

CHILLERS & HEAT PUMPS

EUROPEAN ECODESIGN REGULATIONS



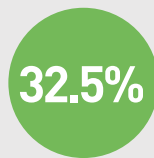


CIAT: RESPONSIBLE THINKING

Designing products and solutions with a lesser impact on the environment and smaller energy consumption lies at the heart of CIAT's long standing engagement for sustainable development, in keeping with the European climate and energy package objectives for 2030.



Greenhouse gas emissions



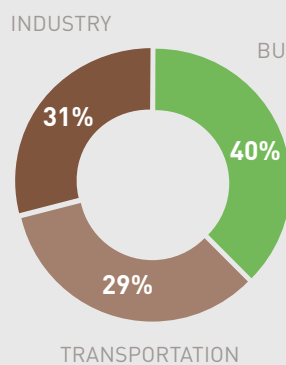
Energy efficiency improvement



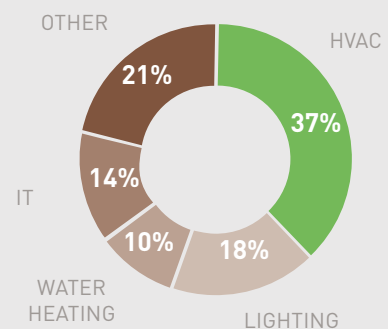
Share of renewable energy

The heating, ventilation and air conditioning (HVAC) market is primarily concerned by this energy efficiency improvement policy.

Buildings being the largest energy consumers and HVAC systems accounting for the better part of this consumption, providing users with energy efficient solutions is both a challenge to be met and a major sustainable development opportunity to be seized by the HVAC industry.



Overall energy consumption



Building energy consumption

A directive has been developed by the European Union in order to meet these objectives, regarding equipment consumption, lighting, IT, water heating and HVAC:

ECODESIGN

ECODESIGN REGULATIONS

The latest European regulations apply to chillers in comfort and industrial process cooling applications, and to heat pumps.

Regulation 2016/2281 sets new energy efficiency requirements for chillers of up to 2000 kW used in air conditioning applications for comfort cooling. It comes into force in January 2018. This regulation also sets new energy efficiency requirements for industrial process cooling chillers of up to 2000 kW with a positive leaving water temperature.

Regulation 2015/1095 introduces increased energy efficiency requirements for industrial process cooling chillers with negative leaving water temperatures and is applicable from July 2018.

Under regulation 813/2013 air- and water-to-water heat pumps up to 400 kW must comply with higher energy efficiency requirements as from September 2017. Heat pumps up to 70 kW must also carry Energy Labelling in line with regulation 811/2013 from September 2015 onwards.

The new regulations also require manufacturers and all companies involved in the supply chain to provide specific technical information. For example, all advertising, sales or technical material must include information on the product's energy efficiency class.

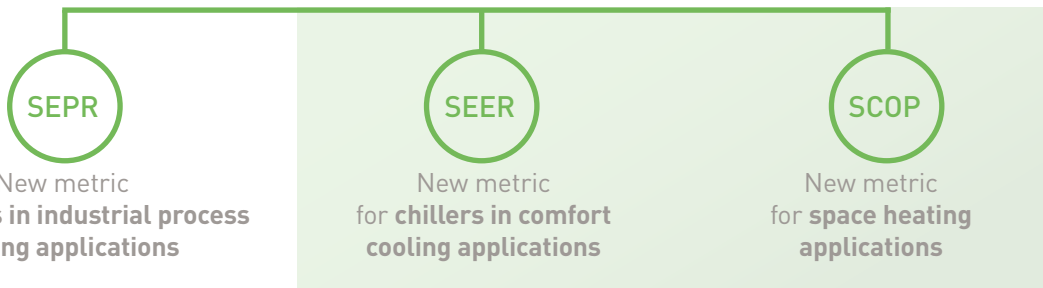
The challenge of seasonal efficiency

EER & COP belong to the past. Now, and in the future, the focus is on seasonal efficiency. With a broad new products range, CIAT is fully engaged to take up the challenge of energy efficiency.

Compliance with the new Ecodesign regulations therefore involves the use of new, more meaningful seasonal efficiency metrics. The Seasonal Energy Efficiency Ratio (SEER), Seasonal Energy Performance Ratio (SEPR) and Seasonal Coefficient of Performance (SCOP) all ensure precise evaluation of the energy actually consumed by chillers and heat pumps, by including seasonal variations in their measurements. Previous metrics (EER & COP) measured operations only at a single point, at full thermal load, and were therefore less representative of consumption over entire heating and cooling seasons.

These new seasonal performance metrics are now the key indicator used for all product ranges, in all applications. They are calculated according to technical standard EN 14825 and compliance is mandatory for a product to obtain CE marking.

~~EER & COP~~



$\eta_s (\eta_s)$:



In order to compare the energy efficiency of products using different sources of energy, the Ecodesign regulation introduces a new measurement expressed in primary energy: η_s cool is the equivalent of SEER for cooling applications and η_s heat is the equivalent of SCOP for space heating.



COMFORT COOLING

Ecodesign regulation 2016/2281 sets minimum efficiency levels for chillers rated up to 2000 kW with a leaving water temperature equal to or greater than 2°C. It covers units used in air conditioning applications to ensure temperature comfort in buildings used by humans. These are divided into two sub-categories based on chilled water temperature:

Low temperature chillers

supplying chilled water to fan coil or air handling units (efficiency calculated at 12/7°C entering/leaving temperature).

Medium temperature chillers

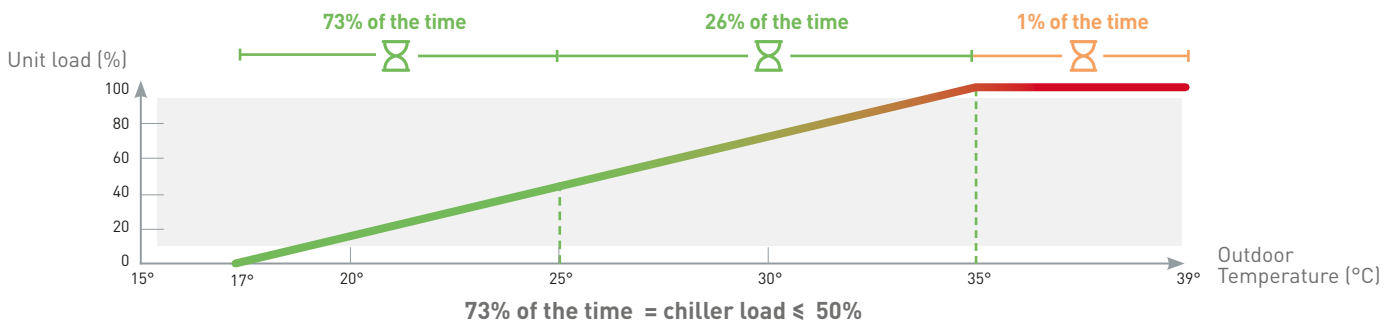
supplying chilled water, for instance to cooling floors or chilled beams (efficiency calculated at 23/18°C entering/leaving temperature).

SEER - Seasonal Energy Efficiency Ratio

SEER measures the seasonal energy efficiency of chillers by calculating the ratio between annual cooling demand and annual energy input. It takes into account the energy efficiency achieved for each outdoor temperature weighted by the number of hours observed for each of these temperatures, using actual climate data.

For low temperature applications the indicator is SEER_{12/7°}, calculated at 12/7° chilled water entering/leaving temperature, while for medium temperature applications SEER_{23/18°} is calculated at 23/18° conditions. It is important to note that SEER_{23/18°} can be up to 20% higher than SEER_{12/7°} so it is crucial to check the chilled water conditions used to determine the SEER when comparing the seasonal energy efficiency of chillers.

SEER is a new way of measuring the true energy efficiency of chillers for comfort cooling over an entire year. This new indicator gives a more realistic indication of the real energy efficiency and environmental impact of a cooling system.



Efficiency requirements

Regulation 2016/2281 sets seasonal energy efficiency in $\eta_{s, cool}$. This expresses SEER in terms of primary energy and so makes it possible to compare the energy efficiency of units using different energy sources.

There is no cooling efficiency requirement for heat pumps concerned by regulation 813/2011 or for medium temperature industrial process chillers concerned by regulation 2015/1095.

Comfort chillers	From 01/2018		From 01/2021	
	$\eta_{s, cool}$ %	SEER 12/7° or 23/18°	$\eta_{s, cool}$ %	SEER 12/7° or 23/18°
Air cooled < 400 kW	149	3,80	161	4,10
Air cooled 400 to 2000 kW	161	4,10	179	4,55
Water cooled < 400 kW	196	4,98	200	5,08
Water cooled 400 to 1500 kW	227	5,75	252	6,38
Water cooled 1500to 2000kW	245	6,20	272	6,88



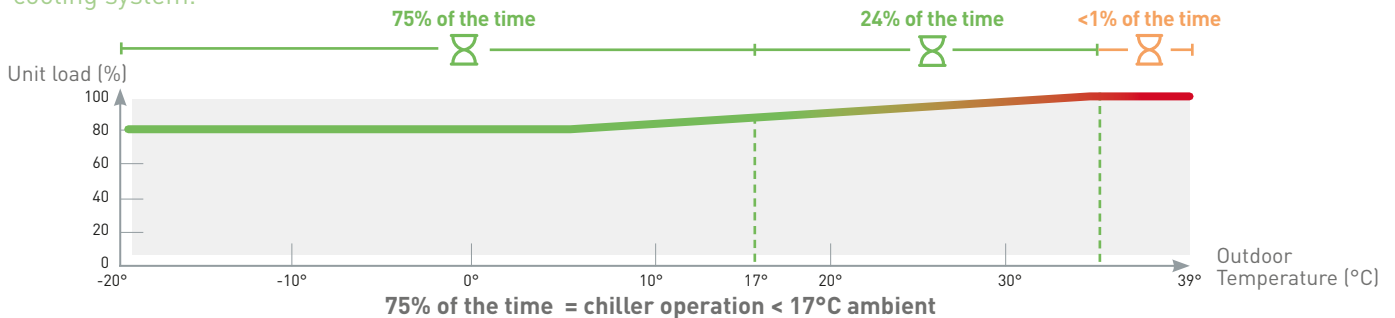
INDUSTRIAL PROCESS

Two Ecodesign regulations set efficiency requirements for industrial process cooling applications such as data centers, agrifood or pharmaceuticals.

SEPR - Seasonal Energy Performance Ratio

SEPR measures the seasonal energy efficiency of process chillers by calculating the ratio between annual cooling demand and annual energy input. It takes into account the energy efficiency achieved at each outdoor temperature of an average climate weighted by the number of hours observed for each of these temperatures.

SEPR is a new way of measuring the true energy efficiency of chillers for process cooling over an entire year. This new indicator gives a more realistic indication of the real energy efficiency and environmental impact of the cooling system.



Efficiency requirements for high temperature process chillers

Regulation 2016/2281 sets minimum efficiency levels for positive leaving water temperature chillers (high temperature chillers) rated up to 2000 kW used in industrial process cooling applications. High temperature chillers are capable of delivering leaving water temperatures of between 2°C and 12°C.

There is no High Temperature SEPR requirement for heat pumps concerned by regulation 813/2011 or medium temperature industrial process chillers concerned by regulation 2015/1095.

High temperature process chillers	From 01/2018	From 01/2021
	SEPR 12/7°	SEPR 12/7°
Air cooled < 400 kW	4,50	5,00
Air cooled 400 to 2000 kW	5,00	5,50
Water cooled < 400 kW	6,50	7,00
Water cooled 400 to 1500 kW	7,50	8,00
Water cooled 1500 to 2000kW	8,00	8,50

Efficiency requirements for medium temperature process chillers

Regulation 2015/1095 sets minimum efficiency levels for chillers with negative leaving water temperature used in industrial process cooling applications. Medium temperature process chillers are defined as units capable of operating at -8°C leaving temperature. Chillers covered by this regulation are not subject to efficiency requirements from regulation 2016/2281.

Medium temperature process chillers	From 07/2018
	SEPR -2/-8°
Air cooled < 300 kW	2,58
Air cooled > 300 kW	3,22
Water cooled < 300 kW	3,29
Water cooled > 300 kW	4,37

Note: for medium temperature process chillers intended to be charged with a refrigerant fluid with a GWP<150, SEPR values can be lowered by a maximum of 10%.



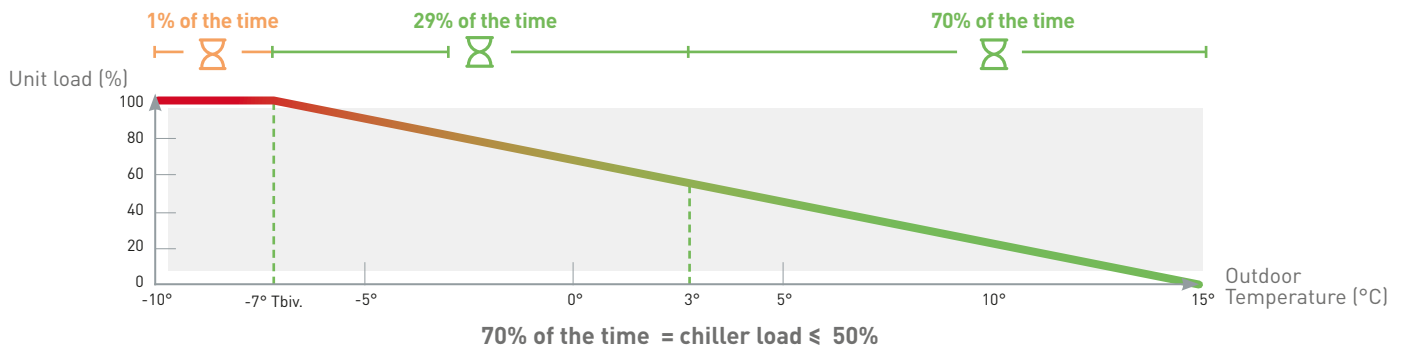
SPACE HEATING

Ecodesign regulation 813/2013 sets minimum energy efficiency levels for air- and water-to-water heat pumps rated up to 400 kW. It relates to units used for space heating only and to combination heaters that also supply hot water, and covers two sub-categories based on leaving water temperature: medium temperature and low temperature.

SCOP – Seasonal Coefficient of Performance

SCOP measures the seasonal energy efficiency of heat pumps by calculating the ratio between annual heating demand and annual energy input. It takes into account the energy efficiency achieved at each outdoor temperature of an average climate weighted by the number of hours observed for each of these temperatures.

SCOP is a new way of measuring the true energy efficiency of heat pumps over an entire year. This new indicator gives a more realistic indication of the real energy efficiency and environmental impact of the heating system.



Efficiency requirements

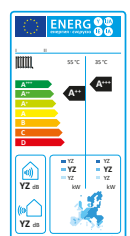
Regulation 813/2013 sets seasonal energy efficiency in Etas heat (η_s heat). This expresses SCOP in terms of primary energy and so makes it possible to compare the energy efficiency of units using different energy sources.

There is no cooling efficiency requirement for heat pumps concerned by regulation 813/2011.

Heat pumps (space & hot water heating 47/55°)	From 09/2017	
	η_s heat %	SCOP 47/55°
Air to water < 400 kW	110	2,83
Water to water < 400 kW	110	2,95
Low temperature heat pumps (space heating 30/35°)	From 09/2017	
	η_s heat %	SCOP 30/35°
Air to water < 400 kW	125	3,20
Water to water < 400 kW	125	3,33

Energy Labelling

In addition, European Energy Labelling regulation 811/2013 classifies heat pumps up to 70 kW from D to A+++, according to their energy efficiency. This enhanced consumer information drives the market towards more energy-efficient products.



CIAT SOLUTIONS : ONE STEP AHEAD OF REGULATION

CIAT's chillers and heat pumps range are already compliant with the Ecodesign regulations.

AQUACIAT^{POWER}



DYNACIAT



HYDROCIAT



FORWARD-LOOKING INNOVATIONS

CIAT's internal R&D capabilities and our consistent involvement in the European ERP (Energy Related Products) programs such as Ground-Med have been taking our products to new levels of combined thermal and acoustic performance, including ground breaking innovations such as:

- free defrost
(natural ventilation optimised defrost)
- overall operating optimisation
(heating mode machine and auxiliaries consumption optimisation)
EN14825, EN14511 standards
- thermodynamic sanitary hot water production for individual and collective applications, EN16147 standard



CIAT AT YOUR SERVICE

At CIAT, our objective is to develop partnerships with you and provide high quality service throughout the lifecycle of your HVAC system. We understand your changing needs, and develop smart services and energy solutions that optimise energy performance and enable savings.

We provide the support you need to get the most out of your solution:

- Preventive and corrective service maintenance.
- On-site inspection by experts close at hand.
- Online parts shop.
- Dedicated hotline for off-site technical support.

We also offer you a comprehensive range of smart services:

- Consulting on energy performance upgrade.
- Advanced monitoring and plant system management solutions.
- Equipment and system modernization.

PRESENT
IN
OVER **50**
countries

OVER
80
years
OF EXPERIENCE



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