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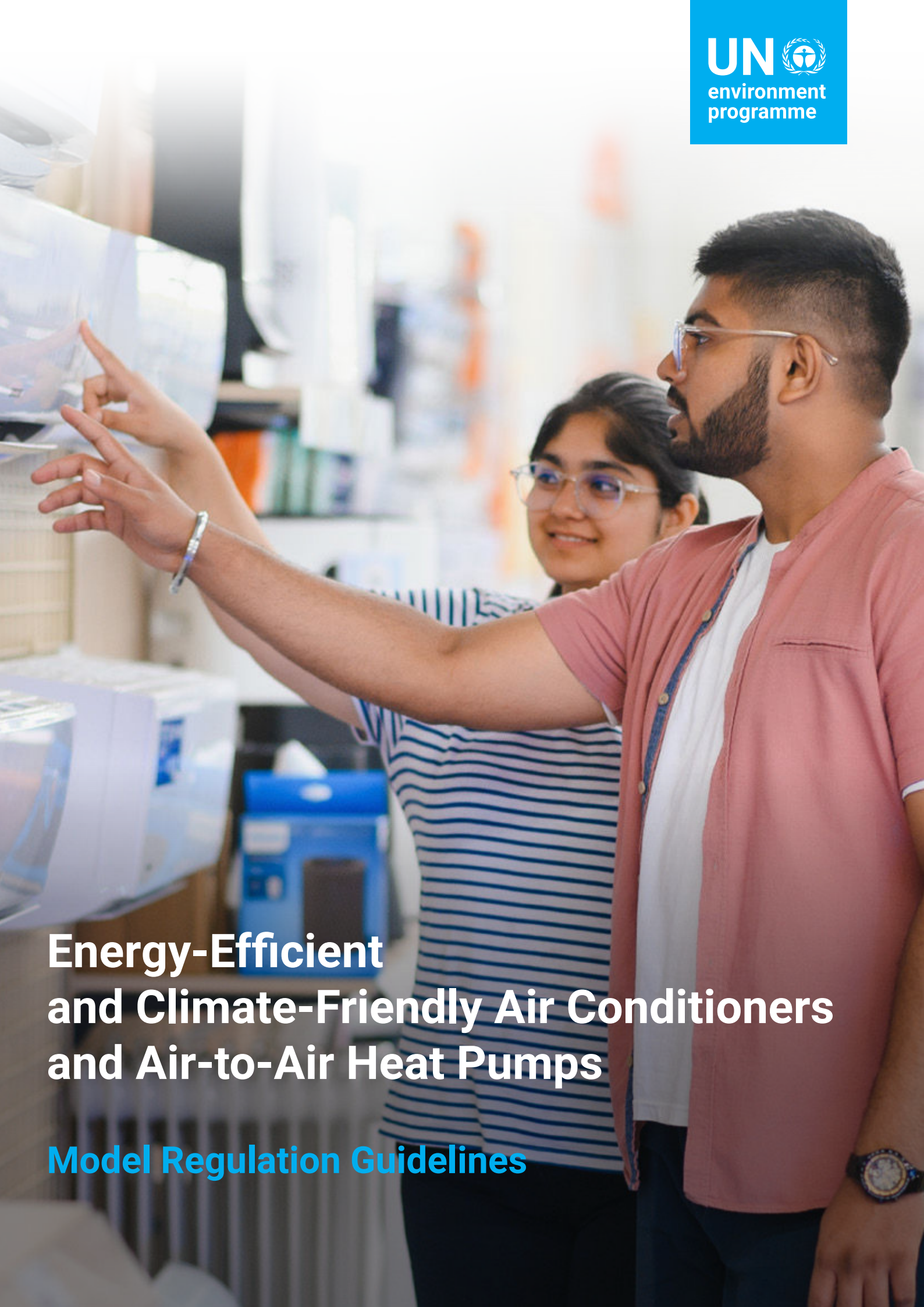

Energy-Efficient and Climate-Friendly Air Conditioners and Air-to-Air Heat Pumps

Model Regulation Guidelines

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About United for Efficiency

U4E (united4efficiency.org/) is a global initiative led by UNEP that accelerates the transition to energy-efficient and climate friendly lighting, appliances and equipment.

Our integrated approach targets:

- Standards and regulations;
- Awareness-raising and capacity building;
- Market monitoring, verification and enforcement;
- Funding and financial delivery mechanisms; and
- Environmentally sound management and health.

U4E provides tailored technical support through in-house experts and specialized partners to help countries make the most of their energy resources. Enhancing efficiency unlocks savings on consumer electricity bills, helps businesses thrive through greater productivity, improves the resiliency of power utilities to meet growing demands for electricity, and assists governments in realizing sustainable development ambitions.

The initiative is active in developing and emerging economies worldwide. U4E provides technical assistance by pursuing solutions for lighting, refrigeration and holistic cold-chain, space conditioning, electric motor systems, distribution power transformers, and system-scale improvements across these and other technologies. These product areas account for well over half of the global electricity consumption.

U4E has developed a proven set of tools, assessments and guides, in collaboration with a diverse range of experts from leading organizations, reflecting international best practices. These resources are applied in market transformation projects at the regional, national and local levels.

This growing suite of resources equips policymakers with the knowledge needed to understand the significant opportunities and steps required to begin transforming their markets to eco-efficient appliances and equipment.

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Abbreviations

AC	Alternating current
APF	Annual Performance Factor
ASEAN	Association of Southeast Asian Nations
ANSI	American National Standards Institute
AR4	IPCC Fourth Assessment Report
AR6	IPCC Sixth Assessment Report
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BIN	Temperature bin (used in seasonal performance calculations)
BTU/h	British thermal unit per hour
COP	Coefficient of Performance
CSEC	Cooling Seasonal Energy Consumption
CSPF	Cooling Seasonal Performance Factor
CSTL	Cooling Seasonal Total Load
DB	Dry-bulb temperature
DC	Direct current
EER	Energy Efficiency Ratio
GCEA	Global Cooling Efficiency Accelerator
GWP	Global Warming Potential
HCFC	Hydrochlorofluorocarbon
HFC	Hydrofluorocarbon
HSEC	Heating Seasonal Energy Consumption
HSPF	Heating Seasonal Performance Factor
HSTL	Heating Seasonal Total Load
HVAC-R	Heating, Ventilation, Air Conditioning and Refrigeration
IEC	International Electrotechnical Commission
IPCC	Intergovernmental Panel on Climate Change

ISO	International Organization for Standardization
MEPS	Minimum Energy Performance Standard
ODP	Ozone Depletion Potential
RT	Refrigeration ton
SEER	Seasonal Energy Efficiency Ratio
SHR	Sensible Heat Ratio
TBD	To be determined
T1	Moderate climate rating condition, as defined in ISO 5151
T3	Hot climate rating condition, as defined in ISO 5151
U4E	United for Efficiency
VRF	Variable Refrigerant Flow
WB	Wet-bulb temperature

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Foreword

The Model Regulation Guidelines provide guidance for governments in developing and emerging economies seeking to implement or update regulatory or legislative frameworks to ensure that air conditioners placed on the market are energy-efficient and use refrigerants with a lower global warming potential (GWP). An accompanying Supporting Information Document presents the underlying rationale and methodologies.

The 2026 edition broadens the scope to include ducted split and multi-split systems with cooling capacities of up to 70 kW, compared with the previous 2019 version, which covered self-contained and single-split air conditioners with cooling capacities of up to 16 kW. It also introduces the Heating Seasonal Performance Factor (HSPF), to be used alongside CSPF in reversible heat pumps for countries that prefer to regulate heating and cooling separately rather than using the unified Annual Performance Factor (APF) metric. In addition, it includes an optional Global Cooling Efficiency Accelerator (GCEA) test that also considers dehumidification performance to identify super-efficient units, which is particularly useful for sustainable procurement and endorsement programmes in high-humidity regions (GCEA, 2025).

As economies and populations grow, the global stock of air conditioners is expected to rise from 2 billion in 2023 to 5.6 billion in 2050[1]. Cooling is critical for occupant health, student and employee productivity - including for women and other individuals disproportionately affected by heat stress - manufacturing processes, data centres and research. Evidence shows that access to adequate cooling is strongly linked to gender equality, as women often work in informal sectors and perform care duties in environments more vulnerable to rising temperatures. The key is expanding cooling access while mitigating energy and environmental impacts.

Improving energy efficiency has a profound impact on the cost of owning and operating these devices. Minimum Energy Performance Standards (MEPS) and energy labels, if well designed and effectively implemented, are among the fastest and most effective approaches to improving efficiency. While dozens of countries have adopted MEPS and energy labels, many of these measures are outdated or inadequately enforced. Weak MEPS and labelling frameworks leave countries vulnerable to becoming dumping grounds for products that cannot be sold elsewhere. China's MEPS and energy labels, implemented in 2020 (GB 21455-2019), have significantly influenced the cost and availability of energy-efficient air conditioners globally, given the scale of its domestic and export markets. Since then, other countries, such as Singapore, have adopted even more stringent MEPS.

Typical air conditioners require electricity and a refrigerant to operate. When electricity is generated from fossil fuel power plants—which is the case for nearly 75 per cent of electricity production in non-OECD countries—greenhouse gases and air pollutants are emitted. Many refrigerants have a global warming potential that is more than 1,000 times that of an equivalent mass of carbon dioxide. Fortunately, technologies are widely available that can both improve energy efficiency and enable the use of refrigerants with lower global warming potential.

1 https://www.iea.org/energy-system/buildings/space-cooling

Under the Kigali Amendment to the Montreal Protocol, developing countries will phase-down hydrofluorocarbons (HFCs) by over 80 per cent, in CO2 equivalent terms, over the next 30 years. The climate benefits are significantly enhanced by improving energy efficiency while phasing down HFCs.

U4E consulted dozens of experts from a wide range of sectors and regions to assess best practices and emerging developments. The objective was to balance ambitious energy performance and refrigerant requirements with the need to minimize impacts on upfront costs and product availability. Further evaluations—such as market assessments and consumer, utility and manufacturer impact analyses—are required before such guidance is pursued.

The recommended MEPS in these Guidelines should be viewed as short- to intermediate-term targets aligned with international best practices. Some countries may be ready to implement these levels as early as 2026; for example, Singapore began implementing comparable efficiency levels in 2025. Other countries may adopt transitional levels based on local conditions before reaching the recommendations set out in these Guidelines; for example, Malaysia and Nigeria are expected to align with similar efficiency levels adopted for implementation in 2030 and 2031, respectively. In such cases, a phased implementation approach is recommended, with the timeline for achieving the full recommended values clearly specified in the regulation. Likewise, the scope of covered products may be adapted to local needs, taking into account factors such as market conditions, testing capacity and other national circumstances.

While these Guidelines reference commonly used international standards, countries may be more familiar with other standards that are well suited to their specific contexts. Countries may also adopt multiple standards for the same product type. In such cases, the energy efficiency levels recommended in these Guidelines should be carefully reviewed and adjusted, as appropriate.

Each country has unique characteristics. This guidance is intended as a starting point to inform regulatory considerations rather than as a final template for adoption. Regulatory processes should be conducted transparently and with sufficient time to address local circumstances, such as product availability and prices, income levels, and utility tariffs. These processes are typically led by an energy ministry, with the support of a national standards body, and undertaken in consultation with experts from the public and private sectors and civil society.[2] The National Ozone Unit (often in the environment ministry) should be closely involved in this process.

Countries committed to market transformation and prepared to invest in the requisite market assessment, impact analyses, stakeholder consultations, monitoring, verification, enforcement, awareness raising, and beyond should strongly consider mandatory MEPS and labels. A comprehensive approach also includes mandatory, performance-based building energy codes. Neighboring countries should align where practicable to reduce the complexity and cost of compliance for manufacturers and alleviate some of the oversight and enforcement challenges for officials. Consistent approaches across countries help yield economies of scale for products that save consumers money on electricity bills, reduce air pollution, mitigate greenhouse gas emissions, and enable greater electrical grid stability.[3] U4E hopes that this guidance is helpful with unlocking the many benefits of energy-efficient and climate-friendly cooling.

2 See Figure 2.9 on page 60 of the Report on the Issues Related to Energy Efficiency while Phasing Down HFCs for additional context, available at http://conf.montreal-protocol.org/meeting/mop/mop30/presession/Background-Documents/TEAP_DecisionXXIX-10_Task_Force_EE_September2018.pdf

3 For an approximation of the electricity and greenhouse gas impacts of adopting the model regulation guidance, see the U4E Country Savings Assessments at https://united4efficiency.org/countries/country-assessments

01 Scope of Covered products

1.1 Scope

This regulation applies to all new electrical single-phase and three-phase air-to-air air conditioners and reversible heat pumps, with a rated cooling output of 70 kilowatts (kW) or less, that are placed on the market.

1.2 Exemptions

This regulation shall not apply to:

a. an air conditioner that is designed to use an energy source other than electricity or NOT powered by alternate current;

b. an evaporative cooler or any other cooling system that is not of the vapour-compression type;

c. a close-control air conditioner;

d. a spot cooler;

e. a dehumidifier;

f. an air conditioner powered by mains electricity that is designed and sold solely for installation in an end-use mobile application including caravans, mobile homes, camper vans, boats and rail cars;

g. an air conditioner which is powered by mains electricity designed and sold only for installation in a specialised high-temperature industrial application, including crane cabins used over blast furnaces;

h. an air conditioner that does not condition air sourced from within the conditioned space, but instead conditions air sourced from outside the conditioned space and delivers that air to the conditioned space.

02 Terms & Definitions

Definitions of the relevant terms used in this document are set out below. Unless otherwise specified, these definitions are harmonized with those in the standards referenced in Clause 3.1.

Air-to-Air Air Conditioner

A unit that is primarily intended to provide thermal comfort to humans by cooling of indoor air and that:

a. uses a vapour-compression cycle driven by electric motor(s) to capture heat from indoor air (using an evaporator in cooling mode or condenser in heating mode) and release this exclusively to outdoor air (using a condenser in cooling mode or evaporator in heating mode);

b. may be one of the following air conditioner types: self-contained (window, portable or wall mounted); single-split, multi-split (including VRF systems), and ducted-split;

c. may provide additional functions, such as dehumidification and indoor air filtration;

d. supplied water) for evaporation on the condenser, provided that the device is also able to function without the use of additional water, using air only;

e. may operate in reverse to capture heat from the outdoor air and release it into the indoor air to provide heating, in which case the unit is also an air-to-air reversible heat pump.

Annual Performance Factor (APF)

The ratio of the total amount of heat that the equipment can remove from, and add to, indoor air during the cooling and heating seasons, respectively, in active mode, to the total amount of energy consumed by the equipment over both seasons.

Climate Group

Defined by thermal criteria using the heating and cooling degree-days, and by moisture criteria, using monthly average temperature and precipitation.

Close-Control Air Conditioner

An air-to-air air conditioner that is primarily intended to provide cooled air within narrow limits of temperature and humidity to devices or processes in confined spaces and is not intended to provide thermal comfort to humans.

Coefficient of Performance (COP)

The ratio of the heating capacity, expressed in Watts, to the effective power input, expressed in Watts, under specified conditions.

Competent Authority

The designated government agency, department or official body authorized to enforce, oversee and ensure compliance with the provisions of this regulation.

Competent Laboratory

A laboratory accredited to ISO/IEC 17025 by a recognized accreditation body. Laboratories that are in the process of accreditation, but not yet accredited, may be used if designated as acceptable by the competent authority.

Cooling Seasonal Energy Consumption (CSEC)

The total annual amount of energy consumed by the equipment when it is operated for cooling in active mode.

Cooling Seasonal Performance Factor (CSPF)

The ratio of the total annual amount of heat that the equipment can remove from indoor air when operated in cooling mode under active conditions to the total annual amount of energy consumed by the equipment during the same period.

Cooling Seasonal Total Load (CSTL)

The total annual amount of heat that is removed from the indoor air when the equipment is operated for cooling in active mode.

Dealer

A retailer or other person who sells, hires, offers for hire-purchase or displays products to consumers.

Dehumidifier

An encased assembly designed to remove moisture from the surrounding atmosphere using an electrically operated refrigeration system or a desiccant type of material, including a means to circulate air and a drain arrangement for collecting, storing or disposing of the condensate.

Double-Duct[4] Air Conditioner

An air-to-air air conditioner that is placed wholly inside the space to be conditioned, in which the intake air for the condenser, when cooling, is introduced from the outdoor environment through one duct and discharged back to the outdoor environment through a second duct.

Ducted Split Air Conditioner

An air-to-air air conditioner designed primarily to provide ducted delivery of conditioned air to an enclosed space, room or zone.

Note: A ducted split air-conditioner differs from a single-duct or double-duct air conditioner, as in this case the air conditioner is not placed wholly inside the space to be conditioned.

4 Also known as “dual hose”

Ductless Air Conditioner

An air-to-air air conditioner designed primarily to provide free delivery of conditioned air to an enclosed space, room or zone.

Energy Efficiency Ratio (EER)[5]

The ratio of the total cooling capacity to the effective power input to the device under specified conditions.

Fixed Capacity Unit

The type of equipment that does not have the possibility to change its refrigerant volumetric flow rate. It typically runs on an ON and OFF operation based on set levels.

Global Warming Potential (GWP)

A measure of how much heat a greenhouse gas traps in the atmosphere up to a specific time horizon, relative to an equal mass of carbon dioxide in the atmosphere.

Heating Seasonal Total Load (HSTL)

The total annual amount of heat, including make-up heat, which is added to the indoor air when the equipment is operated for heating in active mode.

Heating Seasonal Energy Consumption (HSEC)

The total annual amount of energy consumed by the equipment, including make-up heat, when it is operated for heating in active mode.

Heating Seasonal Performance Factor (HSPF)

The ratio of the total annual amount of heat that the equipment, including make-up heat, can add to the indoor air when operated for heating in active mode to the total annual amount of energy consumed by the equipment during the same period, calculated by HSTL over HSEC.

Indoor Unit

The component of a split system that is located indoors and provides the air movement mechanism and evaporation (cooling mode) or condensation (heating mode). Typically positioned on the floor (standing), wall, or ceiling, it may also be ducted, allowing the distribution of cool air to multiple rooms or various points within a single room through ductwork.

Multi-split air conditioner

An air-to-air air conditioner incorporating more than one indoor unit, one or more refrigerating circuits, one or more compressors and one or more outdoor units, where the indoor units may or may not be individually controlled.

Multi-Stage Capacity Unit

An air-to-air air conditioner in which the refrigerant volumetric flow rate can be varied by three or four steps.

5 An alternate definition of EER is a ratio of the cooling capacity delivered by a system in BTU/h to the power consumed by the system in watts (W) at any given set of rating conditions. 1 BTU/h is equivalent to 0.293 W. Here we use the definition of EER listed above in the units of W/W.

Outdoor Unit

The component of a split system that is located outdoors and provides condensation (cooling mode) or evaporation (heating mode).

Ozone Depletion Potential (ODP)

A measure of the relative degradation of the stratospheric ozone layer caused by an emitted refrigerant relative to trichlorofluoromethane (CFC-11). ODPs in this document refer to "Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer, Twelfth Edition, annexes A, B, C and F".

Portable Air Conditioner (Single and Double Duct)

An air-to-air air conditioner of the **single-duct or double-duct type** that is designed to operate **without being permanently fastened** to a building, possibly requiring removable seals to separate indoor and outdoor environments.

Rated Capacity

The cooling capacity of the vapour compression cycle of the unit at standard rating conditions, expressed in kilowatts (kW).

Refrigerant

A substance or mixture, fluid used for heat transfer in a refrigerating cycle, which absorbs heat at a low temperature and a low pressure of the fluid and rejects it at a higher temperature and a higher pressure of the fluid, usually involving changes of the phase of the fluid.

Reversible Heat Pump

An air-to-air air conditioner that can operate in reverse mode to capture heat from the outdoor air and release it into the indoor air to provide heating

Self-Contained Air Conditioner

An air-to-air air conditioner that consists of an encased assembly designed as a self-contained unit primarily for mounting in a window or through the wall or as a console ducted to the outdoors. All components of the unit are fit into a single housing (evaporator, condenser and associated refrigeration components including the compressor).

Single-duct Air Conditioner

An air-to-air air conditioner which is placed wholly inside the space to be conditioned of which the intake air for the condenser when cooling is introduced from the space containing the unit and discharged outside the space via a duct.

Single-Split Air Conditioner

An air-to-air air conditioner that is comprised of an indoor unit, which contains the indoor heat exchanger, and the outdoor unit, which contains the compressor and outdoor heat exchanger parts.

Spot Cooler

An air-to-air air conditioner that is portable, is located wholly within a space and draws air for the evaporator and condenser from the space, but is primarily intended to be used in industrial environments.

Standard rating conditions

Full capacity at the combination of indoor and outdoor temperatures specified in Tables 1 and 2.

Supplier

The manufacturer, their authorized representative, or the person who places the product on the national market.

Two-Stage Capacity Unit

An air-to-air air conditioner where its refrigerant volumetric flow rate can be varied by two steps.

Variable Capacity Unit

An air-to-air air conditioner where its refrigerant volumetric flow rate can be varied by five or more steps.

Variable Refrigerant Flow (VRF) Air Conditioner

A multisplit air conditioner incorporating a single refrigerant circuit, with one or more outdoor units, that has a mechanism for varying the refrigerant flow to the indoor units based on demand.

Wall Mounted (Single and Double Duct)

An air-to-air single duct or double duct air conditioner that is not portable.

03 Test Methods and Energy Efficiency Performance Calculation

3.1 Reference Test Standards

The following referenced documents are indispensable for the application of this regulation. Unless otherwise specified, test procedures are harmonized with these reference standards. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document, including any amendments, applies.

ISO 16358-1:2013, "Air-cooled air conditioners and air-to-air heat pumps — Testing and calculating methods for seasonal performance factors. Part 1: Cooling seasonal performance factor".

ISO 16358-1:2013 /Amd.1:2019, "Air-cooled air conditioners and air-to-air heat pumps — Testing and calculating methods for seasonal performance factors. Part 1: Cooling seasonal performance factor".

ISO 16358-1:2013/Amd 2:2024, "Air-cooled air conditioners and air-to-air heat pumps — Testing and calculating methods for seasonal performance factors — Part 1: Cooling seasonal performance factor - Amendment 2"

ISO 16358-2:2013, "Air-cooled air conditioners and air-to-air heat pumps — Testing and calculating methods for seasonal performance factors. Part 2: Heating seasonal performance factor".

ISO 16358-3:2013, "Air-cooled air conditioners and air-to-air heat pumps — Testing and calculating methods for seasonal performance factors. Part 3: Annual performance factor".

ISO 5151: 2017, "Non-ducted air conditioners and heat pumps — Testing and rating for performance".[6]

ISO 5151:2017/Amd 1:2020, "Non-ducted air conditioners and heat pumps — Testing and rating for performance".

ISO 18326:2018, "Non-ducted portable air-cooled air conditioners and air-to-air heat pumps having a single exhaust duct – Testing and rating for performance".[7]

ISO 18326:2018/ Amd 1:2021, "Non-ducted portable air-cooled air conditioners and air-to-air heat pumps having a single exhaust duct – Testing and rating for performance".

ISO 13253:2017, "Ducted air-conditioners and air-to-air heat pumps — Testing and rating for performance".

ISO 13253:2017/Amd 1:2020, "Ducted air-conditioners and air-to-air heat pumps — Testing and rating for performance".

6 ISO 5151 specifies how to measure the cooling capacity and efficiency of air conditioners using stipulated test conditions. While ISO 5151 and ISO 16358 are primary references, countries might consider others that fulfil the same objective and maintain the energy efficiency requirements.

7 EN14511 and the U.S. standard, i.e., USA Federal Register 81 (105), can be alternative references of testing portable products.

ISO 15042: 2017, “Multiple split-system air conditioners and air-to-air heat pumps — Testing and rating for performance”.

ISO 15042: 2017/Amd 1:2020, “Multiple split-system air conditioners and air-to-air heat pumps — Testing and rating for performance”.

IEC 60335-2-40:2024, “Household electrical appliances and equivalents – Safety – Part 2-40: Particular requirements for electrical heat pumps, air conditioners and dehumidifiers”.

ISO 5149-1:2014, “Refrigerating systems and heat pumps — Safety and environmental requirements – Part 1 to 5”.

ISO 5149-1:2014/Amd 1:2015, “Refrigerating systems and heat pumps — Safety and environmental requirements – Part 1: Definitions, classification and selection criteria.

Note: ISO 18107:2026 was published during the finalization of this guideline and introduces seasonal performance methods for VRF systems, including seasonal efficiency metrics. Countries considering regulation of VRF systems may wish to review this standard, as appropriate, and use it as a reference instead of ISO 15042 and the ISO 16358 series for this type of system. Further technical review is recommended before assuming equivalence with the seasonal calculation framework referenced elsewhere in this guideline.

3.2 Standard Rating and Test Conditions

The standard capacity rating conditions are shown in Table 1 for cooling mode and in Table 2 for heating mode.

All air conditioners, excluding single-duct and double-duct units, shall be evaluated using a seasonal performance factor calculated in accordance with ISO 16358 and this regulation, namely the Cooling Seasonal Performance Factor (CSPF) for cooling mode and the Heating Seasonal Performance Factor (HSPF) for heating[8] mode, or the Annual Performance Factor (APF) for countries applying a combined cooling and heating efficiency metric. Specific considerations to be applied when calculating CSPF and HSPF are set out in Table 3.

Table 1: Standard Cooling Capacity Rating Conditions

	Temperature of air entering indoor side dry-bulb / wet-bulb	Temperature of air entering outdoor side dry-bulb / wet-bulb[a]
All Air Conditioners excluding Single and Double Duct (for Group[b] 1 and 3 climate conditions)	27 °C / 19 °C (ISO 5151 T1)	35 °C / 24 °C (ISO 5151 T1)
All Air Conditioners excluding Single and Double Duct (for Group[b] 2 climate conditions)	29 °C / 19 °C (ISO 5151 T3)	46 °C / 24 °C (ISO 5151 T3)
Double Duct Air Conditioners (for any climate conditions)	27 °C / 19 °C (ISO 5151 T1)	35 °C / 24 °C (ISO 5151 T1)
Single Duct Air Conditioners (for any climate conditions)	35 °C / 24 °C	35 °C / 24 °C

a The wet-bulb temperature condition shall only be required when testing air-cooled condensers which evaporate the condensate.

8 Metrics concerning heating efficiency, such as HSPF and APF, only applies to reversible heat pumps.

b Climate conditions are defined in Clause 3.3.

Table 2: Heating Capacity Rating Conditions

	Temperature of air entering indoor side	Temperature of air entering outdoor side
	dry-bulb / wet-bulb	dry-bulb / wet-bulb
All Reversible Heat Pumps excluding Single Duct Standard heating capacity	20 °C / 15 °C (maximum)	7 °C / 6 °C (ISO 5151 H1)
All Air Conditioners excluding Single Duct Low temperature heating capacity		2 °C / 1 °C (ISO 5151 H2)
All Air Conditioners excluding Single Duct Extra-low temperature heating capacity		−7 °C / −8 °C (ISO 5151 H3)
Single Duct Air Conditioners (for any climate conditions)	20 °C / 15 °C	20 °C / 15 °C

Table 3: Test Requirement Specifications

Reference Standard and Clause	Test Requirement Adjustments
ISO 16358-1:2013 Table 1 (Cooling for Group 1 and 3 climate conditions)	1. All test points indicated as "optional test" shall use the default value equations. 2. The "required test" for fixed speed units at the Low temperature cooling capacity condition shall use the default value equations. 3. The default degradation coefficient (C_D) = 0.25 shall be used.
ISO 16358-1:2013/Amd 1:2019 Table F.1 (Cooling for Group 2 climate conditions)	1. All test points indicated as "optional test" shall use the default value equations. 2. The default degradation coefficient (C_D) = 0.27 shall be used.
ISO 16358-2:2013 Table 1 (Heating for all climate conditions)	1. All test points indicated as "Optional test" shall use the Default Value equations. 2. The default degradation coefficient (C_D) = 0.25 shall be used.

3.3 Temperature Bin-Hour Distribution

CSPF and HSPF values, as well as the corresponding energy consumption, shall be calculated using the temperature bin-hour distributions specified in this regulation. ISO 16358 specifies temperature bin-hour distributions for cooling (two climate profiles) and heating (one climate profile). Countries may, however, develop national bin-hour distributions based on local climatic data. To support the adoption of climate-appropriate performance metrics, Annex 4 provides temperature bin-hour distributions for various climate groups, as presented in Table 4.

Table 4: Climate Groups[9]

Primary Climate Groupa	Secondary Climate Groupb			
	Thermal	**Humid**	**Dry**	**Marine**
Group 1	Extremely Hot	0A (Extremely Hot-Humid)		
	Very Hot	1A (Very Hot-Humid)		
	Hot	2A (Hot-Humid)	2B (Hot-Dry)	
	Warm	3A (Warm-Humid)	3B (Warm-Dry)	3C (Warm-Marine)
Group 2	Extremely Hot		0B (Extremely Hot-Dry)	
	Very Hot		1B (Very Hot-Dry)	
Group 3	Mixed	4A (Mixed-Humid)	4B (Mixed-Dry)	
	Cool	5A (Cool-Humid)	5B (Cool-Dry)	
	Cold	6A (Cold-Humid)	6B (Cold-Dry)	
	Very Cold	7		
	Subarctic/Arctic	8		

a For cooling energy efficiency calculation, primary climate group 1 refer to climate defined in ISO 16358-1:2013, primary climate group 2 refers to climate defined in ISO 16358-1:2013/Amd 1:2019, and primary climate group 3 has been defined for this Model Regulation.

b According to ASHRAE climate zone definitions available at ANSI/ASHRAE Standard 169-2013.

9 See Annex 4 for a list of countries and associated climate zones.

04 Minimum Energy Efficiency Requirements

From [a date to be specified by the adopting authority], the cooling performance of all air conditioners and air-to-air reversible heat pumps within the scope of this regulation shall meet or exceed the energy efficiency levels specified in Article 4.1.

From [a date to be specified by the adopting authority], the heating performance of all air-to-air reversible heat pumps within the scope of this regulation shall meet or exceed the energy efficiency levels specified in Article 4.2.

From [a date to be specified by the adopting authority], the combined cooling and heating performance for all air-to-air reversible heat pumps within the scope of this regulation shall meet or exceed the energy efficiency levels specified in Article 4.3.

For air-to-air reversible heat pumps, each country may determine whether to adopt CSPF and HSPF metrics separately, or the combined APF metric. This document provides both options to facilitate alignment with national priorities and circumstances.

Countries prepared to adopt more stringent energy efficiency levels than those specified in this regulation are encouraged to do so. Article 2 provides examples of energy efficiency thresholds corresponding to a hypothetical energy labelling scheme. These efficiency classes may serve as a reference for setting more ambitious MEPS where deemed appropriate.

4.1 Requirements for Cooling Mode

The cooling performance, expressed as CSPF, of all air conditioners within the scope of this regulation, except for single-duct and double-duct units, shall meet or exceed the energy efficiency levels specified in Table 5 (primary climate groups) or in Table 12 of Annex 1 (secondary climate groups), depending on the applicable climate group. Performance shall be assessed using the CSPF metric in conjunction with the outdoor temperature bin-hour distributions specified by the country for the relevant climate group.

Note: The difference in CSPF requirements presented in Tables 5 and 12 for different climate groups reflects differences in climate conditions; however, the levels are equivalent in terms of ambition. Countries should adopt the MEPS corresponding to the climate temperature bin hours defined in their regulations. Countries using climate temperature bin hours other than those provided in this document may need to adjust the CSPF thresholds to maintain an equivalent level of ambition.

Cooling performance of single-duct and double-duct air conditioners within the scope of this regulation shall meet or exceed the EER level in Table 6. EER being calculated at the standard cooling capacity rating conditions specified in Table 1.

Table 5: Reference Minimum Requirements for CSPF (all Air Conditioners excluding Single-Duct and Double-Duct)

Category	Group 1	Group 2	Group 3
CC≤ 6 kW	6.10	5.00	5.30
6 kW < CC ≤ 14 kW	5.10	4.30	4.60
14 kW < CC ≤ 70 kW	4.50	3.80	4.10

CC: rated cooling capacity (cooling mode). See Annex 4 for outdoor temperature bin hours of each climate group.

Table 6: Minimum Requirements (EER) for Single-Duct and Double-Duct Air Conditioners

Category	Minimum
Single and Double Duct Air Conditioners (all capacities)	3.10

4.2 Requirements for Heating Mode

The heating performance, expressed as HSPF, of all reversible heat pumps within the scope of this regulation, except for single-duct and double-duct units, shall meet or exceed the energy efficiency levels specified in Table 7 (primary climate groups) or in Table 13 of Annex 1 (secondary climate groups), depending on the applicable climate group. Performance shall be assessed using the HSPF metric in conjunction with the outdoor temperature bin-hour distributions specified by the country for the relevant climate group.

Note: The differences in HSPF requirements presented in Tables 7 and 13 for different climate groups reflect differences in climate conditions; however, the levels are equivalent in terms of ambition. Countries should adopt the MEPS corresponding to the climate temperature bin hours defined in their regulations. Countries using climate temperature bin hours other than those provided in this document may need to adjust the HSPF thresholds to maintain an equivalent level of ambition.

Heating performance for single-duct and double-duct reversible heat pumps within the scope of this standard shall meet or exceed the COP level in Table 8. The COP shall be calculated under the standard heating capacity rating conditions set out in Table 2.

Table 7: Reference Minimum Requirements for HSPF (all reversible Heat Pumps excluding Single-Duct and Double-Duct)

Category	Group 1	Group 2	Group 3
CC≤ 6 kW	4.60	3.80	2.90
6 kW < CC ≤ 14 kW	3.60	3.50	2.40
14 kW < CC ≤ 70 kW	3.30	3.30	2.20

CC: rated cooling capacity (cooling mode). See Annex 4 for outdoor temperature bin hours of each climate group.

Table 8: Minimum Requirements (COP) for Single-Duct and Double-Duct reversible Heat Pumps

Category	Minimum
Single and Double Duct reversible Heat Pumps (all capacities)	3.10

For split systems, countries with climate group 4A to 8 (Group 3) can optionally have additional minimum COP requirements at the extremely low temperature heating capacity test, as per Table 9.

Table 9: Additional Minimum Requirements for COP of Split Heat Pumps at −15 °C

Extremely low temperature heating capacity	COP
Temperature of air entering indoor side DB/WB 20°C /15 °C Temperature of air entering outdoor side DB/WB −15 °C / -	2.00

4.3 Requirements for Cooling and Heating Mode Combination

The combined cooling and heating performance, expressed as APF, of all reversible heat pumps within the scope of this regulation, except for single-duct and double-duct units, shall meet or exceed the energy efficiency levels specified in Table 10 (primary climate groups) or in Table 14 of Annex 1 (secondary climate groups), depending on the applicable climate group. Performance shall be assessed using the APF metric in conjunction with the outdoor temperature bin-hour distributions specified by the country for the relevant climate group.

Note: The difference in APF requirements presented in Tables 10 and 14 for different climate groups reflects differences in climate conditions; however, the levels are equivalent in terms of ambition. Countries should adopt the MEPS corresponding to the climate temperature bin hours defined in their regulations. Countries using climate temperature bin hours other than those provided in this document may need to adjust the APF thresholds to maintain an equivalent level of ambition.

For split systems, countries in climate group 4A to 8 (Group 3) can optionally have additional minimum COP requirements at the extremely low temperature heating capacity test, as per Table 9.

Table 10: Reference Minimum Requirements for APF

Category	Group 1	Group 2	Group 3
CC≤ 6 kW	5.00	4.00	3.10
6 kW < CC ≤ 14 kW	4.00	3.60	2.50
14 kW < CC ≤ 70 kW	3.60	3.40	2.30

CC: rated cooling capacity (cooling mode). See Annex 4 for outdoor temperature bin hours of each climate group.

05 Functional Performance

All units shall be tested at a test alternating current (AC) voltage and rated frequency, as specified in ISO 5151.

All units shall operate appropriately with the rated voltage with surge protection +/- 15 per cent.

All units shall comply with standard ISO 5149 or IEC 60335-2-40, the latest version, or a nationally modified edition of ISO 5149 or IEC 60335-2-40.

06 Refrigerant Requirements

Refrigerants used in air conditioners and heat pumps shall comply with the requirements[10] for ozone depletion potential (ODP) and global warming potential (GWP), assessed over a 100-year time horizon[11], as set out in Table 11, except where higher values are required to meet applicable safety standards.

Table 11: Requirements for Refrigerant Characteristics (numbers shown are upper limits)

	GWP	ODP
Self-Contained System	150	0
Split System	750	0

10 For air conditioners and reversible heat pumps with a rated cooling output up to 16 kW, it is recommended that the GWP limits be applied as soon as practicable. For larger capacity units (above 16 kW and up to 70 kW), countries may allow an extended transition period to account for technology availability and international market developments.

11 GWP values are based on the 100-year time horizon from the IPCC Fourth Assessment Report (AR4), as adopted under the Kigali Amendment. For substances not listed in AR4, values from the most recent IPCC Assessment Report (e.g. AR6) should be used as a reference.

07 Labelling Requirements

Suppliers shall make available a printed label for each air conditioner that complies with the format and content requirements as set out in this regulation. The label shall be provided for at least one combination of indoor and outdoor units at capacity ratio 1. For other combinations, the required information may alternatively be made available on a freely accessible website.

Dealers, including those selling products online, shall ensure that any product placed on the market is labelled in accordance with the requirements of this regulation. If a product is delivered to a dealer without an energy label, the dealer shall request one from the supplier before displaying the product. The supplier shall provide the label, either in printed form or in digital format for online sales, free of charge and without undue delay, and in any event within five working days of the dealer's request. The label shall be affixed in a clearly visible position before the product is placed on the market.

Suppliers and dealers shall refer to the energy efficiency class of the product and to the range of efficiency classes available on the label in visual advertisements or technical promotional material for a specific model. They shall not provide or display any other labels, marks, symbols or inscriptions that do not comply with the requirements of this regulation where doing so would be likely to mislead or confuse customers regarding energy consumption.

7.1 Label Design and Product Information

Each country or region should design its own label. Below is an example of information that is typically included on energy efficiency labels for air conditioners or reversible heat pumps:

1. Model name;
2. Type of unit [ductless split, self-contained, portable, ducted split, multi-split or VRF];
3. Rated cooling (and heating, if applicable) capacity in kW [or other common units used in the country such as Btu/h];
4. Rated performance efficiency class;
5. Rated energy efficiency in [CSPF, HSPF, APF, EER, or COP]
6. Yearly electricity consumption in kWh [CSEC, HSEC];
7. Refrigerant designation in accordance with [ISO 817 or ASHRAE 34], including ODP and GWP[12].

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8. The name of regulation that applies, and an indication that the performance rating is an indicative value and not representative of actual annual energy consumption in all situations.

[CSPF, APF, EER or COP] shall be declared to three significant digits.

7.2 Energy Efficiency Classes for Comparative Labels

Countries or regions may define national or regional energy class thresholds in accordance with local priorities. The number of classes typically ranges from five to seven.

The highest efficiency class may be defined in one of two ways:

- To represent the best-performing models currently available on the market, or
- To reflect aspirational performance levels not yet achieved commercially but anticipated in the future.

Each approach has advantages and limitations. Jurisdictions with longer intervals between regulatory reviews may adopt higher top-class thresholds to allow for future improvement, while those with more frequent updates may define more attainable thresholds to accelerate market adoption of higher-efficiency models.

Annex 2 provides performance grades that may support the definition of efficiency classes for labels.

7.3 Endorsement Labels

In addition to mandatory comparative labels, some countries may introduce voluntary endorsement labels to identify models that significantly exceed standard requirements from an energy or sustainability perspective. Annex 2 provides additional specifications that may serve as criteria for such labels. These criteria extend beyond conventional test results to include additional performance parameters, such as dehumidification efficiency.

Note: Countries are encouraged to test label comprehension across genders and consumer segments to ensure information is equally accessible, and to design labels that are easily understood by diverse groups (including women, low-literacy consumers, and first-time buyers). When developing labels and MEPS, stakeholder consultations (e.g., suppliers, manufacturers, utilities, consumer associations, and civil society) should also be inclusive of women's groups and organizations representing vulnerable populations to capture differentiated needs and barriers.

08 Entry into Force

All suppliers and dealers of air conditioners and reversible heat pumps within the scope of this regulation shall comply with its provisions within a period to be defined by the adopting authority.

09 Conformity Assessment

The competent authority shall establish the requirements for demonstrating compliance with this regulation. These requirements may include, for example: test reports performed by a competent laboratory, technical documentation about the model being certified, application forms, payment of fees, product registration obligations, and the reference conditions under which the product complies. The authority shall also determine who is responsible for submitting this information, whether by means of a supplier's self-declaration or through an accredited conformity assessment body.

The conformity assessment documentation shall be submitted to the competent authority for review prior to placing a product in the market. Approval shall be confirmed in writing and, where applicable, by listing the product in the official product registration system. If the application is rejected, a written explanation shall be provided to the submitter. The applicant shall address all identified issues in a revised submission; until approval is granted, the product is not eligible to be placed on the market.

The conformity assessment documentation shall apply to the designated model as certified and remains valid provided the product specifications remain unchanged. Significant changes to the model that may affect performance or compliance require a new conformity assessment and approval before the modified product may be placed on the market.

For split systems performance declarations, manufacturers shall identify the pairs of indoor and outdoor units that jointly comprise the rated product, and each pair shall be independently represented in the applicable registration system prior to introduction into commerce. The sale or installation of cabinet units not identified as a matched pair shall not be permitted. Performance testing shall be conducted for indoor-outdoor unit combinations at a capacity ratio of 1.

For multi-split systems performance declarations, the combined nominal capacities of the connected indoor units shall match the capacity of the outdoor unit, and more than one indoor unit shall be connected during testing. The indoor units used for testing must be of types that are commercially available on the market. For other combinations, performance information may alternatively be provided on a publicly accessible website.

10 Market Surveillance

The designated authority implementing this regulation shall develop a programme to check compliance with this standard and monitor the market for noncompliance. The programme shall include details on sample size, laboratory accreditation requirements (ISO/IEC 17025 certified), and a challenge process that manufacturers may use if the initial testing of their product is found to be non-compliant.[13] The programme shall also consider specifying the tolerance for differences in efficiency and cooling/heating capacity between a product's certified rating and the measurements resulting from verification testing of that product.[14]

[Agency name] shall be responsible for enforcement activities that include potential assessment of penalties for non-compliant products on the national market. [Agency name] shall establish written policies that clearly spell out its authority, procedures, and penalties. All testing conducted for compliance and market surveillance testing purposes shall be done using the measurement and calculation methods set out in this regulation.

11 Revision

This regulation shall be strengthened through a simple administrative rulemaking process based on updated market, technology, and economic assessments of the cost and availability of new technologies every five years after this regulation enters into force. The review process shall assess the necessity and appropriateness of revising energy efficiency requirements that are in place or establish additional requirements for energy efficiency and other elements.

13 For further guidance on how to develop and implement compliance certification, market surveillance and enforcement programs please refer to the U4E Policy Guide and another guidance, "Ensuring Compliance with MEPS and Energy Labels". Additional stipulations regarding such protocols are often included in MEPS and labelling legislation / policy documents. Given the variance in approaches based on national context, a specific example is not provided in this Model Regulation Guidance.

14 For example, for a product to be in compliance under some existing regulations, the efficiency determined via verification testing must be no more than 10% lower than the certified efficiency level. In addition, the capacity determined via verification testing must be no more than 5% higher than the certified capacity rating. Those tolerance values can vary, and setting the specific values is part of each individual regulatory process. Additional guidance can be found in the U4E document, Ensuring Compliance with MEPS and Energy Labels.

Annex 1. Minimum Performance Requirements

Table 12: Minimum Requirements for Air Conditioners and Reversible Heat Pumps Cooling Mode in CSPF by Secondary Climate Group

Primary	Secondary	Rated Cooling Capacity ≤ 6 kW	6 kW < Rated Cooling Capacity ≤ 14 kW	14 kW < Rated Cooling Capacity ≤ 70 kW	Outdoor Temperature Bin Hours
Group 1	0A	5.70	4.90	4.30	Model Regulation Guidelines Annex 4
	1A	5.40	4.70	4.20	
	2A	5.60	4.80	4.30	
	3A	5.40	4.70	4.20	
	2B	4.90	4.30	4.00	
	3B	5.40	4.70	4.20	
	3C	6.00	5.10	4.50	
Group 2	0B	4.60	4.00	3.70	
	1B	4.70	4.10	3.70	
Group 3	4A	5.30	4.60	4.20	
	5A	5.60	4.80	4.30	
	6A	6.00	5.10	4.50	
	4B	5.00	4.40	4.00	
	5B	4.70	4.20	3.90	
	6B	5.90	5.00	4.40	
	7	5.80	5.00	4.40	
	8	5.70	4.90	4.30	

Table 13: Minimum Requirements for Reversible Heat Pumps Heating Mode HSPF by Secondary Climate Group

Primary	Secondary	Rated Cooling Capacity ≤ 6 kW	6 kW < Rated Cooling Capacity ≤ 14 kW	14 kW < Rated Cooling Capacity ≤ 70 kW	Outdoor Temperature Bin Hours
Group 1	0A	-	-	-	Model Regulation Guidelines Annex 4
	1A	4.10	3.40	3.10	
	2A	4.00	3.30	2.90	
	3A	4.30	3.60	3.20	
	2B	4.00	3.40	3.10	
	3B	3.90	3.30	3.00	
	3C	4.90	3.90	3.40	
Group 2	0B	3.70	3.40	3.20	
	1B	3.80	3.50	3.30	
Group 3	4A	3.30	2.80	2.60	
	5A	3.10	2.50	2.20	
	6A	3.10	2.60	2.40	
	4B	3.20	2.70	2.50	
	5B	3.30	2.70	2.50	
	6B	2.90	2.40	2.30	
	7	3.00	2.40	2.20	
	8	3.00	2.40	2.20	

Table 14: Minimum Requirements for Reversible Heat Pumps in APF by Secondary Climate Group

Primary	Secondary	Rated Cooling Capacity ≤ 6 kW	6 kW < Rated Cooling Capacity ≤ 14 kW	14 kW < Rated Cooling Capacity ≤ 70 kW	Outdoor Temperature Bin Hours
Group 1	0A	-	-	-	Model Regulation Guidelines Annex 4
	1A	4.60	3.80	3.50	
	2A	4.80	3.90	3.50	
	3A	4.70	3.90	3.50	
	2B	4.40	3.70	3.40	
	3B	4.40	3.70	3.40	
	3C	5.20	4.10	3.60	
Group 2	0B	3.90	3.50	3.30	
	1B	4.00	3.60	3.40	
Group 3	4A	3.60	3.00	2.80	
	5A	3.30	2.70	2.30	
	6A	3.20	2.70	2.40	
	4B	3.60	3.00	2.80	
	5B	3.50	2.90	2.70	
	6B	3.10	2.50	2.40	
	7	3.10	2.50	2.30	
	8	3.10	2.50	2.30	

Annex 2. Performance Grade Requirements

Labels indicating achievement of a higher performance grade may be applied to units that meet or exceed the levels specified in Article 3 during testing conducted in accordance with the requirements set out in Article 3.

The high efficiency levels in Table 15 to 23 represent approximately 30-60 per cent of the efficiency improvement that is possible in energy-efficient technologies globally, but less than the efficiency levels of best available technologies, which are not necessarily available in all markets.

A. Air Conditioners in CSPF

Table 15: Labelling Requirements for Air Conditioners in Group 1 Countries

Climate Group (Temperature Bin Hours)	Grade	Rated Cooling Capacity ≤ 6 kW	6 kW < Rated Cooling Capacity ≤ 14 kW	14 kW < Rated Cooling Capacity ≤ 70 kW
Group 1 (ISO 16358-1: 2013)	High Efficiency	8.00 ≤ CSPF	7.60 ≤ CSPF	7.10 ≤ CSPF
	Intermediate	7.10 ≤ CSPF < 8.00	6.40 ≤ CSPF < 7.60	5.80 ≤ CSPF < 7.10
	Lower Efficiency	6.10 ≤ CSPF < 7.10	5.10 ≤ CSPF < 6.40	4.50 ≤ CSPF < 5.80
0A (Model Regulation)	High Efficiency	7.40 ≤ CSPF	7.00 ≤ CSPF	6.60 ≤ CSPF
	Intermediate	6.60 ≤ CSPF < 7.40	6.00 ≤ CSPF < 7.00	5.50 ≤ CSPF < 6.60
	Lower Efficiency	5.70 ≤ CSPF < 6.60	4.90 ≤ CSPF < 6.00	4.30 ≤ CSPF < 5.50
1A (Model Regulation)	High Efficiency	7.00 ≤ CSPF	6.60 ≤ CSPF	6.20 ≤ CSPF
	Intermediate	6.20 ≤ CSPF < 7.00	5.70 ≤ CSPF < 6.60	5.20 ≤ CSPF < 6.20
	Lower Efficiency	5.40 ≤ CSPF < 6.20	4.70 ≤ CSPF < 5.70	4.20 ≤ CSPF < 5.20
2A (Model Regulation)	High Efficiency	7.30 ≤ CSPF	6.90 ≤ CSPF	6.50 ≤ CSPF
	Intermediate	6.50 ≤ CSPF < 7.30	5.90 ≤ CSPF < 6.90	5.40 ≤ CSPF < 6.50
	Lower Efficiency	5.60 ≤ CSPF < 6.50	4.80 ≤ CSPF < 5.90	4.30 ≤ CSPF < 5.40
3A (Model Regulation)	High Efficiency	7.00 ≤ CSPF	6.60 ≤ CSPF	6.20 ≤ CSPF
	Intermediate	6.20 ≤ CSPF < 7.00	5.70 ≤ CSPF < 6.60	5.20 ≤ CSPF < 6.20
	Lower Efficiency	5.40 ≤ CSPF < 6.20	4.70 ≤ CSPF < 4.70	4.20 ≤ CSPF < 5.20
2B (Model Regulation)	High Efficiency	6.20 ≤ CSPF	5.90 ≤ CSPF	5.60 ≤ CSPF
	Intermediate	5.60 ≤ CSPF < 6.20	5.10 ≤ CSPF < 5.90	4.80 ≤ CSPF < 5.60
	Lower Efficiency	4.90 ≤ CSPF < 5.60	4.30 ≤ CSPF < 5.10	4.00 ≤ CSPF < 4.80

Climate Group (Temperature Bin Hours)	Grade	Rated Cooling Capacity ≤ 6 kW	6 kW < Rated Cooling Capacity ≤ 14 kW	14 kW < Rated Cooling Capacity ≤ 70 kW
3B (Model Regulation)	High Efficiency	6.90 ≤ CSPF	6.50 ≤ CSPF	6.10 ≤ CSPF
	Intermediate	6.20 ≤ CSPF < 6.90	5.60 ≤ CSPF < 6.50	5.20 ≤ CSPF < 6.10
	Lower Efficiency	5.40 ≤ CSPF < 6.20	4.70 ≤ CSPF < 5.60	4.20 ≤ CSPF < 5.20
3C (Model Regulation)	High Efficiency	7.90 ≤ CSPF	7.50 ≤ CSPF	7.00 ≤ CSPF
	Intermediate	7.00 ≤ CSPF < 7.90	6.30 ≤ CSPF < 7.50	5.80 ≤ CSPF < 7.00
	Lower Efficiency	6.00 ≤ CSPF < 7.00	5.10 ≤ CSPF < 6.30	4.50 ≤ CSPF < 5.80

Table 16: Labelling Requirements for Air Conditioners in Group 2 Countries

Climate Group (Temperature Bin Hours)	Grade	Rated Cooling Capacity ≤ 6 kW	6 kW < Rated Cooling Capacity ≤ 14 kW	14 kW < Rated Cooling Capacity ≤ 70 kW
Group 2 (ISO 16358-1: 2013 /Amd 1:2019)	High Efficiency	6.50 ≤ CSPF	6.20 ≤ CSPF	5.80 ≤ CSPF
	Intermediate	5.80 ≤ CSPF < 6.50	5.30 ≤ CSPF < 6.20	4.80 ≤ CSPF < 5.80
	Lower Efficiency	5.00 ≤ CSPF < 5.80	4.30 ≤ CSPF < 5.30	3.80 ≤ CSPF < 4.80
0B (Model Regulation)	High Efficiency	5.90 ≤ CSPF	5.60 ≤ CSPF	5.30 ≤ CSPF
	Intermediate	5.30 ≤ CSPF < 5.90	4.80 ≤ CSPF < 5.60	4.50 ≤ CSPF < 5.30
	Lower Efficiency	4.60 ≤ CSPF < 5.30	4.00 ≤ CSPF < 4.80	3.70 ≤ CSPF < 4.50
1B (Model Regulation)	High Efficiency	6.00 ≤ CSPF	5.70 ≤ CSPF	5.40 ≤ CSPF
	Intermediate	5.40 ≤ CSPF < 6.00	4.90 ≤ CSPF < 5.70	4.60 ≤ CSPF < 5.40
	Lower Efficiency	4.70 ≤ CSPF < 5.40	4.10 ≤ CSPF < 4.90	3.70 ≤ CSPF < 4.60

Table 17: Labelling Requirements for Air Conditioners in Group 3 Countries

Climate Group (Temperature Bin Hours)	Grade	Rated Cooling Capacity ≤ 6 kW	6 kW < Rated Cooling Capacity ≤ 14 kW	14 kW < Rated Cooling Capacity ≤ 70 kW
Group 3 (Model Regulation)	High Efficiency	6.70 ≤ CSPF	6.40 ≤ CSPF	6.00 ≤ CSPF
	Intermediate	6.00 ≤ CSPF < 6.70	5.50 ≤ CSPF < 6.40	5.10 ≤ CSPF < 6.00
	Lower Efficiency	5.30 ≤ CSPF < 6.00	4.60 ≤ CSPF < 5.50	4.10 ≤ CSPF < 5.10
4A (Model Regulation)	High Efficiency	6.80 ≤ CSPF	6.40 ≤ CSPF	6.10 ≤ CSPF
	Intermediate	6.10 ≤ CSPF < 6.80	5.50 ≤ CSPF < 6.40	5.20 ≤ CSPF < 6.10
	Lower Efficiency	5.30 ≤ CSPF < 6.10	4.60 ≤ CSPF < 5.50	4.20 ≤ CSPF < 5.20
5A (Model Regulation)	High Efficiency	7.20 ≤ CSPF	6.80 ≤ CSPF	6.40 ≤ CSPF
	Intermediate	6.40 ≤ CSPF < 7.20	5.80 ≤ CSPF < 6.80	5.40 ≤ CSPF < 6.40
	Lower Efficiency	5.60 ≤ CSPF < 6.40	4.80 ≤ CSPF < 5.80	4.30 ≤ CSPF < 5.40
6A (Model Regulation)	High Efficiency	7.90 ≤ CSPF	7.40 ≤ CSPF	7.00 ≤ CSPF
	Intermediate	7.00 ≤ CSPF < 7.90	6.30 ≤ CSPF < 7.40	5.80 ≤ CSPF < 7.00
	Lower Efficiency	6.00 ≤ CSPF < 7.00	5.10 ≤ CSPF < 6.30	4.50 ≤ CSPF < 5.80
4B (Model Regulation)	High Efficiency	6.40 ≤ CSPF	6.10 ≤ CSPF	5.70 ≤ CSPF
	Intermediate	5.70 ≤ CSPF < 6.40	5.30 ≤ CSPF < 6.10	4.90 ≤ CSPF < 5.70
	Lower Efficiency	5.00 ≤ CSPF < 5.70	4.40 ≤ CSPF < 5.30	4.00 ≤ CSPF < 4.90
5B (Model Regulation)	High Efficiency	6.00 ≤ CSPF	5.70 ≤ CSPF	5.40 ≤ CSPF
	Intermediate	5.40 ≤ CSPF < 6.00	5.00 ≤ CSPF < 5.70	4.90 ≤ CSPF < 5.40
	Lower Efficiency	4.70 ≤ CSPF < 5.40	4.20 ≤ CSPF < 5.00	4.00 ≤ CSPF < 4.90
6B (Model Regulation)	High Efficiency	7.70 ≤ CSPF	7.20 ≤ CSPF	6.80 ≤ CSPF
	Intermediate	6.80 ≤ CSPF < 7.70	6.10 ≤ CSPF < 7.20	5.60 ≤ CSPF < 6.80
	Lower Efficiency	5.90 ≤ CSPF < 6.80	5.00 ≤ CSPF < 6.10	4.40 ≤ CSPF < 5.60
7 (Model Regulation)	High Efficiency	7.60 ≤ CSPF	7.20 ≤ CSPF	6.70 ≤ CSPF
	Intermediate	6.70 ≤ CSPF < 7.60	6.10 ≤ CSPF < 7.20	5.60 ≤ CSPF < 6.70
	Lower Efficiency	5.80 ≤ CSPF < 6.70	5.00 ≤ CSPF < 6.10	4.40 ≤ CSPF < 5.60
8 (Model Regulation)	High Efficiency	7.40 ≤ CSPF	7.00 ≤ CSPF	6.60 ≤ CSPF
	Intermediate	6.60 ≤ CSPF < 7.40	6.00 ≤ CSPF < 7.00	5.50 ≤ CSPF < 6.60
	Lower Efficiency	5.70 ≤ CSPF < 6.60	4.90 ≤ CSPF < 6.00	4.30 ≤ CSPF < 5.50

B. Heat Pumps in HSPF

Tables 18, 19, and 20 show different levels of efficiency in HSPF for reversible heat pumps heating mode HSPF.

Table 18: Labelling Requirements (HSPF) for Reversible Heat Pumps in Group 1 Countries

Climate Group (Temperature Bin Hours)	Grade	Rated Cooling Capacity ≤ 6 kW	6 kW < Rated Cooling Capacity ≤ 14 kW	14 kW < Rated Cooling Capacity ≤ 70 kW
Group 1 (ISO 16358-2: 2013)	High Efficiency	6.50 ≤ HSPF	5.80 ≤ HSPF	5.30 ≤ HSPF
	Intermediate	5.60 ≤ HSPF < 6.50	4.70 ≤ HSPF < 5.80	4.30 ≤ HSPF < 5.30
	Lower Efficiency	4.60 ≤ HSPF < 5.60	3.60 ≤ HSPF < 4.70	3.30 ≤ HSPF < 4.30
1A (Model Regulation)	High Efficiency	6.40 ≤ HSPF	5.40 ≤ HSPF	4.80 ≤ HSPF
	Intermediate	5.30 ≤ HSPF < 6.40	4.50 ≤ HSPF < 5.40	4.00 ≤ HSPF < 4.80
	Lower Efficiency	4.10 ≤ HSPF < 5.30	3.40 ≤ HSPF < 4.50	3.10 ≤ HSPF < 4.00
2A (Model Regulation)	High Efficiency	6.30 ≤ HSPF	5.40 ≤ HSPF	4.80 ≤ HSPF
	Intermediate	5.20 ≤ HSPF < 6.30	4.40 ≤ HSPF < 5.40	3.90 ≤ HSPF < 4.80
	Lower Efficiency	4.00 ≤ HSPF < 5.20	3.30 ≤ HSPF < 4.40	2.90 ≤ HSPF < 3.90
3A (Model Regulation)	High Efficiency	6.00 ≤ HSPF	5.40 ≤ HSPF	5.10 ≤ HSPF
	Intermediate	5.20 ≤ HSPF < 6.00	4.50 ≤ HSPF < 5.40	4.10 ≤ HSPF < 5.10
	Lower Efficiency	4.30 ≤ HSPF < 5.20	3.60 ≤ HSPF < 4.50	3.20 ≤ HSPF < 4.10
2B (Model Regulation)	High Efficiency	6.00 ≤ HSPF	5.20 ≤ HSPF	4.80 ≤ HSPF
	Intermediate	5.10 ≤ HSPF < 6.00	4.30 ≤ HSPF < 5.20	4.00 ≤ HSPF < 4.80
	Lower Efficiency	4.00 ≤ HSPF < 5.10	3.40 ≤ HSPF < 4.30	3.10 ≤ HSPF < 3.90
3B (Model Regulation)	High Efficiency	5.50 ≤ HSPF	5.00 ≤ HSPF	4.60 ≤ HSPF
	Intermediate	4.70 ≤ HSPF < 5.50	4.20 ≤ HSPF < 5.10	3.80 ≤ HSPF < 4.60
	Lower Efficiency	3.90 ≤ HSPF < 4.70	3.30 ≤ HSPF < 4.20	3.00 ≤ HSPF < 3.80
3C (Model Regulation)	High Efficiency	6.80 ≤ HSPF	6.20 ≤ HSPF	5.70 ≤ HSPF
	Intermediate	5.80 ≤ HSPF < 6.80	5.10 ≤ HSPF < 6.20	4.60 ≤ HSPF < 5.70
	Lower Efficiency	4.90 ≤ HSPF < 5.80	3.90 ≤ HSPF < 5.10	3.40 ≤ HSPF < 4.60

Table 19: Labelling Requirements (HSPF) for Reversible Heat Pumps in Group 2 Countries

Climate Group (Temperature Bin Hours)	Grade	Rated Cooling Capacity ≤ 6 kW	6 kW < Rated Cooling Capacity ≤ 14 kW	14 kW < Rated Cooling Capacity ≤ 70 kW
Group 2 (Model Regulation)	High Efficiency	5.00 ≤ HSPF	4.60 ≤ HSPF	4.40 ≤ HSPF
	Intermediate	4.40 ≤ HSPF < 5.00	4.00 ≤ HSPF < 4.60	3.80 ≤ HSPF < 4.40
	Lower Efficiency	3.80 ≤ HSPF < 4.40	3.50 ≤ HSPF < 4.00	3.30 ≤ HSPF < 3.80
0B (Model Regulation)	High Efficiency	5.20 ≤ HSPF	4.70 ≤ HSPF	4.40 ≤ HSPF
	Intermediate	4.50 ≤ HSPF < 5.20	4.00 ≤ HSPF < 4.70	3.80 ≤ HSPF < 4.40
	Lower Efficiency	3.70 ≤ HSPF < 4.50	3.40 ≤ HSPF < 4.00	3.20 ≤ HSPF < 3.80
1B (Model Regulation)	High Efficiency	5.00 ≤ HSPF	4.60 ≤ HSPF	4.40 ≤ HSPF
	Intermediate	4.40 ≤ HSPF < 5.00	4.00 ≤ HSPF < 4.60	3.80 ≤ HSPF < 4.40
	Lower Efficiency	3.80 ≤ HSPF < 4.40	3.50 ≤ HSPF < 4.00	3.30 ≤ HSPF < 3.80

Table 20: Labelling Requirements (HSPF) for Reversible Heat Pumps in Group 3 Countries

Climate Group (Temperature Bin Hours)	Grade	Rated Cooling Capacity ≤ 6 kW	6 kW < Rated Cooling Capacity ≤ 14 kW	14 kW < Rated Cooling Capacity ≤ 70 kW
Group 3 (Model Regulation)	High Efficiency	4.30 ≤ HSPF	3.80 ≤ HSPF	3.50 ≤ HSPF
	Intermediate	3.70 ≤ HSPF < 4.30	3.10 ≤ HSPF < 3.80	2.80 ≤ HSPF < 3.50
	Lower Efficiency	2.90 ≤ HSPF < 3.70	2.40 ≤ HSPF < 3.10	2.20 ≤ HSPF < 2.80
4A (Model Regulation)	High Efficiency	4.80 ≤ HSPF	4.30 ≤ HSPF	4.00 ≤ HSPF
	Intermediate	4.00 ≤ HSPF < 4.80	3.60 ≤ HSPF < 4.30	3.30 ≤ HSPF < 4.00
	Lower Efficiency	3.30 ≤ HSPF < 4.00	2.80 ≤ HSPF < 3.60	2.60 ≤ HSPF < 3.30
5A (Model Regulation)	High Efficiency	4.60 ≤ HSPF	4.00 ≤ HSPF	3.70 ≤ HSPF
	Intermediate	3.90 ≤ HSPF < 4.60	3.30 ≤ HSPF < 4.00	2.90 ≤ HSPF < 3.70
	Lower Efficiency	3.10 ≤ HSPF < 3.90	2.50 ≤ HSPF < 3.30	2.20 ≤ HSPF < 2.90
6A (Model Regulation)	High Efficiency	4.60 ≤ HSPF	4.00 ≤ HSPF	3.70 ≤ HSPF
	Intermediate	3.90 ≤ HSPF < 4.60	3.30 ≤ HSPF < 4.00	3.00 ≤ HSPF < 3.70
	Lower Efficiency	3.10 ≤ HSPF < 3.90	2.60 ≤ HSPF < 3.30	2.40 ≤ HSPF < 3.00
4B (Model Regulation)	High Efficiency	4.70 ≤ HSPF	4.20 ≤ HSPF	3.80 ≤ HSPF
	Intermediate	4.00 ≤ HSPF < 4.70	3.50 ≤ HSPF < 4.20	3.20 ≤ HSPF < 3.80
	Lower Efficiency	3.20 ≤ HSPF < 4.00	2.70 ≤ HSPF < 3.50	2.50 ≤ HSPF < 3.20

Climate Group (Temperature Bin Hours)	Grade	Rated Cooling Capacity ≤ 6 kW	6 kW < Rated Cooling Capacity ≤ 14 kW	14 kW < Rated Cooling Capacity ≤ 70 kW
5B (Model Regulation)	High Efficiency	4.80 ≤ HSPF	4.20 ≤ HSPF	3.90 ≤ HSPF
	Intermediate	4.00 ≤ HSPF < 4.80	3.50 ≤ HSPF < 4.20	3.20 ≤ HSPF < 3.90
	Lower Efficiency	3.30 ≤ HSPF < 4.00	2.70 ≤ HSPF < 3.50	2.50 ≤ HSPF < 3.20
6B (Model Regulation)	High Efficiency	4.40 ≤ HSPF	3.90 ≤ HSPF	3.50 ≤ HSPF
	Intermediate	3.70 ≤ HSPF < 4.40	3.10 ≤ HSPF < 3.90	2.90 ≤ HSPF < 3.50
	Lower Efficiency	2.90 ≤ HSPF < 3.70	2.40 ≤ HSPF < 3.10	2.30 ≤ HSPF < 2.90
7 (Model Regulation)	High Efficiency	4.40 ≤ HSPF	3.80 ≤ HSPF	3.50 ≤ HSPF
	Intermediate	3.70 ≤ HSPF < 4.40	3.20 ≤ HSPF < 3.80	2.90 ≤ HSPF < 3.50
	Lower Efficiency	3.00 ≤ HSPF < 3.70	2.40 ≤ HSPF < 3.20	2.20 ≤ HSPF < 2.90
8 (Model Regulation)	High Efficiency	4.50 ≤ HSPF	3.90 ≤ HSPF	2.60 ≤ HSPF
	Intermediate	3.80 ≤ HSPF < 4.50	3.20 ≤ HSPF < 3.90	2.90 ≤ HSPF < 2.60
	Lower Efficiency	3.00 ≤ HSPF < 3.80	2.40 ≤ HSPF < 3.20	2.20 ≤ HSPF < 2.90

C. Heat Pumps in APF

Tables 21, 22, and 23 show different levels of efficiency in APF for reversible heat pumps.

Table 21: Labelling Requirements (APF) for Reversible Heat Pumps in Group 1 Countries

Climate Group (Temperature Bin Hours)	Grade	Rated Cooling Capacity ≤ 6 kW	6 kW < Rated Cooling Capacity ≤ 14 kW	14 kW < Rated Cooling Capacity ≤ 70 kW
Group 1 (ISO 16358-1 and ISO 16358-2)	High Efficiency	7.10 ≤ APF	6.40 ≤ APF	5.80 ≤ APF
	Intermediate	6.10 ≤ APF < 7.10	5.20 ≤ APF < 6.40	4.70 ≤ APF < 5.80
	Lower Efficiency	5.00 ≤ APF < 6.10	4.00 ≤ APF < 5.20	3.60 ≤ APF < 4.70
1A (Model Regulation)	High Efficiency	7.20 ≤ APF	6.10 ≤ APF	5.40 ≤ APF
	Intermediate	5.90 ≤ APF < 7.20	5.00 ≤ APF < 6.10	4.50 ≤ APF < 5.40
	Lower Efficiency	4.60 ≤ APF < 5.90	3.80 ≤ APF < 5.00	3.50 ≤ APF < 4.50
2A (Model Regulation)	High Efficiency	7.50 ≤ APF	6.40 ≤ APF	5.70 ≤ APF
	Intermediate	6.20 ≤ APF < 7.50	5.20 ≤ APF < 6.40	4.60 ≤ APF < 5.70
	Lower Efficiency	4.80 ≤ APF < 6.20	3.90 ≤ APF < 5.20	3.50 ≤ APF < 4.60
3A (Model Regulation)	High Efficiency	6.50 ≤ APF	5.90 ≤ APF	5.50 ≤ APF
	Intermediate	5.60 ≤ APF < 6.50	4.90 ≤ APF < 5.90	4.50 ≤ APF < 5.50
	Lower Efficiency	4.70 ≤ APF < 5.60	3.90 ≤ APF < 4.90	3.50 ≤ APF < 4.50

Climate Group (Temperature Bin Hours)	Grade	Rated Cooling Capacity ≤ 6 kW	6 kW < Rated Cooling Capacity ≤ 14 kW	14 kW < Rated Cooling Capacity ≤ 70 kW
2B (Model Regulation)	High Efficiency	6.50 ≤ APF	5.70 ≤ APF	5.20 ≤ APF
	Intermediate	5.50 ≤ APF < 6.50	4.70 ≤ APF < 5.70	4.30 ≤ APF < 5.20
	Lower Efficiency	4.40 ≤ APF < 5.50	3.70 ≤ APF < 4.70	3.40 ≤ APF < 4.30
3B (Model Regulation)	High Efficiency	6.20 ≤ APF	5.60 ≤ APF	5.20 ≤ APF
	Intermediate	5.30 ≤ APF < 6.20	4.70 ≤ APF < 5.60	4.30 ≤ APF < 5.20
	Lower Efficiency	4.40 ≤ APF < 5.30	3.70 ≤ APF < 4.70	3.40 ≤ APF < 4.30
3C (Model Regulation)	High Efficiency	7.20 ≤ APF	6.60 ≤ APF	6.10 ≤ APF
	Intermediate	6.20 ≤ APF < 7.20	5.40 ≤ APF < 6.60	4.90 ≤ APF < 6.10
	Lower Efficiency	5.20 ≤ APF < 6.20	4.10 ≤ APF < 5.40	3.60 ≤ APF < 4.90

Table 22: Labelling Requirements (APF) for Reversible Heat Pumps in Group 2 Countries

Climate Group (Temperature Bin Hours)	Grade	Rated Cooling Capacity ≤ 6 kW	6 kW < Rated Cooling Capacity ≤ 14 kW	14 kW < Rated Cooling Capacity ≤ 70 kW
Group 2 (ISO 16358-1:2013/ And 1:2019 and Model Regulation)	High Efficiency	5.20 ≤ APF	4.80 ≤ APF	4.60 ≤ APF
	Intermediate	4.60 ≤ APF < 5.20	4.20 ≤ APF < 4.80	4.00 ≤ APF < 4.60
	Lower Efficiency	4.00 ≤ APF < 4.60	3.60 ≤ APF < 4.20	3.40 ≤ APF < 4.00
0B (Model Regulation)	High Efficiency	5.40 ≤ APF	4.90 ≤ APF	4.60 ≤ APF
	Intermediate	4.70 ≤ APF < 5.40	4.20 ≤ APF < 4.90	4.00 ≤ APF < 4.60
	Lower Efficiency	3.90 ≤ APF < 4.70	3.50 ≤ APF < 4.20	3.30 ≤ APF < 4.00
1B (Model Regulation)	High Efficiency	5.20 ≤ APF	4.80 ≤ APF	4.60 ≤ APF
	Intermediate	4.60 ≤ APF < 5.20	4.20 ≤ APF < 4.80	4.00 ≤ APF < 4.60
	Lower Efficiency	4.00 ≤ APF < 4.60	3.60 ≤ APF < 4.20	3.40 ≤ APF < 4.00

Table 23: Labelling Requirements (APF) for Reversible Heat Pumps in Group 3 Countries

Climate Group (Temperature Bin Hours)	Grade	Rated Cooling Capacity ≤ 6 kW	6 kW < Rated Cooling Capacity ≤ 14 kW	14 kW < Rated Cooling Capacity ≤ 70 kW
Group 3 (Model Regulation)	High Efficiency	4.60 ≤ APF	4.00 ≤ APF	3.70 ≤ APF
	Intermediate	3.90 ≤ APF < 4.60	3.30 ≤ APF < 4.00	3.00 ≤ APF < 3.70
	Lower Efficiency	3.10 ≤ APF < 3.90	2.50 ≤ APF < 3.30	2.30 ≤ APF < 3.00
4A (Model Regulation)	High Efficiency	5.20 ≤ APF	4.70 ≤ APF	4.30 ≤ APF
	Intermediate	4.40 ≤ APF < 5.20	3.90 ≤ APF < 4.70	3.60 ≤ APF < 4.30
	Lower Efficiency	3.60 ≤ APF < 4.40	3.00 ≤ APF < 3.90	2.80 ≤ APF < 3.60
5A (Model Regulation)	High Efficiency	4.90 ≤ APF	4.30 ≤ APF	3.90 ≤ APF
	Intermediate	4.10 ≤ APF < 4.90	3.50 ≤ APF < 4.30	3.10 ≤ APF < 3.90
	Lower Efficiency	3.30 ≤ APF < 4.10	2.70 ≤ APF < 3.50	2.30 ≤ APF < 3.10
6A (Model Regulation)	High Efficiency	4.70 ≤ APF	4.10 ≤ APF	3.80 ≤ APF
	Intermediate	4.00 ≤ APF < 4.70	3.40 ≤ APF < 4.10	3.10 ≤ APF < 3.80
	Lower Efficiency	3.20 ≤ APF < 4.00	2.70 ≤ APF < 3.40	2.40 ≤ APF < 3.10
4B (Model Regulation)	High Efficiency	5.30 ≤ APF	4.70 ≤ APF	4.30 ≤ APF
	Intermediate	4.50 ≤ APF < 5.30	3.90 ≤ APF < 4.70	3.60 ≤ APF < 4.30
	Lower Efficiency	3.60 ≤ APF < 4.50	3.00 ≤ APF < 3.90	2.80 ≤ APF < 3.60
5B (Model Regulation)	High Efficiency	5.10 ≤ APF	4.50 ≤ APF	4.10 ≤ APF
	Intermediate	4.30 ≤ APF < 5.10	3.70 ≤ APF < 4.50	3.40 ≤ APF < 4.10
	Lower Efficiency	3.50 ≤ APF < 4.30	2.90 ≤ APF < 3.70	2.70 ≤ APF < 3.40
6B (Model Regulation)	High Efficiency	4.70 ≤ APF	4.10 ≤ APF	3.70 ≤ APF
	Intermediate	3.90 ≤ APF < 4.70	3.30 ≤ APF < 4.10	3.10 ≤ APF < 3.70
	Lower Efficiency	3.10 ≤ APF < 3.90	2.50 ≤ APF < 3.30	2.40 ≤ APF < 3.10
7 (Model Regulation)	High Efficiency	4.60 ≤ APF	4.00 ≤ APF	3.60 ≤ APF
	Intermediate	3.90 ≤ APF < 4.60	3.30 ≤ APF < 4.00	3.00 ≤ APF < 3.60
	Lower Efficiency	3.10 ≤ APF < 3.90	2.50 ≤ APF < 3.30	2.30 ≤ APF < 3.00
8 (Model Regulation)	High Efficiency	4.60 ≤ APF	4.00 ≤ APF	3.70 ≤ APF
	Intermediate	3.90 ≤ APF < 4.60	3.30 ≤ APF < 4.00	3.00 ≤ APF < 3.70
	Lower Efficiency	3.10 ≤ APF < 3.90	2.50 ≤ APF < 3.30	2.30 ≤ APF < 3.00

D. Two Examples of Five-Class Labelling Requirements for Air Conditioners

Table 24 presents an example of labelling requirements, with the "Excellent" tier representing the best-performing models currently available on the global market. Table 25 presents an example of labelling requirements in which the "Excellent" tier reflects aspirational performance levels not yet commercially achieved, but anticipated in the future.

Note: These examples illustrate two approaches for defining energy-efficiency thresholds. Countries may adapt to the thresholds based on local market conditions, policy objectives, and factors such as regulatory update frequency.

These examples are illustrative only. Table 24 reflects current best-available performance, while Table 25 reflects aspirational performance levels that may not yet be commercially available. They do not constitute UNEP endorsement or mandatory requirements.

Table 24: Labelling Requirements for Air Conditioners in Group 1 Countries

Climate Group (Temperature Bin Hours)	Grade	Rated Cooling Capacity ≤ 70 kW
Group 1 (ISO 16358-1: 2013)	Excellent	8.30 ≤ CSPF
	Very Good	7.50 ≤ CSPF < 8.30
	Good	6.80 ≤ CSPF < 7.50
	Fair	6.10 ≤ CSPF < 6.80
	Low	CSPF < 6.10

Table 25: Labelling Requirements for Air Conditioners in Group 1 Countries

Climate Group (Temperature Bin Hours)	Grade	Rated Cooling Capacity ≤ 70 kW
Group 1 (ISO 16358-1: 2013)	Excellent	10.00 ≤ CSPF
	Very Good	8.60 ≤ CSPF < 10.00
	Good	7.40 ≤ CSPF < 8.60
	Fair	6.10 ≤ CSPF < 7.40
	Low	CSPF < 6.10

Annex 3. (Informative) Climate Groups and Countries

The climates listed in Table 26 are provided for information purposes only. They represent typical climatic conditions for selected countries to guide policymakers in choosing relevant climate profiles. Countries may adopt one of the predefined climates or define their own based on local conditions. If other climate data are used, the efficiency levels should be adjusted accordingly.

Table 26: Countries by Climate Group

1. The secondary climate group is based on the data from the ASHRAE Weather Data Viewer 6.0.

2. * represents the climate of the city or region with the largest population for which data are available.

3. ◊ represents the climate estimated from other sources other than the ASHRAE Weather Data Viewer 6.0.

4. The representative climate group may be subject to change as additional information becomes available.

Country	Climate Group	
	Primary	Secondary
Albania	1	3A
Algeria	1*, 2, 3	0B, 1B, 2A, 2B, 3A*, 3B, 4A, 4B
Angola	1	1A◊
Antigua and Barbuda	1	0A
Argentina	1*, 3	2A, 2B, 3A*, 3B, 4B, 5B, 5C, 6A
Armenia	3	4A*, 4B, 6A
Azerbaijan	1, 3*	3A, 3B, 4A, 4B*
Bahamas	1	1A
Bahrain	2	0B
Bangladesh	1	0A, 1A
Barbados	1	0A
Belarus	3	5A, 6A*
Belize	1	0A
Benin	1	0A
Bhutan	1	3A◊
Bolivia	1*, 3	1A*, 3B, 5A
Bosnia and Herzegovina	1, 3*	3A, 4A*, 5A, 7

Source: ASHRAE Weather Data Viewer 6.0; ISO 16358; U4E analysis.

Country	Climate Group	
	Primary	Secondary
Botswana	1*, 2	1B, 2B*
Brazil	1	0A, 1A, 2A*, 3A
Brunei Darussalam	1	0A
Burkina Faso	1, 2	0A, 0B*
Burundi	1	1A◊
Cambodia	1	0A◊
Cameroon	1	0A*, 1A
Cape Verde	2	1B
Central African Republic	1	0A
Chad	1, 2*	0A, 0B*
Chile	1*, 3	3B, 3C*, 4A, 4C, 6A
China	1*, 3	0A, 1A, 2A*, 2B, 3A, 3B, 3C, 4A, 4B, 5A, 5B, 6A, 6B, 7, 8
Colombia	1	0A, 1A, 3A*
Comoros	1	0A
Costa Rica	1	2A
Côte d'Ivoire	1	0A, 1A, 2A
Cuba	1	0B, 1A*
Democratic People's Republic of Korea	3	4A, 5A*, 6A, 7
Democratic Republic of the Congo	1	1A
Djibouti	2	0B◊
Dominica	1	0A◊
Dominican Republic	1	0A*, 1A
Ecuador	1*, 2	1A, 1B, 3A*
Egypt	1*, 2	0B, 1B, 2B*, 3B
El Salvador	1	0A
Equatorial Guinea	1	0A◊
Eritrea	2	0B◊
Ethiopia	1	2A◊

Source: ASHRAE Weather Data Viewer 6.0; ISO 16358; U4E analysis.

Country	Climate Group	
	Primary	Secondary
Federated States of Micronesia	1	0A
Fiji	1	0A, 1A*
Gabon	1	0A
Gambia	1	0A
Georgia	3	3A, 4A*, 5A, 7
Ghana	1, 2	0A◊, 0B
Grenada	1	0A
Guatemala	1	0A, 1A, 2A*, 3C
Guinea	1	0A
Guinea-Bissau	1	1A◊
Guyana	1	0A
Haiti	1	0A◊
Honduras	1	0A, 1A, 2A*
India	1*, 2	0A*, 0B, 1A, 1B, 2A, 2B
Indonesia	1	0A*, 1A
Iran	1*, 2, 3	0B, 1A, 1B, 2B, 3A, 3B*, 4A, 4B, 5A, 5C
Iraq	1, 2*	1B*, 2B
Israel	1*, 2	1B, 2A*, 2B, 3A
Jamaica	1	0A
Jordan	1*, 2	1B, 2B, 3A, 3B*
Kazakhstan	3	4A, 4B, 5A*, 6A, 6B, 7
Kenya	1	0A, 0B, 1B, 2A*, 2B, 3A, 3C
Kiribati	1	0A
Kuwait	2	0B
Kyrgyz Republic	3	4A, 4B, 5A, 7, 8
Lao People's Democratic Republic	1	0A
Lebanon	1	2A*, 3A
Lesotho	1	3B◊

Source: ASHRAE Weather Data Viewer 6.0; ISO 16358; U4E analysis.

Country	Climate Group	
	Primary	Secondary
Liberia	1	1A◊
Libya	1	1B, 2B*
Macedonia, FYR	3	4A*, 4C
Madagascar	1	0A, 1A, 3A*
Malawi	1	3A◊
Malaysia	1	0A
Maldives	1	0A
Mali	1	0A
Marshall Islands	1	0A
Mauritania	1, 2	0A◊, 0B*, 2B
Mauritius	1	0A, 1A*, 2A
Mexico	1*, 2	0A, 1A, 1B, 2A, 2B, 3A*, 3B, 3C
Mongolia	3	6B, 7, 8*
Montenegro	3A	3A*, 4A, 5A
Morocco	1	2B, 3A*, 3B, 3C
Mozambique	1	1A
Myanmar	1	0A
Namibia	1	2B
Nepal	1	2A◊
Nicaragua	1	0A
Niger	1, 2	0A◊, 0B
Nigeria	1	0A◊
Oman	2	0B*, 1B, 2B, 3B
Pakistan	2	0A, 0B, 1A, 1B*, 2A, 2B, 3A, 4B
Panama	1	0A
Papua New Guinea	1	0A
Paraguay	1	1A, 2A*
Peru	1	0A, 1B, 2B*, 3B, 3C, 4A

Source: ASHRAE Weather Data Viewer 6.0; ISO 16358; U4E analysis.

Country	Climate Group	
	Primary	Secondary
Philippines	1	0A*, 1A, 2A
Qatar	2	0B
Republic of Congo	1	1A
Republic of Moldova	3	5A
Russia	1, 3*	3A, 4A, 4B, 5A, 5B, 6A*, 7, 8
Rwanda	1	2A◊
Saint Kitts and Nevis	1	0A◊
Saint Lucia	1	0A
Saint Vincent and the Grenadines	1	0A◊
Samoa	1	0A
Sao Tome and Principe	1	1A◊
Saudi Arabia	1, 2*	0B*, 1B, 2B, 3B
Senegal	1, 2*	0A, 0B, 1A, 1B*
Serbia	3	4A*, 5A, 6A, 7
Seychelles	1	0A
Sierra Leone	1	1A◊
Singapore	1	0A
Solomon Islands	1	0A
Somalia	1	0A◊
South Africa	1*, 2, 3	1B, 2A, 2B, 3A, 3B, 3C*, 6A
South Sudan	2	0B
Sri Lanka	1	0A
State of Palestine	1	3A
Sudan	1, 2	0A◊, 0B
Suriname	1	0A
Swaziland	1	3A◊
Syrian Arab Republic	1	3B◊
Tajikistan	1*, 3	3A*, 3B, 4B, 5B, 6A

Source: ASHRAE Weather Data Viewer 6.0; ISO 16358; U4E analysis.

Country	Climate Group	
	Primary	Secondary
Thailand	1	0A*, 1A
Timor-Leste	1	0A◊
Togo	1	0A
Tonga	1	1A
Trinidad and Tobago	1	0A
Tunisia	1	2A*, 2B, 3A, 3B
Turkey	1, 3*	2A, 3A, 4A*, 4B, 4C, 5A, 5C, 6A
Turkmenistan	1*, 3	2B, 3B*, 4B
Uganda	1	2A◊
Ukraine	3	4A, 5A*, 6A
United Arab Emirates	2	0B
United Republic of Tanzania	1	0A, 1A*, 2B
Uruguay	1	3A
Uzbekistan	1, 3*	3B, 4A, 4B*, 5B, 5C
Vanuatu	1	0A, 1A*
Venezuela	1, 2*	0A, 0B*, 1A, 1B, 2A
Vietnam	1	0A*, 1A, 2A
Yemen	1*, 2	0B, 3B*
Zambia	1	3A◊
Zimbabwe	1	2B, 3A*

Source: ASHRAE Weather Data Viewer 6.0; ISO 16358; U4E analysis.

Annex 4. Outdoor Temperature Bin Hours

Table 27: Temperature bin hours for calculating CSPF in Group 1 countries

Outdoor temperature	Group 1 Reference	0A	1A	2A	3A	2B	3B	3C
°C	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours
21	100	5	33	49	32	30	34	34
22	139	23	86	92	62	64	60	60
23	165	76	167	128	83	102	84	73
24	196	205	250	161	99	138	98	75
25	210	383	327	191	103	169	108	74
26	215	537	360	210	101	201	109	60
27	210	646	388	219	93	216	109	50
28	181	671	395	212	85	221	105	41
29	150	630	371	188	79	217	97	32
30	120	596	332	149	72	203	88	27
31	75	501	285	118	63	200	75	18
32	35	361	227	86	52	191	61	12
33	11	206	153	58	41	180	50	6
34	6	86	90	37	29	147	36	3
35	4	32	55	22	18	113	27	2
36	0	11	35	13	11	80	16	1
37	0	3	22	8	7	53	10	0
38	0	1	16	4	4	34	6	0
39	0	0	12	3	2	21	3	0
40	0	0	10	1	1	13	1	0
41	0	0	7	1	1	8	1	0
42	0	0	5	1	0	4	0	0
43	0	0	3	0	0	3	0	0
44	0	0	1	0	0	1	0	0
45	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0
Total	**1817**	**4973**	**3630**	**1951**	**1038**	**2609**	**1178**	**568**

Table 28: Temperature bin hours for calculating CSPF in Group 2 countries

Outdoor temperature	Group 2 Reference	0B	1B
°C	Bin hours	Bin hours	Bin hours
21	307	18	22
22	311	40	47
23	317	74	83
24	325	130	113
25	334	198	151
26	342	241	182
27	349	290	228
28	354	329	253
29	356	364	277
30	355	381	289
31	351	388	289
32	344	393	287
33	332	372	288
34	317	307	257
35	299	255	234
36	277	213	189
37	252	185	164
38	225	155	134
39	195	131	116
40	165	106	97
41	133	88	78
42	103	71	59
43	73	55	40
44	47	41	22
45	24	27	11
46	6	19	4
47	0	11	1
48	0	6	0
49	0	3	0
50	0	1	0
Total	**6493**	**4892**	**3915**

Table 29: Temperature bin hours for calculating CSPF in Group 3 countries

Outdoor temperature	Group 3 Reference	4A	5A	6A	4B	5B	6B	7	8
°C	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours
21	16	20	20	13	22	13	18	14	10
22	31	39	39	22	45	26	36	25	19
23	44	55	55	28	67	38	52	35	25
24	54	70	67	30	85	49	65	41	30
25	61	82	76	30	100	57	75	43	29
26	65	90	80	29	109	64	82	43	30
27	66	95	79	26	115	69	79	41	28
28	64	97	78	22	115	72	71	36	24
29	59	93	70	17	117	73	60	28	21
30	55	91	62	12	115	74	50	23	17
31	48	83	49	8	111	72	35	18	13
32	42	74	38	5	104	70	25	13	9
33	35	60	28	3	92	67	15	9	8
34	26	42	19	1	72	58	7	6	5
35	19	28	12	1	56	49	4	3	3
36	13	15	6	1	40	39	2	1	2
37	8	8	3	0	26	28	1	0	1
38	5	4	2	0	15	19	0	0	0
39	2	2	1	0	7	11	0	0	0
40	1	1	0	0	3	6	0	0	0
41	0	0	0	0	2	3	0	0	0
42	0	0	0	0	0	1	0	0	0
43	0	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0
Total	**714**	**1049**	**784**	**248**	**1418**	**958**	**677**	**379**	**274**

Table 30: Temperature bin hours for calculating HSPF in Group 1 countries

Outdoor temperature	Group 1 Reference	1A	2A	3A	2B	3B	3C
°C	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours
-7	0	0	0	0	0	1	0
-6	0	0	0	1	0	2	0
-5	0	0	0	2	0	4	0
-4	0	0	0	4	0	7	0
-3	0	0	0	8	1	12	1
-2	0	0	1	13	1	19	3
-1	4	0	2	20	2	28	5
0	15	0	2	16	3	24	8
1	33	0	5	41	7	46	15
2	68	0	8	54	13	63	23
3	119	0	12	72	20	78	34
4	169	0	18	97	32	98	49
5	200	1	25	126	45	117	68
6	234	1	34	154	58	137	89
7	250	3	49	187	72	159	117
8	260	5	55	201	82	165	131
9	265	7	64	208	90	162	143
10	260	10	67	216	90	168	159
11	245	13	71	211	94	155	163
12	215	15	72	196	91	150	179
13	192	17	70	164	82	138	191
14	151	17	65	135	70	119	184
15	110	15	53	95	49	96	139
16	76	10	33	49	28	53	76
Total	**2866**	**114**	**706**	**2270**	**930**	**2001**	**1777**

Table 31: Temperature bin hours for calculating HSPF in Group 2 countries

Outdoor temperature	Group 2 Reference	0B	1B
°C	Bin hours	Bin hours	Bin hours
-7	0	0	0
-6	0	0	0
-5	0	0	0
-4	0	0	0
-3	0	0	0
-2	0	0	1
-1	0	0	1
0	0	0	1
1	1	0	3
2	3	1	5
3	5	2	9
4	9	4	15
5	16	6	26
6	22	8	36
7	29	11	48
8	36	15	58
9	42	18	67
10	45	22	68
11	47	25	70
12	47	27	68
13	45	27	63
14	38	25	51
15	29	20	39
16	16	12	20
Total	**430**	**223**	**649**

Table 32: Temperature bin hours for calculating HSPF in Group 3 countries

Outdoor temperature	Group 3 Reference	4A	5A	6A	4B	5B	6B	7	8
°C	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours
-7	108	47	109	137	50	86	158	144	134
-6	119	62	127	158	60	102	158	148	142
-5	135	84	143	185	81	122	157	160	148
-4	150	112	169	200	102	139	166	163	150
-3	169	144	192	232	129	173	174	162	148
-2	191	176	225	265	160	204	172	168	160
-1	212	204	249	308	186	246	171	169	163
0	162	177	194	247	184	173	94	113	120
1	252	253	287	424	217	318	183	175	164
2	239	249	259	371	227	317	167	162	162
3	224	252	236	301	226	315	160	157	147
4	218	255	228	264	232	305	154	157	151
5	261	309	266	299	281	376	188	189	187
6	239	286	241	258	267	329	177	172	187
7	218	262	215	232	241	299	163	164	172
8	197	237	197	213	209	259	147	154	165
9	176	209	174	192	185	225	138	143	149
10	158	187	158	178	161	196	122	129	135
11	136	158	135	156	137	158	108	120	121
12	116	133	116	142	114	127	91	103	102
13	94	107	94	115	94	97	75	88	82
14	73	83	74	87	70	69	60	70	71
15	49	56	51	58	49	45	41	49	44
16	24	28	26	28	25	21	22	24	21
Total	**3920**	**4070**	**4165**	**5050**	**3687**	**4701**	**3246**	**3283**	**3225**

Annex 5. (Informative) Performance Specifications for a Super-Efficient Air Conditioner

This informative annex provides minimum requirements to identify super-efficient ductless split-type air conditioners and reversible heat pumps considering both the sensible and latent heat in cooling mode, i.e., the ability to control temperature and humidity respectively.

While most international test standards, particularly those that apply to residential air conditioning products, focus on the control of temperature in the laboratory, humidity is also a critical component of thermal comfort. Improved humidity control has significant benefits for groups especially sensitive to heat stress, including pregnant women, elderly women, and caregivers who spend longer periods indoors. When air conditioners are used in real life under a combination of higher ambient humid conditions and activities that add latent loads in the indoor space, the user typically sets lower temperatures on the thermostat to achieve a reduction in humidity, leading to overcooling of the space and consequently higher energy consumption than what is predicted by the current testing standards. In this sense, air conditioners that effectively remove latent heat can avoid significant overcooling of the space, resulting in energy savings.

While international standards work on including more real-life test procedures, like the currently drafted ISO 21280 standard, the Global Cooling Efficiency Accelerator (GCEA) – through extensive lab and field testing of air conditioners – has developed recommendations for India to support the evaluation of both sensible and latent cooling performance with the aim to address the limitations of current standards and accelerate the pathway to integration of de-humidification performance in the future standards.

Aware of the benefits to include de-humidification performance, not only on occupant comfort but also on power grid stability and emissions reduction, U4E has adapted the GCEA guidelines, *Super-efficient Room Air Conditioner Performance Specification Guideline for Indian Market*, to be applied worldwide and include them in this informative annex of the MRG. According to GCEA, an air conditioner complying with these performance specifications will save over 60% more energy when compared to the average product in the market in the year 2023. The criteria presented in this annex are intended for voluntary use in support of endorsement labeling, sustainable procurement, or other incentive-based programs.

The criteria in this annex are voluntary and intended for endorsement labels, sustainable procurement, or incentive-based programmes only. They do not constitute mandatory requirements.

A. Scope

This Annex applies to ductless split type air-to-air air conditioners and reversible heat pumps with a rated cooling capacity up to 6 kW, for use in voluntary schemes such as endorsement labels or sustainable procurement or other incentive-based programs.

Note: The scope is defined based on the unit types assessed in the GCEA study used to develop the super-efficient air conditioning criteria (ductless single-split air conditioners of approximately 5.3 kW). Countries may expand the capacity range and include additional air conditioning types if sufficient data demonstrates that these requirements are applicable to those products.

B. Technology Requirements

To qualify under this voluntary specification, the unit must feature a variable-speed compressor with a direct current (DC) motor for precise temperature control, reduced energy consumption, and quieter operation.

C. Test Methods and Conditions

Tests shall be conducted under T1 moderate climate conditions as defined in ISO 5151:

- Outdoor temperature conditions: 35°C dry bulb / 24°C wet bulb

- Indoor temperature conditions: 27°C dry bulb / 19°C wet bulb

The supplier shall provide test data (sensible and latent cooling capacities, and power draw) for the following load conditions:

- 100%: Full capacity test included in ISO 16358-1:2013
- 75%: Intermediate load, additional test point
- 50%: Half load, test included in ISO 16358-1:2013
- 25%: Low load, additional test point

Test tolerance for part-load operation shall be ± 5% of full load capacity.

If 25% capacity is not achievable, then the unit cannot qualify under this voluntary specification, unless otherwise notified by the competent authority, in which case, the unit will be tested at the first three conditions along with the lowest possible capacity possible.

The manufacturer shall provide information on how to achieve the desired capacity if requested by the testing laboratory.

D. Energy Efficiency Requirements

To qualify under this voluntary specification, the air conditioner shall meet or exceed the performance criteria in Table 33:

Table 33: Super-efficient Air Conditioning Requirements

% Nominal Capacity	Maximum Sensible Heat Ratio*	Minimum EER
25%	65%	7.7
50%	80%	6.4
75%	90%	6.1
100%	92%	6.0

** Sensible Heat Ratio (SHR) for an air conditioner is the ratio of sensible cooling (temperature control) to total cooling (sensible plus latent), indicating how much of the cooling addresses temperature versus humidity.*

E. Humidity control

Air conditioners should operate to provide humidity control without significantly overcooling the space, and may include, but not limited to, separate temperature and humidity sensors that optimize evaporator coil and other core components' operation based on real-time conditions and provide better comfort and higher energy savings. The air conditioner unit shall have integrated dehumidification capabilities that allow it to modulate its sensible and latent cooling such that the indoor relative humidity can be satisfactorily maintained at or below 60% in real life conditions.

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