectively:

- the SEPR value, rounded to two decimal places;
- the annual electricity consumption, expressed in kWh per year;
- the rated cooling capacity, rated power input and rated COP;

– the declared cooling capacity and declared power input, expressed in kW and rounded to three decimal places, and the COP value, rounded to two decimal places, at rating points B, C and D;

(iv) for condensing units intended for use at ambient temperature above 35 °C, the COP value, at full load and 43 °C ambient temperature, rounded to two decimal places, and corresponding cooling capacity and power input, expressed in kW and rounded to two decimal places;

(v) the type(s) and name(s) of refrigerant fluid(s) intended to be used with the condensing unit;

(vi) any specific precautions that are to be taken when the condensing unit is maintained;

(vii) any specific precautions that are to be taken to optimise the efficiency of the condensing unit when it is integrated into a refrigerating appliance;

(viii) information relevant for recycling or disposal at end-of-life.

(b) a section of the free access websites of manufacturers for installers and other professionals, their authorised representatives, or importers shall be provided, containing information relevant for:

(i) installation in order to optimise energy efficiency of the appliances;

(ii) non-destructive disassembly for maintenance purposes;

(iii) disassembly and dismantling for disposal at end-of life.

(c) the technical documentation for the purposes of conformity assessment pursuant to Article 4 shall contain the following elements:

(i) the elements specified in point (a);

(ii) where the information relating to a specific model has been obtained by calculation on the basis of design or extrapolation from other combinations, the details of such calculations or extrapolations, and of any tests undertaken to verify the accuracy of the calculations, including details of the mathematical model for calculating the performance of such combinations and details of the measurements taken to verify that model.

Tables 4 and 5 below provide an indicative layout for the requested information

Table 4 — Information requirements for condensing units with a rated cooling capacity lower than 5kW and 2kW for medium and low operating temperatures respectively.

Model(s): [information identifying the model(s) to which the information relates]

Refrigerant fluid(s):[information to identify the refrigerant fluid(s) intended to be used with the condensing unit]

Item	**Symbol**	**Value**		**Unit**
Evaporating temperature*	*t*	-10 °C	-35 °C	°C
Parameters at full load and ambient temperature 32°C				
Rated cooling capacity	P_A	x.xxx	x.xxx	kW

Rated power input	D_A	x.xxx	x.xxx	kW
Rated COP	COP_A	x.xx	x.xx	
Parameters at full load and ambient temperature 25°C				
Cooling capacity	P_2	x.xxx	x.xxx	kW
Power input	D_2	x.xxx	x.xxx	kW
COP	COP_2	x.xx	x.xx	
Parameters at full load and ambient temperature 43°C (where applicable)				
Cooling capacity	P_3	x.xxx	x.xxx	kW
Power input	D_3	x.xxx	x.xxx	kW
COP	COP_3	x.xx	x.xx	
Other items				
Capacity control	fixed/step/variable			
Contact details	Name and address of the manufacturer or its authorised representative.			

* For condensing units intended to operate at only one evaporating temperature, one of the two columns related to 'Value' can be deleted.

Table 5 — Information requirements for condensing units with a rated cooling capacity higher than 5kW and 2kW for medium and low operating temperatures respectively

Model(s): [information identifying the model(s) to which the information relates]

Refrigerant fluid(s):[information to identify the refrigerant fluid(s) intended to be used with the condensing unit]

Item	**Symbol**	**Value**		**Unit**
Evaporating temperature*	*t*	-10 °C	-35 °C	°C
Annual electricity consumption	*Q*	x	x	kWh/a
Seasonal energy performance ratio	*SEPR*	x.xx	x.xx	
Parameters at full load and ambient temperature 32°C (Point A)				
Rated cooling capacity	P_A	x.xx	x.xx	kW
Rated power input	D_A	x.xx	x.xx	kW
Rated COP	$\boldsymbol{COP_A}$	**x.xx**	**x.xx**	
Parameters at part load and ambient temperature 25°C (Point B)				
Declared cooling capacity	P_B	x.xx	x.xx	kW
Declared power input	D_B	x.xx	x.xx	kW
Declared COP	$\boldsymbol{COP_B}$	**x.xx**	**x.xx**	
Parameters at part load and ambient temperature 15°C (Point C)				
Declared cooling capacity	P_c	x.xx	x.xx	kW
Declared power input	D_c	x.xx	x.xx	kW
Declared COP	$\boldsymbol{COP_C}$	**x.xx**	**x.xx**	
Parameters at part load and ambient temperature 5°C (Point D)				
Declared cooling capacity	P_D	x.xx	x.xx	kW
Declared power input	D_D	x.xx	x.xx	kW
Declared COP	$\boldsymbol{COP_D}$	**x.xx**	**x.xx**	
Parameters at full load and ambient temperature 43°C (where applicable)				
Cooling capacity	P_3	x.xx	x.xx	kW
Power input	D_3	x.xx	x.xx	kW
Declared COP	COP_3	x.xx	**x.xx**	
Other items				
Capacity control		fixed/step/variable		
Degradation coefficient for fixed and staged capacity units	*Cdc*	0.25		

Contact details	Name and address of the manufacturer or its authorised representative.
*****For condensing units intended to operate at only one evaporating temperature, one of the two columns related to 'Value' can be deleted.	

ANNEX VI
Measurements and calculations for condensing units

1. For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements and calculations shall be made using harmonised standards the reference numbers of which have been published for that purpose in the *Official Journal of the European Union*, or using other reliable, accurate and reproducible methods that take into account the generally recognised state-of-the-art methods. They shall meet the conditions and technical parameters set out in point 2.

2. For establishing the values of cooling capacity, power input, coefficient of performance and seasonal energy performance ratio, measurements shall be made under the following conditions:

(a) the reference ambient temperature at the outdoor heat exchanger (condenser) shall be 32 °C;

(b) the saturated evaporating temperature at the indoor heat exchanger (evaporator) shall be -35 °C for low temperature and -10 °C for medium temperature;

(c) where applicable, the variations of ambient temperature throughout the year, representative of average climate conditions in the Union, and the corresponding number of hours when these temperatures occur, shall be as set out in Table 6;

(d) where applicable, the effect of the degradation of energy efficiency caused by cycling, depending on the type of capacity control of the condensing unit, shall be taken into account.

Table 6 — Variations of outdoor temperatures across the year under average climate conditions in Europe for condensing units

j	T_j	h_j
1	-19	0.08
2	-18	0.41
3	-17	0.65
4	-16	1.05
5	-15	1.74
6	-14	2.98
7	-13	3.79
8	-12	5.69
9	-11	8.94
10	-10	11.81
11	-9	17.29

12	-8	20.02
13	-7	28.73
14	-6	39.71
15	-5	56.61
16	-4	76.36
17	-3	106.07
18	-2	153.22
19	-1	203.41
20	0	247.98
21	1	282.01
22	2	275.91
23	3	300.61
24	4	310.77
25	5	336.48
26	6	350.48
27	7	363.49
28	8	368.91
29	9	371.63
30	10	377.32
31	11	376.53
32	12	386.42
33	13	389.84
34	14	384.45
35	15	370.45
36	16	344.96
37	17	328.02
38	18	305.36

39	19	261.87
40	20	223.90
41	21	196.31
42	22	163.04
43	23	141.78
44	24	121.93
45	25	104.46
46	26	85.77
47	27	71.54
48	28	56.57
49	29	43.35
50	30	31.02
51	31	20.21
52	32	11.85
53	33	8.17
54	34	3.83
55	35	2.09
56	36	1.21
57	37	0.52
58	38	0.40

ANNEX VII
Ecodesign requirements for process chillers

1. REQUIREMENTS FOR ENERGY EFFICIENCY

(a) From 1 July 2016, the seasonal energy performance ratio (*SEPR*) of process chillers shall not fall below the following values:

Heat transfer medium at the condensing side	Operating temperature	Rated cooling capacity P_A	Minimum SEPR value
Air	Medium	$P_A \leq 300$ kW	2.24
		$P_A > 300$ kW	2.80
	Low	$P_A \leq 200$ kW	1.48
		$P_A > 200$ kW	1.60
Water	Medium	$P_A \leq 300$ kW	2.86
		$P_A > 300$ kW	3.80
	Low	$P_A \leq 200$ kW	1.82
		$P_A > 200$ kW	2.10

(b) From 1 July 2018, the seasonal energy performance ratio (*SEPR*) of process chillers shall not fall below the following values:

Heat transfer medium at the condensing side	Operating temperature	Rated cooling capacity P_A	Minimum SEPR value
Air	Medium	$P_A \leq 300$ kW	2.58
		$P_A > 300$ kW	3.22
	Low	$P_A \leq 200$ kW	1.70
		$P_A > 200$ kW	1.84
Water	Medium	$P_A \leq 300$ kW	3.29
		$P_A > 300$ kW	4.37
	Low	$P_A \leq 200$ kW	2.09
		$P_A > 200$ kW	2.42

(c) For process chillers intended to be charged with a refrigerant fluid with a global warming potential lower than 150, SEPR values can be lower than the values indicated in points 1(a) and (b) by a maximum of 10 %.

2. REQUIREMENTS FOR PRODUCT INFORMATION

From 1 July 2016, the following product information on process chillers shall be provided:

(a) the instruction manuals for installers and end-users, and free access websites of manufacturers, their authorised representatives and importers, shall contain the following elements:

(i) intended operating temperature, expressed in degrees Celsius (medium temperature -8 °C, low temperature -25 °C);

(ii) the type of process chiller, either air-cooled or water-cooled;

(iii) the rated cooling capacity, rated power input, expressed in kW and rounded to two decimal places;

(iv) the rated energy efficiency ratio (EER_A), rounded to two decimal places;

(v) declared cooling capacity and declared power input at rating points B, C and D, expressed in kW and rounded to two decimal places;

(vi) declared EER at rating points B, C, and D, rounded to two decimal places;

(vii) the SEPR value, rounded to two decimal places;

(viii) the annual electricity consumption, in kWh per year;

(ix) type(s) and name(s) of refrigerant fluid(s) intended to be used with the process chiller;

(x) any specific precautions that are to be taken when the process chiller is maintained;

(xi) information relevant for recycling or disposal at end-of-life.

(b) a section of the free access websites of manufacturers for installers and other professionals, their authorised representatives, or importers shall be provided, containing information relevant for:

(i) installation in order to optimise energy efficiency of the appliances;

(ii) non-destructive disassembly for maintenance purposes;

(iii) disassembly and dismantling for disposal at end-of life.

(c) the technical documentation for the purposes of conformity assessment pursuant to Article 4 shall contain the following elements:

(i) the elements specified in point (a);

(ii) where the information relating to a specific model has been obtained by calculation on the basis of design or extrapolation from other combinations, the details of such calculations or extrapolations, and of any tests undertaken to verify the accuracy of the calculations, including details of the mathematical model for calculating the performance of such combinations and details of the measurements taken to verify that model.

	Table 7 — Information requirements for process chillers				
	Model(s): [information identifying the model(s) to which the information relates]				
	Type of condensing: [air-cooled / water-cooled]				
	Refrigerant fluid(s):[information identifying the refrigerant fluid(s) intended to be used with the process chiller]				
Item		**Symbol**	**Value**		**Unit**
Operating temperature		t	-8 °C	-25 °C	°C
Seasonal Energy Performance Ratio		*SEPR*	x.xx	x.xx	
Annual electricity consumption		Q	x	x	kWh/a
	Parameters at full load and reference ambient temperature (Point A)				
Rated cooling capacity		P_A	x.xx	x.xx	kW
Rated power input		D_A	x.xx	x.xx	kW
Rated EER		$\boldsymbol{EER_A}$	**x.xx**	**x.xx**	
	Parameters at rating point B				
Declared cooling capacity		P_B	x.xx	x.xx	kW
Declared power input		D_B	x.xx	x.xx	kW
Declared EER		$\boldsymbol{EER_B}$	**x.xx**	**x.xx**	
	Parameters at rating point C				
Declared cooling capacity		P_c	x.xx	x.xx	kW
Declared power input		D_c	x.xx	x.xx	kW
Declared EER		$\boldsymbol{EER_C}$	**x.xx**	**x.xx**	
	Parameters at rating point D				
Declared cooling capacity		P_D	x.xx	x.xx	kW
Declared power input		D_D	x.xx	x.xx	kW
Declared EER		$\boldsymbol{EER_D}$	**x.xx**	**x.xx**	
	Other items				
Capacity control			fixed/staged**/variable		
Degradation coefficient for fixed and staged capacity units*		Cc	x.xx	x.xx	
Contact details	Name and address of the manufacturer or its authorised representative.				

* If *Cc* is not determined by measurement then the default degradation coefficient shall be *Cc* = 0.9. Where the default *Cc* value is chosen, then results from cycling tests shall not be required. Otherwise, the cooling cycling test value shall be required.

** For staged capacity units, two values divided by a slash ('/') shall be declared in each box in the section referring to 'cooling capacity' and 'EER'.

For process chillers intended to operate at only one operating temperature, one of the two columns related to 'Value' can be deleted.

ANNEX VIII
Measurements and calculations for process chillers

1. For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements and calculations shall be made using harmonised standards the reference numbers of which have been published for that purpose in the *Official Journal of the European Union*, or using other reliable, accurate and reproducible methods that take into account the generally recognised state-of-the-art methods. They shall meet the conditions and technical parameters set out in points 2 and 3.

2. For establishing the values of cooling capacity, power input, energy efficiency ratio and seasonal energy performance ratio, measurements shall be made under the following conditions:

(a) the reference ambient temperature at the outdoor heat exchanger shall be 35 °C for air-cooled chillers and 30 °C water inlet temperature at the condenser for water-cooled chillers;

(b) the outlet temperature of the liquid at the indoor heat exchanger shall be -25 °C for low temperature and -8 °C for medium temperature;

(c) the variations of ambient temperature throughout the year, representative of average climate conditions in the Union, and the corresponding number of hours when these temperatures occur, shall be as set out in Table 6 in Annex VI;

(d) the effect of the degradation of energy efficiency caused by cycling depending on the type of capacity control of the process chiller shall be taken into account.

ANNEX IX
Verification procedure for market surveillance purposes for professional refrigerated storage cabinets

When performing the market surveillance checks referred to in Article 3(2) of Directive 2009/125/EC, the authorities of Member States shall apply the following verification procedure for the requirements set out in Annex II:

1. The Member State authorities shall test one single unit per model.

2. The model shall be considered to comply with the applicable requirements set out in Annex II where:

(a) the declared values comply with the requirements set out in Annex II;

(b) the measured volume is not lower than the rated value by more than 3 %;

(c) the measured value of energy consumption is not greater than the rated value (E24h) by more than 10 %.

3. Where the result referred to in point 2 is not achieved, the Member State authorities shall randomly select three additional units of the same model for testing. As an alternative, the three additional units selected may be of one or more different models which have been listed as equivalent product in the technical documentation.

4. The model shall be considered to comply with the applicable requirements set out in Annex II where:

(a) the average of the three units for the measured volume is not lower than the rated value by more than 3 %;

(b) the average of the three units for the measured value of energy consumption is not greater than the rated value (E24h) by more than 10 %.

5. If the results referred to in point 4 are not achieved, the model and all other equivalent professional refrigerated storage cabinet models shall be considered not to comply with this Regulation. The Member State authorities shall provide the test results and other relevant information to the authorities of other Member States and to the Commission within one month of the decision being taken on the non-compliance of the model.

Member State authorities shall use the measurement and calculation methods set out in Annexes III and IV.

The verification tolerances set out in this Annex relate only to the verification of the measured parameters by Member State authorities and shall not be used by the supplier as an allowed tolerance to establish the values in the technical documentation. The values and classes on the label or in the product fiche shall not be more favourable for the supplier than the values reported in the technical documentation.

ANNEX X
Verification procedure for market surveillance purposes for condensing units

When performing the market surveillance checks referred to in Article 3(2) of Directive 2009/125/EC, the authorities of Member States shall apply the following verification procedure for the requirements set out in Annex V:

1. The Member State authorities shall test one single unit per model.

2. The condensing unit model shall be considered to comply with the applicable requirements set out in Annex V where:

(a) the declared values comply with the requirements set out in Annex V;

(b) for condensing units with a rated cooling capacity higher than 2 kW at low temperature and 5 kW at medium temperature, the seasonal energy performance ratio (*SEPR*) is not more than 10% lower than the declared value, with point A measured at the rated cooling capacity;

(c) for condensing units with a rated cooling capacity lower than 2 kW at low temperature and 5 kW at medium temperature, the rated coefficient of performance (COP_A) is not more than 10% lower than the declared value measured at the rated cooling capacity;

(d) for condensing units with a rated cooling capacity lower than 2 kW at low temperature and 5 kW at medium temperature, the coefficients of performance COP_B, COP_c, COP_D are not more than 10 % lower than the declared value measured at the declared cooling capacity;

3. If the result referred to in point 2 is not achieved, the Member State authorities shall randomly select three additional units of the same model for testing.

4. The condensing unit model shall be considered to comply with the applicable requirements set out in Annex V where:

(a) for condensing units with a rated cooling capacity higher than 2 kW at low temperature and 5 kW at medium temperature, the average of the three units for seasonal performance energy ratio (*SEPR*) is not more than 10% lower than the declared value, with point A measured at the rated cooling capacity;

(b) for condensing units with a rated cooling capacity lower than 2 kW at low temperature and 5 kW at medium temperature, the average of the three units for the rated coefficient of performance (COP_A) is not more than 10% lower than the declared value measured at the rated cooling capacity;

(c) for condensing units with a rated cooling capacity lower than 2 kW at low temperature and 5 kW at medium temperature, the averages of the three units for the coefficients of performance COP_B, COP_c, COP_D are not more than 10 % lower than the declared value measured at the declared cooling capacity.

5. If the results referred to in point 4 are not achieved, the model shall be considered not to comply with this Regulation.

Member State authorities shall use the measurement and calculation methods set out in Annex VI.

The verification tolerances set out in this Annex relate only to the verification of the measured parameters by Member State authorities and shall not be used by the supplier as an allowed tolerance to establish the values in the technical documentation.

ANNEX XI
Verification procedure for market surveillance purposes for process chillers

When performing the market surveillance checks referred to in Article 3(2) of Directive 2009/125/EC, the authorities of the Member States shall apply the following verification procedure for the requirements set out in Annex VII:

1. The Member State authorities shall test one single unit per model.

2. The process chiller model shall be considered to comply with the applicable requirements set out in Annex VII where:

(a) the declared values comply with the requirements set out in Annex VII;

(b) the seasonal energy performance ratio (*SEPR*) is not more than 10 % lower than the declared value, with point A measured at the rated cooling capacity;

(c) the rated energy efficiency ratio (EER_A) is not more than 10 % lower than the declared value, measured at the rated cooling capacity.

3. Where the result referred to in point 2 is not achieved, the Member State authorities shall randomly select three additional units of the same model for testing.

4. The process chiller model shall be considered to comply with the applicable requirements set out in Annex VII where:

(a) the average of the three units for seasonal performance energy ratio (*SEPR*) is not more than 10% lower than the declared value, with point A measured at the rated cooling capacity;

(b) the average of the three units for the rated energy efficiency ratio (EER_A) is not more than 10 % lower than the declared value, measured at the rated cooling capacity.

5. If the results referred to in point 4 are not achieved, the model shall be considered not to comply with this Regulation.

Member State authorities shall use the measurement and calculation methods set out in Annex VIII.

The verification tolerances set out in this Annex relate only to the verification of the measured parameters by Member State authorities and shall not be used by the supplier as an allowed tolerance to establish the values in the technical documentation.

ANNEX XII
Indicative benchmarks referred to in Article 6

1. At the date of entry into force of this Regulation, the best available technology on the market for professional refrigerated storage cabinets in terms of their energy efficiency index (EEI) was identified as follows:

	Net volume (litres)	Annual energy consumption	EEI
Chilled vertical	600	474.5	29.7
Chilled counter	300	547.5	21.4
Frozen vertical	600	1825	41.2
Frozen counter	200	1460	41.0

2. At the date of entry into force of this Regulation, the best available technology on the market for condensing units in terms of rated coefficient of performance and seasonal energy performance ratio was identified as follows:

Operating temperature	Rated capacity P_A	Applicable ratio	Benchmark value
Medium	$0.2\text{kW} \leq P_A \leq 1\text{kW}$	COP	1.9
	$1\text{kW} < P_A \leq 5\text{kW}$	COP	2.3
	$5\text{kW} < P_A \leq 20\text{kW}$	SEPR	3.6
	$20\text{kW} < P_A \leq 50\text{kW}$	SEPR	3.5
Low	$0.1\text{kW} \leq P_A \leq 0.4\text{kW}$	COP	1.0
	$0.4\text{kW} < P_A \leq 2\text{kW}$	COP	1.3
	$2\text{kW} < P_A \leq 8\text{kW}$	SEPR	2.0
	$8\text{kW} < P_A \leq 20\text{kW}$	SEPR	2.0

3. At the date of entry into force of this Regulation, the best available technology on the market for process chillers in terms of seasonal energy performance ratio was identified as follows:

Heat transfer medium at the condensing side	Operating temperature	Rated cooling capacity P_A	Minimum SEPR value
Air	Medium	$P_A \leq 300$ kW	3.4
		$P_A > 300$ kW	3.7

	Low	$P_A \leq 200$ kW	1.9
		$P_A > 200$ kW	1.95
Water	Medium	$P_A \leq 300$ kW	4.3
		$P_A > 300$ kW	4.5
	Low	$P_A \leq 200$ kW	2.3
		$P_A > 200$ kW	2.7