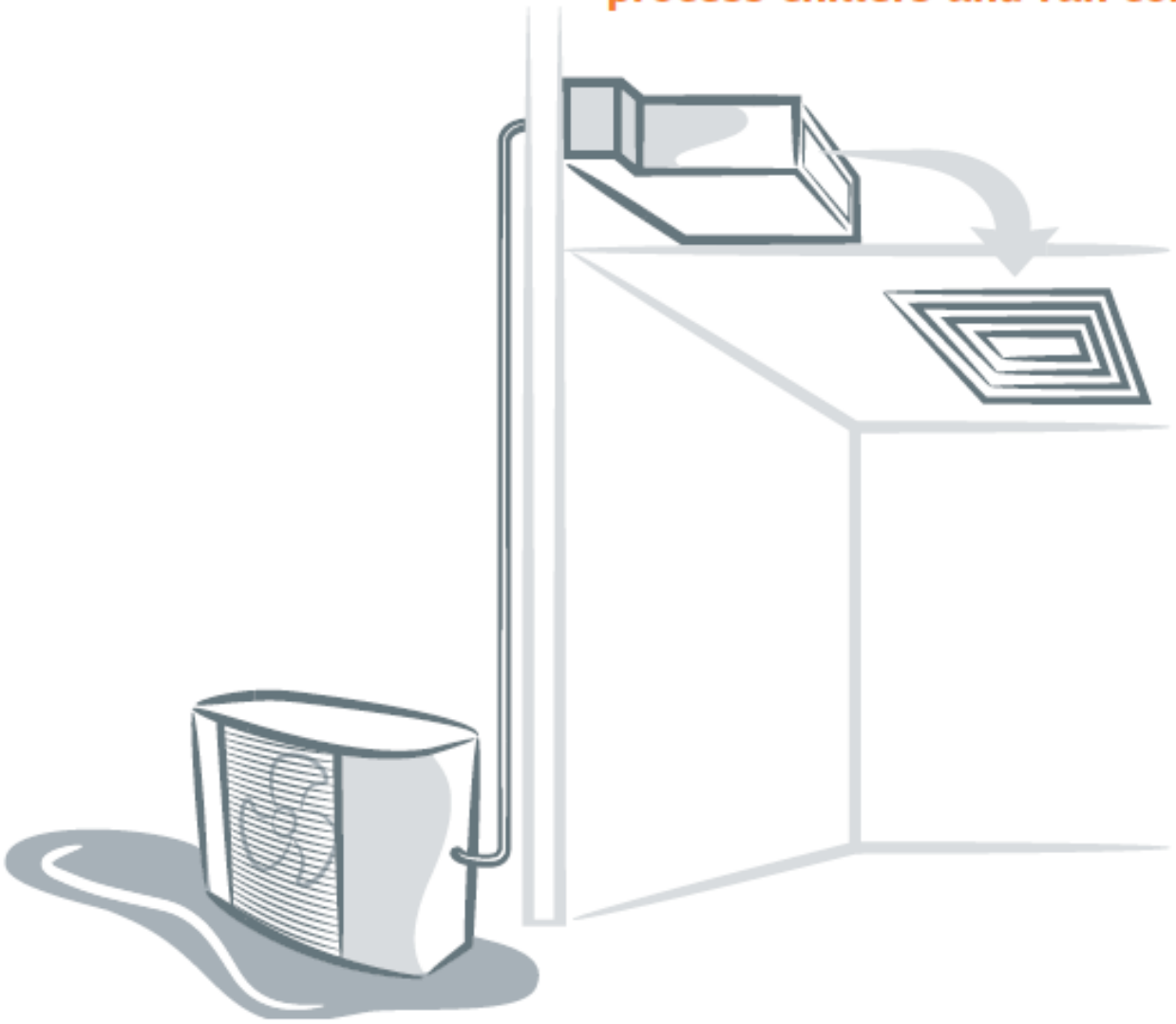
European Commission

Guidelines accompanying

2018

Regulation (EU) 2016/2281 with regard to **ecodesign requirements for air heating products, cooling products, high temperature process chillers and fan coil units**



Energy

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1. Purpose of the guidelines and disclaimer

The Ecodesign Regulation for air heating products, cooling products, high temperature process chillers and fan coil units was published in 2016. This regulation establishes minimum requirements for the products in scope. These guidelines aim to help relevant stakeholders, including industry and public authorities, to implement the regulations in practice. They summarise the most relevant information from the regulations and answer the most common questions.

The guidelines are intended only to facilitate the implementation of the Regulations. They are not intended to replace the Regulations or to provide "interpretation" beyond their intent. The guidelines only reflect the opinion of the Commission services and are not legally binding. A finally binding interpretation of EU legislation may only be provided by the European Court of Justice.

1.1. The Regulation

Commission Regulation (EU) 2016/2281 of 30 November 2016 implementing Directive 2009/125/EC of the European Parliament and of the Council with regards to ecodesign requirements for air heating products, cooling products, high temperature process chillers and fan coil units [1].

2. Scope

The Ecodesign Regulation covers air-heating products with a rated heating capacity not exceeding 1 MW, cooling products and high temperature process chillers with a rated cooling capacity not exceeding 2 MW and fan coil units.

The products covered by the Regulation can be classified as follows:

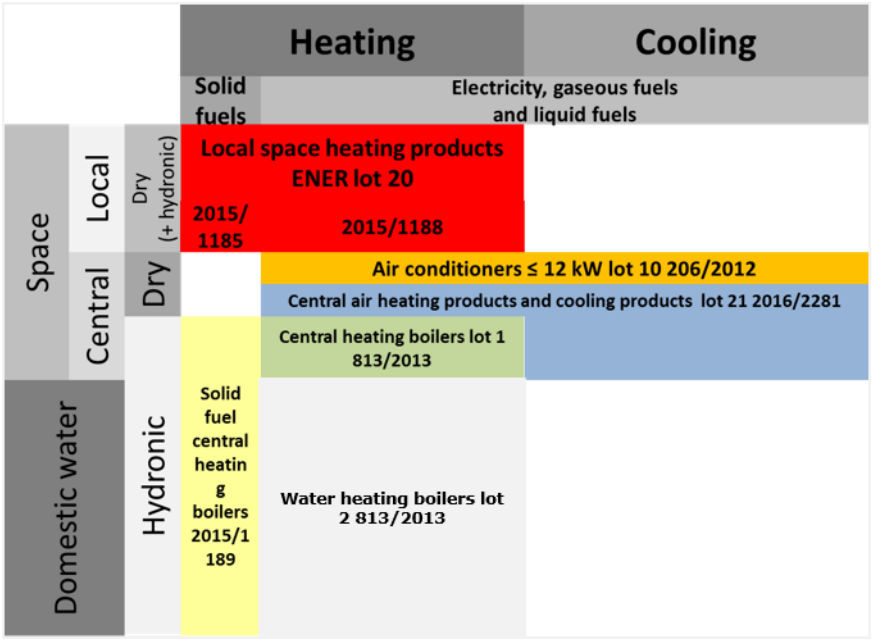
- Warm air heaters
- Comfort chillers
- Air-to-air air conditioners > 12 kW
- Water/brine-to-air air conditioners
- Fan coil units
- Air-to-air heat pumps > 12 kW
- Water/brine-to-air heat pumps
- High temperature process chillers

With this regulation, the most common space heating and space cooling appliances are covered by ecodesign regulations[2]; most residential heating and cooling appliances are also

[1] OJ L 346, 20.12.2016, p. 1.

[2] Ecodesign Regulation (EU) No 206/2012 for air conditioners and comfort fans (OJ L 72, 10.3.2012, p. 7–27), Ecodesign Regulation (EU) No 813/2013 for space heaters and combination heaters (OJ L 239, 6.9.2013, p. 136–161), Ecodesign Regulation (EU) 2015/1185 for solid fuel local space heaters (OJ L 193, 21.7.2015, p. 1–19), Ecodesign Regulation (EU) 2015/1185 for local space heaters (OJ L 193, 21.7.2015, p. 1–19), Ecodesign Regulation (EU) 2015/1189 for solid fuel boilers (OJ L 193, 21.7.2015, p. 100–114), Ecodesign Regulation (EU) 2016/2281 for air heating products, cooling products, high temperature process chillers and fan coil units (OJ L 346, 20.12.2016, p. 1–50).

covered by an energy labelling regulations[3]. An overview of the Ecodesign Regulations for different space heating, space cooling and water heating products is presented in below figure:



3. Product environmental impacts

The preparatory study identified and analysed the relevant environmental impacts of air heating products, cooling products, high temperature process chillers and fan coil units. The use phase of the products has been identified as the most important phase in terms of environmental impacts and having the most potential for improvement. Therefore, no specific requirements considering production or transport were proposed and the regulatory measure focusses on the use phase and on the end-of life-phase.

As for most of the products subject to ecodesign regulations, the primary energy consumption during the use phase is the source of the most important environmental impact via the CO_2 emissions.

Emissions from the combustion of fuel, i.e. nitrogen oxide emissions (NO_x), are also relevant for air heating products and cooling products with a burner or a combustion engine. Air heating products and cooling products working on electricity do not produce direct emissions of this kind.

4. State of play of legislation

4.1. History of the product legislations to date

From the start of the preparatory study in 2011 until the publication of the implementing acts in 2016, the ecodesign process lasted 5 years.

[3] Energy labelling Regulation (EU) No 626/2011 for air conditioners (OJ L 178, 6.7.2011, p. 1–72), Energy labelling Regulation (EU) No 811/2013 for space heaters and combination heaters (OJ L 239, 6.9.2013, p. 1–82), Energy labelling Regulation (EU) 2015/1186 for local space heaters (OJ L 193, 21.7.2015, p. 20–42), Energy labelling Regulation (EU) 2015/1187 for solid fuel boilers (OJ L 193, 21.7.2015, p. 43–75).

4.2. Time table

- 20/12/2016: Publication
- 30/12/2016: Entry into force
- 01/01/2018: Tier 1 requirements on energy efficiency
- 26/09/2018: Tier 1 requirements on NO_x emissions
- 01/01/2021: Tier 2 requirements on energy efficiency and NO_x emissions
- 01/01/2022: Review

4.3. Review

A review of this regulation is foreseen in 2022.

The regulation requires the Commission to undertake the review in particular to assess:

- The appropriateness of setting ecodesign requirements covering direct greenhouse gas emissions caused by refrigerants;
- The appropriateness of setting ecodesign requirements for high temperature process chillers using evaporative condensing and high temperature process chillers using absorption technology;
- The appropriateness of setting stricter ecodesign requirements for the energy efficiency and emissions of nitrogen oxides of air heating products, cooling products and high temperature process chillers;
- The appropriateness of setting ecodesign requirements for the noise emissions of air heating products, cooling products, high temperature process chillers and fan coil units;
- The appropriateness of setting emission requirements on the basis of useful heating or cooling capacity, instead of energy input;
- The appropriateness of setting ecodesign requirements for combination warm air heaters;
- The appropriateness of setting energy labelling requirements for domestic air heating products;
- The appropriateness of setting stricter ecodesign requirements for C2 and C4 warm air heaters;
- The appropriateness of setting stricter ecodesign requirements for rooftop and ductable air conditioners and heat pumps;
- The appropriateness of third party certification;
- The value of the tolerances for verification, as mentioned in the verification procedures set out in Annex IV.

5. Key requirements

5.1. Ecodesign requirements

The key parameter for air heating products is the seasonal space heating energy efficiency; for cooling products, the seasonal space cooling energy efficiency; and for high temperature process chillers, the seasonal energy performance ratio.

Heating, cooling and refrigeration demands are not constant over the year. The seasonal space heating energy efficiency, the seasonal space cooling energy efficiency and the seasonal energy performance ratio capture the seasonal demand variations by considering the behaviour of the product at full load as well as at part load conditions. The energy efficiency requirements are technology specific and in some cases size dependent.

In addition to energy efficiency, the regulation defines an additional compliance criteria aimed at reducing other relevant environmental impacts, i.e. NO_x emissions for fuel based air heating and cooling products.

For NO_x emissions the requirements are technology and fuel dependent, and are expressed in mg / kWh in terms of gross calorific values.

- ✓ The following table gives an overview of the criteria to be fulfilled, as well as the dates on which these criteria come into force.

		Space heating or cooling energy efficiency	**Emissions of nitrogen oxides**	**Information requirements**
TIER I		01/01/2018	26/08/2018	1/1/2018
TIER II		01/01/2021	01/01/2021	-
Warm air heaters	**using fuel**	✓	✓	✓
	using electricity	✓	N.A.	✓
Comfort chillers	**combustion engine**	✓	✓	✓
	electric	✓	N.A.	✓
Air-to-air air conditioners	**combustion engine**	✓	✓	✓
	electric	✓	N.A.	✓
Water/brine-to-air air conditioners		N.A.	N.A.	✓
Fan coil units		N.A.	N.A.	✓
Heat pumps	**combustion engine**	✓	✓	✓
	electric	✓	N.A.	✓
High temperature process chillers		✓	N.A.	✓

6. Measurements and calculations methods

For purposes of conformity assessment and compliance verification, measurements and calculations should preferably be done by using harmonised standards.

If the reference numbers of the standards have not been published in the Official Journal of the European Union, the standards have not been recognised by the European Commission as providing presumption of conformity with the Regulations. In that case, the regulations have to be applied in combination with the Commission communication (2017/C 229/01)[4], also referred to as the transitional methods.

[4] OJ C 229 of 14.07.2017, p 1-23

7. Frequently asked questions

Scope

1. ***Are air conditioners used for data centres cooling (Close Control Units) in scope of this regulation?***

No. The purpose of the close control unit's air based cooling system from which the indoor side heat exchanger extracts heat is not to 'attain and maintain the desired indoor temperature of an enclosed space, such as a building or parts thereof, for the thermal comfort of human beings'.

2. ***Is an energy-using product which is connected to a photovoltaic system and is disconnected from the grid, working as an island solution, excluded from the scope of this regulation?***

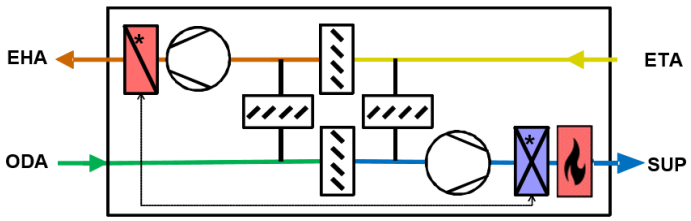
No. The definition of an air heating products and a cooling product does not exclude these products.

3. ***Are heat pumps integrated in air handling units in scope of the regulation?***

Depending on the intended use of the heat pump and on how it is marketed they are either in scope or they are out of scope.

When the intended use of the heat pump is space heating for the thermal comfort of human beings or when the heat pump is marketed as such, it is in scope of the regulation. Otherwise, it is not.

4. ***Some rooftop heat pumps have an additional warm air heater using gaseous fuel to complete the heating. Are these products in scope of 2281/2016 and covered by the definition of a rooftop heat pump?***



Yes. These products are in scope of the regulation and fall under the definition of a rooftop heat pump.

When sold as a single package, the efficiency value should reflect the product's efficiency, including the fossil fuel heater. In the absence of a calculation methodology for heat pumps integrating a fossil fuel supplementary heater, and in analogy with the manufacturer's guide for space and water heaters[5], suppliers can use the same methodology as laid down in EN 14825 for electrical supplementary heaters by replacing

[5] https://ec.europa.eu/energy/sites/ener/files/documents/GuidelinesSpaceWaterHeaters_FINAL.pdf

performances of electrical supplementary heater with the performances of fossil fuel supplementary heater.

The supplementary heater of a heat pump needs to be taken into account when measuring and calculating the rated heating capacity, seasonal space heating energy efficiency, sound power level and emissions of nitrogen oxides.

5. ***Are warm air heaters using gaseous fuels and intended to complement the heating of a rooftop heat pump in the scope of this regulation?***

Yes.

According to Art. 2(1), an air heating product can be equipped with one or more heat generators. Therefore, when warm air heaters are sold as a single package with the rooftop heat pump, they are in the scope and the reasoning in question 4 applies.

When warm air heaters are not sold as a single package and when the intended use of its air based heating system is space heating for the thermal comfort of human beings or when it is marketed as such, they are in scope of the regulation.

6. ***Are air conditioners and heat pumps (including rooftops) which are fitted with an apparatus to mix the conditioned air with fresh air (e.g. with a mixing box) in the scope of the regulation?***

Yes. One of the intended uses of these appliances is space cooling and or space heating for the thermal comfort of human beings as such it is in scope of the regulation.

7. ***When a process chiller cannot operate at the reference point for medium temperature chillers (-8°C) in accordance with Regulation (EU) 2015/1095, but can operate in the temperature range between 2°C and 12°C, is it a high temperature process chiller in accordance with Regulation (EU) 2016/2281?***

Yes. The process chiller is a high temperature process chiller and has to comply with the requirements relevant to high temperature process chillers.

8. ***Many process chillers placed on the market are designed to operate between the temperature ranges of -7°C and +7°C. These products may be capable of reaching -8°C in some circumstances. This will impact their original and intended declared design rated cooling capacity. As they are capable of reaching -8°C should a manufacturer declare the product as medium temperature process chillers under Regulation 2015/1095 or a high temperature process chiller under Regulation 2016/2281?***

In those cases, it is the manufacturer's responsibility to identify and declare the process chiller operating temperature under Regulation 2015/1095 or Regulation 2016/2281 depending on its intended use and on how they are marketed.

9. ***Some comfort chillers can operate with a leaving water temperature of less than + 2 °C, but can also operate above +2°C; similarly, some high temperature process***

chillers can operate with a leaving water temperature of below +2°C or above +12°C but can also cover the operating range between 2°C and 12°C. Are these chillers exempted by the exemption in art 1.1(e)?

No. These chillers are considered in scope of the regulation.

10. The definition of chilled leaving water is missing - are chillers that are using oil, polishing agent, or water with special chemical additives instead of fresh water in scope of the regulation?

Yes. A standardised process fluid is not defined in the regulation. In the case of a process chiller working with fluids other than water, compliance with requirements has to be assessed by testing the product with the process liquid used by the process chiller.

If the same process chiller can operate with difference process fluids (e.g. water, brine, oil, etc.), it is up to manufacturer to choose the process fluid with which to show compliance against the requirements.

11. Is a reversible chiller in scope of the regulation?

According to art 1.1.(c), products covered by Regulation (EU) No 813/2013 are not in scope of this regulation, as per the following table:

	Rated heat output	Rated heat output
Reversible chillers	≤ 400 kW	> 400 kW
Regulation	(EU) No 813/2013	(EU) 2016/2281

12. The chilled leaving water temperatures of immersion chillers are not known at the time of manufacturing since the evaporator coil is placed in a basin with unknown temperature (determined by the needs of the customer). Are immersion chillers in scope of Regulation (EU) 2016/2281?

Yes. Real world applications almost never run at the exact conditions defined to calculate SEPR. Immersion chillers that are covered by Art. 2, definition 10 have to comply with the requirements for high temperature process chillers.

Are water loop heat pumps in scope of the regulation?

Yes. They have to comply with information and nitrogen oxide emissions requirements in case they are driven by combustion engines. The part load conditions for these heat pumps will be included in the EN14825:2017.

13. Are exhaust air-to-air heat pumps in the scope of this regulation?

When space heating for the thermal comfort of human beings is not one of the functions marketed and when space heating for the thermal comfort of human beings is not one of the intended functions (e.g. the heat pump is only used for heat recovery purposes), the exhaust air-to-air heat pump is excluded from the scope.

When an exhaust air-to-air heat pump is marketed and intended to be used as a space heater for the thermal comfort of human beings it is in the scope because the definition of a heat pump clearly includes ventilation exhaust air as one of the heat sources.

Note however, that minimum efficiency requirements only apply to air-to-air heat pumps, of which the definition only specifies ambient air as a heat source. As such, exhaust air heat pumps do not have to meet the minimum energy efficiency requirements; they have to meet the NOx requirements when applicable and the information requirements.

The part load conditions for these heat pumps will be included in the EN14825.

14. Are exhaust air air-conditioners in the scope of this regulation?

No. The definition of an air conditioner only specifies ambient air, water or ground as a heat sink.

15. What is meant with 'single package' in the definition of a rooftop heat pump and a rooftop air conditioner?

A single package means an assembly constituting a unique functional unit that is provided by one manufacturer with one single commercial reference. However, this assembly can be provided on one or two separate frames.

The following categories of roof-top units may exist:

- A unit mounted on a single frame that can be installed either outdoors (on the roof of the building or aside the building) or indoors. In the latter case, the unit is ducted on air side outdoors and/or indoors.
- A unit the components of which are mounted on two separate frames, and connected with refrigerant lines, constituting a single package installed as a unique product. The two parts are generally installed indoors at two different locations in the building, with or without air ducts.

The choice of configuration, i.e. one or frames, will depend on the constraints on the integration of the unit into the building for the required application.

The technical design and the individual components of the two types of units are identical and therefore both types are covered by the definition of rooftop air conditioner and/or rooftop heat pump.

A system only available in two or more structures (structures) such as a single split or a multi-split air conditioner or heat pump is not a rooftop air conditioner or heat pump.

16. Are indoor units of multi-split heat pumps and multi-split air conditioners fan coils?

Yes. The definition of a fan coil unit does not exclude those products containing refrigerants as a heat transfer medium.

The standard rating conditions for fan coil units using refrigerants, i.e. indoor units of multi-split heat pumps and multi-split air conditioners, can be found in Table 16 and Table 19 in the Regulation.

The standard rating conditions for fan coil units using water can be found in Table 13.

17. Are air-handling units without a heat generators fan coil units?

An air-handling unit without recirculation with heating and cooling coils is not considered a fan coil unit.

An air-handling unit with 100% recirculation is considered a fan coil unit if it has no or minimal ductwork.

In accordance with the guidelines accompanying Regulation (EU) No 1254/2014 and 1253/2014, when the product has an outdoor connection with supply air/exhaust air flowrate at nominal operation point of at least 10%, it is not a fan coil unit but a ventilation unit. These units are covered by Regulation (EU) No 1253/2014; when the air flow rate is lower than 10% it is a fan coil unit covered by Regulation (EU) 2016/2281.

18. Are air-handling units with a heat generator in scope of the Regulation?

If the air-handling unit is marketed or intended to be used as a space heater for the comfort of human beings, it is an air heating product according to the regulation.

19. Are absorption chillers excluded from the scope of Regulation 2016/2281?

If the product is intended to be used/marketed solely to operate as a comfort chiller, it is in the scope of Regulation (EU) 2016/2281.

If the product is intended to be used/marketed solely to operate as a high temperature process chiller, it is not in scope of Regulation (EU) 2016/2281 (exempted by art 1.2(l).

If the product is intended to be used/marketed for dual use i.e. either comfort chilling or high temperature process chilling, it is still a comfort chiller according to Regulation (EU) 2016/2281 and therefore in scope for the requirements related to comfort chillers.

20. What is the difference between an air heating product and a local space heater?

The main difference between an air heating product and a local space heater is the location of the heat generator.

Local space heaters fall under the scope of Regulation 2015/1188. The heat generator of a local space heater is situated in the space that is heated, see Art.2(1) of Regulation 2015/1188.

Excluded from the scope of Regulation 2015/1188 are air heating products. According to that regulation, an air heating product's heat generator delivers its heat via an air based heating system. Here, it is the air based heating system that is at least partly situated in

the space that is heated, see Art.2(23) of Regulation 2015/1188. As an example, when the air based heating system is a duct with a fan, this duct will supply the heated air from the heat generator (not situated in the space that is heated) to the space that is heated.

An additional specification is that to be excluded from the scope of Regulation 2015/1188, air heating products need to be fastened or secured in a specific location or wall mounted.

Verification procedures

21. When the authorities request the ErP documentation for a verification test for multi-split units, is it necessary to provide a test report with each type of the indoor unit of the same group?

Yes. A test report needs to be provided for the combination that was tested.

For combinations that were calculated, a test report of the representative combination that was tested and used as the basis for the calculation, as well as information about the calculation, needs to be provided.

22. When the authorities request the ErP documentation for a verification test for products in scope of the regulation, for which the parameters where determined based on a calculation, is it necessary to provide a test report and information about the calculation?

Yes. A test report of the representative product that was tested to start the calculation from and information about the calculation needs to be provided.

Ecodesign requirements and performance declarations

23. For heat pumps in this Regulation, the rated capacity is not equal to the design load as is the case in Regulation (EU) No 813/2013. Can the design capacity be declared in addition to the rated capacity?

It is recommended to declare the design capacity whenever the seasonal space heating efficiency for heating is declared. Only in this way, the end-user and the installer are informed about the design load used to calculate the seasonal space heating efficiency.

24. Will the adoption of a new PEF value change the conversion coefficient in Regulation 2016/2281?

The value of the conversion coefficient is 2.5 (Annex I.1) and will only change when Regulation 2016/2281 is revised.

25. Are comfort chillers in compliance with the Regulation if they declare the $\eta_{s,c}$ for only 23/18°C conditions although the operating envelope (intended use) of a product also allows for 12/7°C operation?

Chillers must be compliant with the requirements corresponding to their intended use or to the application they are marketed for. If the manufacturer declares both applications, the product has to compliant with $\eta_{s,c}$ in both applications.

If the $\eta_{s,c}$ for one application are reached (e.g. 23/18°C) and for the other are not reached (e.g. 12/7°C), the declaration at 12/7°C would be prohibited. The operating range as declared by the manufacturer in any documentation shall not state any operating conditions and performance data for which the product is not compliant.

26. Some chillers can operate at leaving water temperature from -10 to 18°. They conform to the efficiency requirements from Regulation (EU) 2015/1095 for medium temperature process chillers. Can these chillers show the values for the SEPR for high temperature process applications and $\eta_{s,c}$ values for comfort chillers?

Yes. Although Art 1.1.(d) excludes these products from the scope of Regulation (EU) 2016/2281, manufacturers can, on voluntary basis, declare the SEPR for the high temperature process application and $\eta_{s,c}$ values for comfort chillers.

27. When a chiller complies with the SEPR requirements for high temperature process chillers, but does not pass the efficiency requirements for comfort chillers; can it be marketed as a comfort chiller?

No. If the minimum requirements for an application are not met, the chiller cannot be used for that application and the manufacturer cannot market the product as such.

28. When a chiller can be used as a comfort chiller and as a high temperature process chiller, i.e. a 'dual use chiller', should both the SEPR and the seasonal space cooling efficiency be declared?

No. One of the purposes of a dual use chiller is to provide cooling of a space for the thermal comfort of human beings; this means that per article 2, definition 10 in the regulation, this chiller is not a high temperature process chiller. As such, a dual use chiller is considered as a comfort chiller.

Voluntarily, the manufacturer can declare SEPR values for high temperature process cooling.

The next table provides an overview of different types of dual use chillers and with which efficiency requirements they have to comply:

Application	SEPR LT 2015/1095	SEPR MT 2015/1095	SEPR HT 2016/2281	$\eta_{s,h}$ 2016/2281
Low temperature process cooling (LT)	x			
Medium temperature process cooling (MT)		x		
LT and MT	x	x		
High temperature process cooling (HT)			x	

Comfort cooling				x
HT and comfort cooling			o	x

x = mandatory declaration; o = voluntary declaration

Chillers that are intended for applications covered by Regulation 2015/1095 and Regulation 2016/2281 (e.g. HT and MT) are excluded from the scope of 2016/2281, even if they can operate as a HT chiller or a comfort chiller.

29. Is it possible for multi-split heat pumps (multi-split air conditioners) to have different declarations of performance for the same outdoor unit by the group of Indoor units (organized by type or model), e.g. outdoor unit model 1 has two $\eta_{s,h}$ ($\eta_{s,c}$) declarations, 1 for wall mounted indoor units and 1 for ducted indoor units?

Yes. The Regulation does not prohibit the declaration of more than one combination.

Each combination has to comply with the applicable minimum requirements. Further information can be found in Commission Communication (2017/C 229/01)[6]

The energy efficiency of the system is declared based on the performance of the outdoor unit.

30. Should product information be provided in instruction manuals for installers and end-users of both indoor and outdoor units of multi-split heat pump and air conditioners?

The product information in Table 11, 12 and 14 of the Regulation should be provided in the manual or in the packaging of at least the outdoor unit.

Given that the indoor units are fan coils, the manuals for the indoor units should contain the information relevant for the fan coil units.

Measurements and calculations

31. When a process chiller is only approved for inside use, in some cases the ambient temperature of 5°C cannot be reached, e.g. chiller having an operating range between 10°C and 40°C, how should point D (80%) in Table 22 be treated?

Only when 5°C cannot be achieved, the lowest ambient temperature in the operating range of the chiller shall be determined instead. Point D shall be a result of extrapolation from that lowest temperature point.

32. How should the correction factors F(i) be applied?

The correction factors are to be applied in percentage points.

Example of an air to air heat pump with an SCOP of 4:

[6] OJ C 229, 14.07.2017, p1-23

$$\eta_{s,h} = \frac{SCOP}{CC} - F(1) = \frac{4}{2{,}5}.100\% - 3\% = 160\% - 3\% = 157\%$$

33. The footnotes in Table 21 to 23 differ from the footnotes in the EN14825, how should this be dealt with?

The footnotes in the EN14825:2016 should be applied.