

**ASERCOM-EPEE-EUROVENT Joint Industry Expert Group Position Paper on
the outcome of the ENTR Lot 1
Stakeholder Consultation Forum at 19 January 2012**

Brussels, 10 February 2012

Dear Ms. Baillargeon, Dear Members of the Consultation Forum,

The Joint Industry Expert Group (JIEG) of ASERCOM, EPEE and EUROVENT on ENTR Lot 1 would like to thank the European Commission for the work achieved so far on ENTR Lot 1 - Refrigerating and Freezing equipment.

Following the Consultation Forum Meeting on 19 January 2012, the JIEG herewith presents an additional position paper referring in particular to remote condensing units and industrial process chillers.

We hope that this paper will help you in a positive and constructive way and will contribute to the working documents.

Should you have any questions, we remain at your disposal.

Kind regards,



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Chairman
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1. Executive Summary

This position paper of the JIEG covers only the product categories

- (remote) condensing units
- industrial process chillers

of the energy related products (ErP) for professional refrigeration applications in Lot 1 of the EU Ecodesign Directive 2009/125/EC.

The JIEG suggests considering in ENTR Lot 1 not only remote condensing units, but also packaged condensing units which would mean in general “condensing units”.

The JIEG sees a mandatory energy labelling neither for Condensing Units (CUs) nor Industrial Process Chillers (IPCs) as inappropriate as these products are part of complete refrigeration systems and B2B products judged on their energy efficiency by technically highly qualified staff of its customers versus rather uninformed end users of B2C products for which mandatory energy labelling seems reasonable.

The JIEG also considers bonus schemes for energy related products (ErP) using low GWP refrigerants as inopportune, as the best achievable energy efficiency of these ErP is the main target of the EU Ecodesign Directive whilst the direct greenhouse gas emissions impact of refrigerants are covered by the EU F-Gas Regulation EC/842/2006.

MEPS for CUs are recommended based on COP for lower refrigeration loads ≤ 5 kW (MT)/ ≤ 2 kW (LT), whilst MEPS based on SEPR are recommended for higher refrigeration loads > 5 kW (MT)/ > 2 kW (LT) for tier 1 and tier 2 with constant COP for the segments of the lower capacities and constant SEPR for the segments of the higher capacities. MEPS for IPCs are recommended based on SEPR for MT applications and for LT applications. No MEPS have been proposed so far for the IPCs used in HT applications, but the JIEG will support DG ENTR in defining some. The JIEG supports in general the approach to define MEPS for IPCs based on SEPR and not based on COP.

The recommended MEPS introduced in 2014 for tier 1 and in 2017 for tier 2 are rather challenging for the HVAC-R industry, however the JIEG commits itself to make sure that the HVAC-R industry will comply with these proposed challenging MEPS by 2014/ 2017.

The JIEG will be more than happy to explain this position paper in more details to all concerned stakeholders of the ongoing ENTR Lot 1 implementation regulation process for CUs and IPCs.

2. General remarks

The Joint Industry Expert Group (JIEG) of ASERCOM, EPEE and EUROVENT welcomes the stakeholder consultation process organised by DG ENTR on the implementation regulations for the energy related products (ErP) for professional refrigeration applications in Lot 1 of the EU Ecodesign Directive 2009/125/EC. The JIEG supports explicitly implementation regulations for the five product categories

- professional refrigerated cabinets
- blast cabinets
- walk-in cold rooms
- remote condensing units*

- industrial process chillers

in ENTR Lot 1 as proposed by DG ENTR at the Stakeholder Consultation Forum in January 2012.

The term “remote condensing units” does not exist in the industry nor in EN or other standards. Therefore, the JIEG proposes to use the official term “condensing units (CU)” as defined in EN 378-1.

The JIEG agrees on the overall timeline for the definition of the implementation regulations as proposed by DG ENTR.

2.1 Energy Labelling

The JIEG would like to reconfirm its position that neither Condensing Units (CUs) nor Industrial Process Chillers (IPCs) shall be subjects of a mandatory energy labelling as these products are part of complete refrigeration systems and B2B products. The energy efficiency of complete refrigeration systems can not be judged by the energy efficiency of its individual components, but only on the level of the entire system. Therefore, the JIEG sees a big danger that a mandatory energy labelling for an “incomplete machinery” (like CU’s and IPCs as a part of such entire systems) will be misunderstood by the end users as to be valid for the entire system.

In addition, the customers of B2B products assign technically highly qualified staff to the selection and evaluation processes of these products whose qualification level differs substantially from rather uninformed end users of B2C products for which the EU Energy Labelling Directive 2010/30/EC was implemented and is reasonable. The JIEG supports however the provision of additional information on the energy efficiency of the considered CUs and IPCs.

2.2 Bonus schemes for the use of low GWP refrigerants

The JIEG also would like to confirm its position that it does not support any bonus schemes applied for energy related products (ErP) with sub-optimal energy efficiencies when using low GWP refrigerants, as the JIEG sees best achievable energy efficiency of these ErP as the main target of the EU Ecodesign Directive whilst the direct greenhouse gas emissions impact of these refrigerants is already covered by the current EU F-Gas Regulation EC/842/2006. The targets of energy efficiency improvements and reductions of the direct greenhouse emissions impact shall not be mixed in the implementation regulations of the Ecodesign Directives.

2.3 Consideration of CO₂ “Condensing” Units*

At the recent Stakeholder Consultation Forum meeting a proposal was made by several policy officers to include “Condensing” Units* using CO₂ as refrigerant in this project (in the following called CO₂ Units).

CO₂ technology has proven to be a viable and efficient solution particularly for supermarket applications (SMA) in the colder climate zones of Central and Northern Europe. However, their system design and controls are severely different from the typical CUs used in their very fragmented applications and different climatic conditions across entire Europe.

A transfer of CO₂ technology to typical CU conditions would even be counter-productive in terms of energy efficiency, since its COP during long term operation in trans-critical operating mode will be significantly lower than that of CUs operated in typical sub-critical operating mode with traditional refrigerants. Furthermore, it is worth to mention that CO₂ technology is far more demanding in terms of system design, operation and servicing and requires highly educated planners, contractors and service personnel. In this conjunction, it needs also to be considered that a high proportion of CUs are sold directly to contractors for which the required skill level is not yet available.

All in all, this is the reason why “CO₂ Units” can not be seen as a general solution for all ambient conditions across Europe in the foreseeable future. So far only some field trial systems are in operation in the colder ambient climates which are tailored to purposes with regular observation and maintenance.

Therefore, the JIEG does not see at this stage a practical solution to include CO₂ Units in this project.

3. Condensing Units (CUs)

3.1 Performance segmentation

The JIEG confirms that the segmentation as proposed in the DG ENTR Lot1 working document is appropriately described, taking into consideration the fact that CUs are applied in a very broad type of applications in a very fragmented market. The JIEG confirms that the considered refrigeration loads in this working document for MT applications and for LT applications qualify these products for professional refrigeration applications in the hotel/ restaurant/ catering (HoReCa) industry as well as for commercial refrigeration applications in the food retail industry.

3.2 MEPS metrics

The JIEG recommends referring to the temperatures as defined in EN 13215. In that sense, the evaporating temperature rather than the storage temperature is considered on the heat extraction (cooling) side of CUs.

The JIEG has proposed for CUs stepwise MEPS for MT and LT applications based on COP for the 2 segments of refrigeration loads ≤ 5 kW (MT)/ ≤ 2 kW (LT) and based on SEPR for the 2 segments of refrigeration loads > 5 kW (MT)/ > 2 kW (LT) for tier 1 and tier 2. MEPS based on COP for lower refrigeration loads are suitable for CUs used indoor in 24/ 7 operations all year round connected to display cabinets, service cabinets and blast cabinets. MEPS based on SEPR for higher refrigeration loads are suitable for CUs used outdoor in operations with fluctuating seasonal ambient and load conditions.

By introducing the seasonal energy performance ratio SEPR for larger capacity CUs, the refrigeration industry will be pushed to use compressors with modulation techniques or to optimise CUs otherwise in order to obtain improved operation behaviour. For example compressors with capacity modulation can adapt to the cooling demand that is actually needed, instead of going into on-off cycling when using fixed capacity compressors. The on-off cycling consumes more energy and so the compressor modulation techniques or the CU optimisation will as such result in a large reduction of the energy consumption.

The introduction of MEPS based on SEPR already imposes heavy challenges on the HVAC-R industry. Most CUs placed on the market today are not yet optimised for a seasonal operating mode. Therefore, the MEPS proposed by the JIEG for tier 1 and tier 2 will already put a heavily strain on the HVAC-R industry.

Increasing the MEPS for tier 2 even further as proposed by some EU member states and NGO's will have substantial economic consequences for these products and are not recommended by the JIEG for an implementing measure in 2017. The JIEG favours a quick adoption of the implementation regulations for tier 1 in 2014 and tier 2 in 2017 on the base of the MEPS proposed in the JIEG working document over a much more ambitious legislation with a delaying effect on the energy efficiency improvements of the CUs.

The stepwise MEPS for CUs in MT and LT applications based on COP or on SEPR over growing refrigeration capacities as proposed by the JIEG are more appropriate than a linear or non-linear function of COP or SEPR over the refrigeration capacities as the proposed MEPS based on COP for lower capacities and the MEPS based on SEPR for higher capacities each differ only insignificantly. Moreover, the transition from the COP related MEPS to the SEPR related MEPS will result in stepwise MEPS anyhow.

A continuous function to define MEPS over the refrigeration capacity (vs. a stepwise definition) shall also be discouraged for the following reasons:

- It is considered impractical to define an adequate numerical function to represent a reasonable definition of MEPS over the refrigeration capacity.
- A step-wise definition makes it possible to assess the impact of this MEPS upon energy savings as it allows to calculate the units removed from the market in each load segment; a continuous function does not allow this calculation (at least in a practical manner which does not heavily rely on numerical approximations).
- The perceived unfairness at the limits of the load segments defined does not exist in reality because the offered products on the market comply with requested capacities. This capacities offered are not highly continuous across those segment limits, but only within discrete capacity intervals, so that the deliberate positioning of CUs at those segment limits to fall into a lower MEPS categories is extremely unlikely.
- A linear function for MEPS over refrigeration capacity is totally inadequate as it does by far not represent the actual product performance placed on the market.

Due to the simplification of the calculation method, the crankcase heater of CUs is not considered in the SEPR calculations. With regard to the relatively continuous operation of CUs with capacity modulation, the power consumption of a heater is irrelevant and in case of fixed capacity units the degradation factor (for SEPR calculation) also includes the potential impact of crankcase heaters. Therefore, the JIEG recommends adding only an information requirement on the capacity of the crankcase heaters.

The constant MEPS based on COP for CUs in MT applications of

- 2,2 for tier 1
- 2,5 for tier 2

and the constant MEPS based on COP for CUs in LT applications of

- 1,2 for tier 1
- 1,3 for tier 2

as proposed by the consultants BIO IS in its ENTR Lot 1 Preparatory Study are neither technically nor economically feasible and do also not consider the fact that smaller components (compressors, fans) provide inherently lower efficiencies. Furthermore the consideration of constant COP for the MEPS across all refrigeration loads neglects the fluctuating seasonal ambient conditions for the CUs with higher refrigeration capacities operated outdoor.

3.3 Product performance data and verification tests for Market Surveillance

For the evaluation of the product performance of CUs based on COP, verification tests shall be carried out according to EN 13771-2 with performance rating related to EN 13215. Tests for the evaluation of the product performance of CUs based on SEPR shall be carried out according to the Annex 1 of the JIEG Working Document. However, these tests shall only be conducted for some reference products to define reference values for the entire scope of refrigeration capacities and ambient conditions while the full set of product performance evaluations shall be conducted on the base of mathematical modeling from the reference product performances received from the tests of the reference products. The JIEG recommends applying for these performance calculations as an adapted method following the implementing measures for Ecodesign ENER Lot 10, Annex II, Paragraph 3.

4. Industrial Process Chillers (IPC)

The JIEG has proposed stepwise MEPS for IPCs based on SEPR for the 2 segments of refrigeration loads ≤ 300 kW and > 300 kW in MT applications and for the 2 segments of refrigeration loads ≤ 200 kW and > 200 kW in LT applications. No MEPS have been proposed so far for the IPCs used in HT applications; however, the JIEG is prepared to support DG ENTR in also defining MEPS for those IPCs used in HT applications.

These MEPS for HT IPCs need to be well aligned with the expected MEPS proposals of the ENTR Lot 6 JIEG for HT chillers in comfort cooling AC applications as the same products can be used for both applications. The JIEG supports in general the approach to define MEPS for IPCs based on SEPR and not based on COP.

DG ENTR has confirmed that IPC for HT applications shall be kept in ENTR Lot 1, while the AC chillers for HT applications will be kept in ENTR Lot 6. The JIEG appreciates this classification of DG ENTR, however it needs to be understood that the testing procedures and the calculation methods for the evaluation of the product performances of IPCs and AC chillers must be comparable although the load profiles for each of these chiller types in HT applications are totally different. This comparison of load profiles will show even bigger differences if the AC chillers are operated as heat pumps.

The JIEG likes to emphasize that IPCs are run for process refrigeration (MT/ LT) and process cooling (HT) applications in 24/ 7 operations all year round under fluctuating seasonal ambient conditions, whereas AC chillers are run for comfort cooling (HT) applications in the warmer period of the year only under variable ambient conditions.

The major share of chillers in general is used in HT applications (~75% of the total volume), while the minor share is used in MT and LT applications. Within the segment of HT applications, the major share (~80% of the total HT chiller volume) is used for comfort cooling AC applications while the minor share is used for process cooling applications. The JIEG will support DG ENTR

and its consultant in providing more market data to proof these different shares of the respective segments in more details.

The lack of product data for the performance evaluation of IPCs is mainly due to the tailor-made design of these products for which the product specifications are normally available in the manufacturers' product databases, but for which the product performance data has not been published in catalogues or electronic product literature.

The JIEG has evaluated the product performances for the base case by sound thermodynamic calculations and solid market assumptions for the different technologies used across the scope of refrigeration capacities. Tests for the evaluation of the product performances of IPCs based on SEPR shall be carried out according to EN 14511 and to the Annex A of the JIEG Working Document.

The JIEG proposes to conduct product performance tests for MT IPCs with $Q_0 \leq 300$ kW and LT IPCs with $Q_0 \leq 200$ kW and to trust in product performance calculations only for MT IPCs with $Q_0 > 300$ kW and LT IPCs with $Q_0 > 200$ kW as a standard procedure, as the IPCs with higher refrigeration capacities than $Q_0 > 300$ kW for MT applications and $Q_0 > 200$ kW for LT applications are produced in single-digit quantities and can not be tested every time before the delivery of these IPCs to its customers.

Therefore the JIEG also sees a problem to test 3 equal IPCs and accept their mean product performance as the reference result of this testing in case that the initial testing of a first IPC has not confirmed its claimed product performance and requires a retesting. As most of these IPCs are produced in very low quantities tailor-made for individual customer orders that will not allow testing of 3 equal IPCs in a row as proposed by DG ENTR. Authorities will only be able to conduct product performance checks for the market surveillance by verifying its technical product documentation.

DG ENTR has presented MEPS based on COP for the air-cooled and water-cooled IPCs in MT applications for the segments of refrigeration loads $Q_0 \leq 300$ kW and $Q_0 > 300$ kW and for the air-cooled and water-cooled IPCs in LT applications for the segments of refrigeration loads $Q_0 \leq 200$ kW and $Q_0 > 200$ kW which were recalculated from the MEPS based on SEPR proposed by the JIEG.

These MEPS based on COP were then assigned to the energy efficiency classes defined for AC chillers in the Eurovent Certification Programme and showed very poor energy efficiency levels for tier 1 (classes D to G) and for tier 2 (classes B to D). In addition, these MEPS based on COP were compared to MEPS published in the UK ECA scheme and energy efficiency schemes in Australia, California, Canada and New Zealand.

The comparison of energy efficiency levels of IPCs in MT and LT applications with energy efficiency levels of AC chillers in HT applications defined in the respective Eurovent Certification Programme is therefore completely misleading as the reference energy efficiency indices (100 %) of IPCs and AC chillers are not the same. Moreover, the exact references for the UK ECA scheme and the energy efficiency schemes in Australia, California, Canada and new Zealand need to be evaluated in detail before any comparison of its MEPS with the MEPS proposed by the JIEG is carried out. Finally, the recalculation method to receive MEPS based on COP from MEPS based on SEPR needs to be validated to avoid any confusion with the SEPR seasonal energy performance ratio of AC chillers.

As a consequence, the JIEG is kindly asking DG ENTR to share

- the reference energy efficiency indices (100 %) for the classification according to the Eurovent Certification Programme for AC chillers
- the exact references used in the MEPS calculation of the energy efficiency schemes of Australia, California, Canada and New Zealand
- the calculation method to deduct MEPS based on COP from MEPS based on SEPR

with the experts of the JIEG.

5. Next meeting with DG ENTREPRISE

To explain the position of the JIEG laid out in this position paper, the JIEG of ASERCOM, EPEE and EUROVENT will be more than happy to explain its position in detail in further meetings to all concerned ENTR Lot 1 stakeholders, in particular, to the assigned consultant of DG ENTR charged with the Impact Assessment Study of this lot.

The JIEG is also prepared to provide further market data and background information to this position paper for CUs and IPCs as far as this is available to support the consultant of DG ENTR in preparing the ENTR Lot 1 Impact Assessment Study.

In addition, this position paper will be published on circa.

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ⁱ * The term "Condensing Unit" cannot be used for CO₂ Units as the heat exchanger for heat rejection on the discharge side either works as a gas cooler at trans-critical conditions (above approx. 18-20°C ambient temperature) or as a condenser at sub-critical mode (below approx. 18°C-20°C). ⁱ