

Minutes of the second Stakeholder Meeting for EuP Preparatory Study Lot 1: Refrigerating and Freezing equipment

Place: European Commission, Beylarmont Building, 36 Rue Froissart, 1049 Brussels – (Belgium)

Date / Time: 04th of June 2010, 10:00-17:00

Document: Meeting Minutes

Contact BIO IS: Shailendra Mudgal, Jonathan Bain
Tel.: +33 (0)1 53 90 11 80
Email: jonathan.bain@biois.com, shailendra.mudgal@biois.com

Consortium:

Name:

European Commission

Laure Baillargeon (LB)

Project Team

Pierre Sonigo (PS)

Shailendra Mudgal

Benoît Tinetti (BT)

Jonathan Bain (JB)

Ian Kuwahara (IK)

Alvaro de Prado (AdP)

Raul Cervantes (RC)

Per Henrik Pedersen

Phillipe Riviere

Organisation:

European Commission – DG ENTR

Bio Intelligence Service

Bio Intelligence Service (not present)

Bio Intelligence Service

Bio Intelligence Service

Bio Intelligence Service

Bio Intelligence Service

Bio Intelligence Service

Danish Technological institute

Armines

OBJECTIVES AND AGENDA

09:30 – 10:00	Arrival and registration	
10:00 – 10:20	Welcome, explanation of the meeting structure and “Tour de table”	BIO Intelligence Service (BIO) and all participants
10:20 – 10:30	Short introduction to the Ecodesign Directive	BIO
10:30 – 10:40	Horizontal session: Progress update and selection of Base Cases	BIO
10:40 – 11:30	Product focus: Walk-in cold rooms	All participants
11:30 – 11:50	COFFEE BREAK	
11:50 – 12:40	Product focus: Service cabinets	All participants
12:40 – 13:30	Product focus: Blast cabinets	All participants
13:30 – 14:20	LUNCH BREAK	
14:20 – 15:10	Product focus: Remote condensing units	All participants
15:10 – 15:40	Horizontal session: Refrigeration systems	All participants
15:40 – 16:00	COFFEE BREAK	
16:00 – 16:50	Product focus: Chillers	All participants
16:50 – 17:20	Horizontal session: Refrigerants	All participants
17:20 – 17:30	Conclusions from the day, next actions to be taken and AOB	All participants

The presentations and discussions in this meeting will be based on the documents published on the project website:

www.ecofreezercom.org/documents_1.php

In addition to general discussion, priority topics for each product group are:

Service cabinets:

- Agreement on classification by technical features and according to market reality to determine the technical specifications of the “representative” base case (e.g. components, “average” operating temperature)
- Collection of additional BOMs
- BAT models with technical specifications comparable to the base case
- Agreement on BNAT

Blast chillers:

- Agreement on classification by technical features and according to market reality to determine the technical specifications of the “representative” base case (e.g. components, “average” operating temperature)
- Discussion of standardisation options
- Collection of additional BOMs
- Discussion of technical factors’ effect on energy consumption
- BAT models with technical specifications comparable to the base case
- Agreement on BNAT

Walk-in cold rooms:

- Agreement on classification by technical features and according to market reality to determine the technical specifications of the “representative” base case (e.g. components, “average” operating temperature)
- Discussion of standardisation options
- Discussion of technical factors’ effect on energy consumption
- Collection of additional BOMs
- BAT models with technical specifications comparable to the base case
- Agreement on BNAT

Chillers:

- Collection of additional BOMs
- BAT models with technical specifications comparable to the base case
- Agreement on BNAT

Remote condensing units:

- Agreement on classification by technical features and according to market reality to determine the technical specifications of the “representative” base case (e.g. components, “average” operating temperature)
- BAT models with technical specifications comparable to the base case
- Agreement on BNAT

INTRODUCTION, TOUR DE TABLE AND PROGRESS UPDATE

Jonathan Bain presented the agenda for the day and introduced the project consortium. Benoit Tinetti presented background information on the Eco-Design directive and Bio Intelligence Service. A tour de table was done to introduce all attendees at the meeting.

First Name	Last Name	Organization
Niels	Schreuder	AGC Flat Glass Europe
Philippe	Riviere	Armines
Manfred	Schwarz	Asskuehl
	Dissard	Auchan
David	Harrison	Bayer Material Science
Keith	Warren	Catering Equipment Suppliers Association
Duccio	De Santis	CECED Italia
Per Henrik	Pedersen	Danish Technological institute
David	Gibson	Defra MTP programme
Erika	Menosso	Electrolux
Christoph	Brouwers	EPEE
Veerle	De Smedt	EPEE
Pascal	Faidy	EPEE (Du Pont)
Ingrid	Boinett	Euro Coop
Christel	Davidson	EuroCommerce
Johannes	Hoogkamer	Eurovent
Evelien	Nijs	Federal Public Service (FPS) Health, Food Chain Safety and Environment
Chris	Playford	Foster
Hans	Craen	GDA
Grahame	Keeping	Gr Scott
Anders	Sjøgaard	Gram Commercial A/S
Volker	Siede	HKI
Tim	Vink	Honeywell
Jose Luis	Crespillo Guardeso	Infrico
Juan Manuel	Martínez de Estarrona Moreno	Infrico
Dariusz	Miszczak	S.A. Coca-Cola Services
Alexandra	Maratou	Shecco
Christianna	Papazahariou	Shecco
Andrew	Pearson	Star Refrigeration
Emmanuel	Regnier	Tecumseh Product Company
Adriana	Nosewicz	Unesda

PRESENTATION OF WALK IN COLD ROOMS AND DISCUSSION RESULTS

Presentation by Jonathan Bain [1:50:00 on recording]

Discussion by Jonathan Bain

Grahame Keeping (GK): Regarding testing standards, the ones coming directly from the industry should be considered for the final version of a testing standard¹. Moreover, in the UK, some computerized testing (VCR Model) is being developed – by Defra in association with the London South Bank University-. The size classification is not accurate and the percentage of the plug-in equipment vs. remote equipments as well. Mini and small WICR are too big; mini could actually be 6-8m³, where for small we may use the size of the mini as stated in the presentation (27m³).

Jonathan Bain (JB): What is the difference between walk-in cold rooms and big warehouse stores?

Chris Playford (CP): Mini WICR replaces service cabinets where there are size constraints on installing a service cabinet.

David Gibson (DG): The base case is too small

JB: The base case is based on Bill of Materials provided by the industry; only one partial BOM was received. The solution might be scaling up the base case, but there is a need for more BOM to construct a more representative base case. At what size is a loading machine included in a walk in cold store?

GK: Approximately 100m²

CP: Upper limit not defined. To supply bigger volumes basic panels would be provided and the walk in cold store would be constructed inside.

JB: What are other grey areas between WICR and large logistics stores?

GK: The distribution market makes a difference. Classification may use market and not only function.

CP: The biggest problem is the customization. Foster for instance supply several types of units like mono-blocks that are erected on site.

GK: This is typical in the UK.

¹ Standards coming from the industry refer to those standards developed or adapted for the evaluation of Walk-in cold room. There are no national or international level official standards for evaluation of these equipments.

Erika Menosso (EM): Mono-blocks are not important for Electrolux. WICR are customized products, even the internal space arrangement which is a requirement of the customer. The data on mono-blocks numbers produced by Electrolux will be sent. Regarding the energy consumption, the US methodology is not good for the EU, European standards and methodology are used by Electrolux for testing. The ECA methodology is used after service cabinets. Regarding the volume Electrolux is only able to provide the maximum volume of produced mono-blocks.

JB: Would the standard calculation used by Electrolux for the energy consumption be available?

EM: No, it is still in progress with the manufacturers association, and it is a working process. It cannot be distributed yet.

JB: The flux is quite a big issue. Do you know what difference does the flux make in terms of standards or accuracy of the calculation?

EM: Manufacturers will prefer to have the same approach for all refrigeration equipment, but this is difficult for WICR because the size, internal organization of the room and walls vary widely.

JB: Are there different measurement methods for packaged products and field erected products?

CP: The industry differentiates between walk-in vs. reach-in vs. wander in equipment. The biggest equipment mentioned in the presentation is quite large, corresponding more to stores. Classification should behold if the unit is prefabricated or constructed as part of the building. What might make the difference between these equipments and should be considered is that for a walk-in room potentially the air inside the unit can be exchanged with the air from outside due to the size, not being the case for bigger units. Furthermore, rooms with loading docks fall out of the scope; these have other sources of heat that should be considered making the test more difficult. 400m³ is too big for big walk-in cold rooms.

JB: What are your comments on the proportion of the market?

DG: It is obvious that this is a very complicated issue, when deciding the categories for cold rooms. The size and the way they are used are complicated. Software was mentioned, the American process as a part of that, there is also one being developed by London South Bank University in the UK, free product, to be validated by Defra and GR Scott. It incorporates air flow in the cold room, how products are organized in the cold room. If validated, it would be a valuable tool to proceed with the process of estimating energy consumption, for given categories of the rooms, or what energy saving modifications are cost effective and efficient. For instance, inverse speed control would probably not be cost effective addition to a small cold room, or if thicker insulation depends on where the cold room is used.

JB: Taking international trade walk-in cold rooms might be useful to harmonize approach with US one, this would be worthy to discuss. Comments on the specific facts? Deadline to deliver comments would be 21st/06.

CP: When making service cabinets, after testing, it is packaged and plugged-in, the manufacturer has somehow control of this. This extrapolation is not good for cold rooms, which might be field erected, assembled by someone else. A highly optimized efficient cold room not installed properly, or the opposite: a very poorly designed cold room that is very well installed can perform equally. Comparing models would be like this, and there is a part of the market that does not look at this. The installation process varies enormously and is probably associated with the installation cost, but it is important to consider that the cold room is not an extension of service cabinets. There are more variables that people can influence in the performance that cannot be modelled with software. The other issue is bringing US standards into Europe, where the market is very different. Considering the catering establishments in the US are much bigger, their kitchens installations tend to be large projects. It is not possible to pick up legislation from the US and implement it in Europe, without considering what it was based upon.

EM: Maybe two approaches for the regulation can be considered, one that considers mono-bloc² equipment as service cabinets in order to use existing methodology for service cabinets and another for assembled cold rooms that would be treated in another way. This is in order to have one energy consumption test for the mono-block and another for assembled cold rooms

JB: It is indeed important to have a methodology in place for all classifications including non-packaged non-mono-block; otherwise there is the risk that the market changes taking into account this fact. Both need to be considered.

Pascal Faidy (PF): The R134a is not suitable for low temperature operation. Hence, it is recommended to split medium and low temperature. It is also recommended to construct the base case with R404a.

LB: If the industry is interested in a forum to discuss the right approach for a testing standard in Europe for walk-in and reach-in cold rooms, elements mentioned during the meeting can be helpful for this. It would be better to agree on the approach for standardization before mandatory elements are set. Some informal beforehand discussion would be useful.

Keith Warren (KW): The forum can be provided through EFCEM (European Federation of Catering Equipment Manufacturers), which comprises 9 national organizations around Europe. Some of them are represented here today. Forecasting Ecodesign regulations, two years ago EFCEM started a programme on developing standards and methodologies for the evaluation of the energy performance of a number of products

² Mono-block: units simple to install, but with limited applications and features. Using hermetic or scroll compressors. They consist of a complete evaporator unit, cased with expansion valve, defrost and other options fitted. They are coupled with a complete cased condensing unit (BSRIA. Report: French Market for Refrigeration, 2009)

used in commercial kitchens, refrigeration included. It does not have a mandate, it is only the way the industry is pulling together the best practice and the optimum approach, and some other problems discussed during the meeting. Therefore ECCEM would be pleased to develop and cooperate, since it is in the final stages of developing a refrigeration methodology.

Andy Pearson (AP): Equipment for pharmaceutical storage is similar but has a very different tightness on temperature control and stability specs. They use a double freezing system. They involve specific manufacturers. Are these equipments going to be excluded or added with the other categories?

JB: The size of the market for that specific subgroup would be interesting.

AP: It is sure the market size is small, but might get caught in a regulation that is very inappropriate for them.

JB: In terms of MEPS might be possible to have different MEPS but that would need to be discussed in the same context as the testing methodology. Do you know specific manufacturers for that type of equipments for that product group?

GK: Pharmaceuticals have a much stricter build specification; though it is a very small market it is important and requires special attention.

Siede Volker (SV): CWA³ is not a standard in a formal document and deals with cleanability, construction, not food safety standard. This may not impact energy consumption.

JB: The details of that specific standard are not available at the moment. Are you aware of other relevant standards that were not included?

SV: The EN67-2 deals nearly with the same topic. It is a standard to look at.

JB: Other questions? It is a good opportunity to comment on the figures for the base case, as a representation of the average on the market stock.

CP: Maybe it is not possible to put together a base case for a cold room. We are trying to deal with cold rooms for different industries and with different temperatures, different refrigerants and variable installation. Even if one base is concreted it will have no meaning to anybody. It does not say anything to the manufacturers, and the question is whom is it for?

JB: It is an input requirement for the assessment as part of this methodology. The objective is a close representation as possible, even if for cold rooms it is not really representative, it is a requirement for impact assessment. At the moment the energy requirement seems significant for the proportion for the use phase, and it is important

³ CEN Workshop Agreement 15596:2006. Code of practice on cleanability of commercial food equipment used in the retail and catering sectors

to know if that is correct and how much impact efficiencies could have. Efficiency also relies on others elements such as construction. We need to take consideration of what we have.

CP: Repeating myself, I do not think it is possible to narrow all equipments into single equipment.

EM: This kind of product should be split in two: mono-block and assembled. They are so wide that a single best case could be a disaster for biggest or smallest appliances.

JB: Sub-base-case is a possibility.

EM: The market gives the answer in terms of size. In terms of energy efficiency for this kind of appliances, the big ones are the real problem for manufacturers. Little appliances are sold in big numbers, and they have lower energy consumption and high efficiency, whereas bigger appliances are sold in lower number having high energy consumption with low efficiency since there is no control of the production process. Therefore there is kind of a compensation that the market size is not considering.

JB: That is why obtaining a good classification and market figures are important. So the understanding of these variables is done.

Pierre Sonigo (PS): It seems clear that there is an infinite variation of models for cold rooms. Even if we may define sub-classes, we must be cautious because an infinity of sub-classes will be impossible to manage. It may be preferable to find the right measure, allowing comparisons, than to expand classification.

DG: Defra MTP figures are statistical as well. The most important thing is to organize a forum to categorize in terms of size and usage which would be the basis for standards and legislation, leaving the base case issue behind.

KW: Equipment is classified according to functionality, for instance in restaurants or hotels, and even the type of restaurant, where the volume of the food to store will vary. The key issue is to store food at the levels required by the national standard regulations. Therefore, the specifications for cold rooms become infinite. A cold room is a particular product in its own right to satisfy that particular need, in that respect to achieve the requirements. Using Prodcom values is not good enough, as it provides very little information in specific categories of refrigeration products. Although it is very difficult to get information from industry, as industry does not have it on European or national basis, since there is no requirement to collect it. The analysis of where the specifications can and cannot be applied easily is really important for practical reasons.

PRESENTATION OF SERVICE CABINETS AND DISCUSSION RESULTS

Presented by Jonathan Bain at 12:02pm [3:03:00 on recording]

Discussion by Jonathan Bain at 12:11pm

Chris Playford (CP): Fridge / freezer service cabinets do not have a market presence, less than 1% market. Other stakeholders agreed (Erika Menosso, Andy Pearson, Juan Martínez).

CP: Chest freezers are not a commercial appliance, even though domestic products are used there. There was general agreement among stakeholders. Erika Menosso agreed, and would ask colleagues for data if available.

Keith Warren (KW): Units with drawers have not been included and should be mentioned in the study categorization.

KW: Open service counters such as pizza preparation tables with refrigeration units may be considered for exclusion due to the low volume of sales and the way they store food as they have open food on countertops.

JB: How are units with drawers different than cabinet styles, in terms of testing and performance?

CP: Units with drawers create too many combinations for product types. They were prevented to be included in ECA scheme because the testing of combinations would take so long it would prevent progress. Market numbers can be provided depicting the market sales for each arrangement of drawers. Drawers are only on undercounter products (general agreement among stakeholders).

Erika Menosso (EM): Testing is difficult for models with drawers because we have no solution to open and close drawers automatically. Drawers derive from models with doors. Thus, only equivalent models with doors are tested and used as a proxy for drawers.

Per Henrik Pedersen (PHP): In Danish scheme units with drawers are not tested.

EM: Energy star is the same, it doesn't test drawers, and it's a practical problem.

JB: What proportion of products incorporate drawers and are not tested?

EM: No data.

Laure Baillargeon (LB): Service cabinets with glass doors will be covered under display cabinets in Lot 12.

CP: Glass doors are not increasing according to our market research.

JB: The base cases are list prices.

EM: Refrigerant used is not most popular. R134a is by far most important and BOM should be related to this type. Electrolux professional would provide this data if a NDA was signed.

Anders Sjøgaard (AS): Agreed. This BOM was sent from Danish hit list and is closer to BAT and not base case.

CP: Remote cabinets are less than 2% and are not part of industry in a big way and should not be included. EM agrees.

JB: Would it be possible to use default values for testing a remote unit's condenser?

EM: It can be done with a calculation but not with a real test, only a calculation.

CP: We wouldn't do it; testing it would be too expensive and the products wouldn't be tested.

JB: Loopholes cannot exist in legislation, so is there a solution that could be imagined to prevent this.

CP: Remote units are typically used in situations when their energy savings is at least equal to or better than a plug in unit so the plug in unit's performance could be taken as a proxy, or used with an adjustment factor.

KW: The preparatory study on pumps⁴ had developed a system approach which is applicable for refrigeration systems.

JB: US have MEPS for service cabinets for remote and plug in so there is a solution that can be found and should be considered.

AS: Net volume is too high, 450L is typical. The way net volume is measured needs to be defined.

EM: ECA index online has energy consumption for many vertical service cabinets, we can take this data freely.

CP: ECA website data is upper tier, say top 20%, so not good for base case.

PHP: Same as in Denmark. A good indicator of base case would be Danish scheme threshold values because 50% of market is above and 50% below in Denmark.

CP: No data available on product manufactured outside of EU.

⁴ <http://www.ecomotors.org>. A new methodology for setting the efficiency levels for different types of pumps has been devised, based on a 3-D plane. Although the derivation of this is technically complex, it is easy for manufacturers to use. This is thought to be the first time that a way has been found to compare pumps on a scientifically rigorous basis, and has been fully accepted by the manufacturers during the stakeholder process.

EM: Manufacturers make products that are both on the ECA scheme and not.

Duccio de Santis (DdS): Consumption based on net volume seems to be consistent and could be useful after CECED test results are available.

EM: Why does the BAT have a different volume (350l) than the BC (550l)?

JB: Limited information has been received.

CP: Energy savings potential in improvement options are too ambitious, and the features do not match test results. We must be careful when publishing this information. They will share test results with us on improvement options.

CP: What is a bubble valve?

JB: It is from information of manufacturers and 3rd party suppliers.

AS: BAT as a smaller product would be difficult to be better than a larger product. Products must be tested under the same.

CP: ECA scheme proved that a 350L cabinet is more efficient EEI wise than a 600L cabinet. It is not possible to compare small cabinets with large one in a single index.

EM: Agreed.

CP: EN 23953 is a good foundation and there are CECED, UK schemes but needs to be built into an EN standard.

DdS: Agreed, CECED has moved in this direction.

KW: EFCEM believes in the need of common methodology which Member States can be encouraged to use for setting up their own schemes. CECED's methodology is going in that direction. EFCEM will take this and offer it at a European level standard as a basis for a standard.

PHP: Danish and UK standard⁵ good for fridge cabinets door openings (10-250), freezer openings are different (2-25 openings).

JB: MEPS and incentive schemes are different. MEPS are different. MEPS are at EU level to cut out worst products, incentive schemes are at MS level to promote best products.

⁵ EN 441: Refrigeration display cabinets.

PRESENTATION OF BLAST CABINETS AND DISCUSSION RESULTS

Raul Cervantes (RC) presentation at 2:00pm [5:06:00 on recording]

Discussion conducted by Jonathan Bain (JB)

Andy Pearson (AP): The functional unit that has been used is not useful since kg of foodstuff is not meaningful, what is considered to be important for this case is the geometry and the size of the equipment.

Chris Playford (CP): The geometry of the equipment is very important for its evaluation, walk-in cold rooms or blast equipments behaviour is very different from the cabinet equipments.

CP: The market for Blast Freezers only is very limited, therefore the functional unit base on freezing equipments is not relevant. Additionally, the size of the base case is relevant only for the continental market, but for the UK market size of equipments are much bigger (35kg).

Erika Menosso: There is an important issue regarding the lack of testing methodology and the way of measuring the energy consumption.

CP: A testing standard 'Lecap' is used in France and that can base further methodologies, just by adding energy measures.

Manfred Schwarz (MS): Agreed regarding the typical use of blast cabinets, and added that the energy consumption is not the main concern of these equipments, but the food safety. Therefore AFNOR considering time and temperature must be taken in account to develop testing standards.

Keith Warren (KW): Each Member State country has different parameters of food storage temperatures therefore any efficacy regulation should recognise this in its performance criteria..

KW: A mistake during the presentation, where CWA 15596 was included as food safety standard being a hygienic and cleaning standard.

JB: What is the market proportion for freezers and chillers?

CP: The perception is that exclusively freezing equipment is not useful in the purchaser point of view. They normally prefer to buy freezing/chilling equipments in that case.

CP: Display blast market data is not available.

MS: The largest cabinets are around 50kW, and in combined models⁶ the range increases up to 350/400kW.

⁶ Combined: chilling and freezing appliances

MS: One important issue in testing Blast Cabinets is the contents.

Anders Sjogaard (AS): L packages can be useful for testing, while MS, EM and CP agreed that mashed potatoes can be used during the testing.

EM: There is a need of developing a new material for testing.

MS: The possible process should include the rise of the temperature of the testing material up to +63C and its cool down to +10C.

EM: The testing materials fail during these processes often however due to the wide temperature variations.

JB: What is the threshold between walk through and reach-in⁷ blast cabinets?

MS: The smallest equipments can be from 3kg to 15kg of foodstuff, but trolley equipments can vary from 1 to 6 trolleys having 18 racks each one. He mentioned the equipment gastronome 1.1 with 30kg of capacity, which increases for 2.1.

CP: The upper limit for testing should be 2 trolleys of 30kg each.

JB: Is there market distinctions for the size?

CP: Reach-in plug-in equipments are between 70% and 80%.

EM: Agreed with figure and added that reach-in cabinets for Electrolux can keep up to 100kg.

JB: What is the possible scope for developing standards? EM considered that NF standard is applicable to blast equipments, and that 'Lecap' scope is limited to 50kg.

CP and AS: Agreed, the market sale figure presented should be divided by a factor of 10.

CP: Some of the technologies presented as Best Improvement Options are not applicable to the product group, for instance: insulation thickness, heat load, defrost control, light bulbs, zeolite filters.

PRESENTATION OF RCUs AND DISCUSSION RESULTS

Ian Kuwahara (IK) presentation – 2.50pm [6:04:00 on recording]

Jonathan Bain (JB) discussion – 3.00pm

⁷ Reach-in: non walk-in or pass-through (trolleys) equipments

David Gibson (DG): COP of base case and BAT are terrible. Air on temperatures should not be 32C, but should be reflective of actual performance in real life. This means something closer to 11C for UK and northern climates and 15C for Spain or southern climates. Realistic temperature range should be used for all of Europe.

Grahame Keeping (GK): Scroll compressors go from 7 – 45kW in commercial sector and are dominant technology. Digital scroll compressor would be BAT.

GK: Problem with condensing units are bought and installed without any regard for orientation, pipe runs, pipe sizes, with no regard for gas velocities and oil recovery. A really well designed system which is not installed properly could be in a sense a poorly designed system. Systems must be installed properly and the designer should incorporate this into the design.

Emmanuel Regnier (ER): Scroll compressors are a small market for larger sized compressors. The larger and more important market is reciprocating compressors which is for smaller compressors which are much more common. The base case is thus not representative at this size and as a scroll type compressor. The price is also too high for this type of equipment.

GK: Would it be possible to use EU wide averages for member states to estimate the average operating 'air-on' temperatures of this equipment.

DG: Yes it should be fairly straightforward to do this or perhaps to split into two climate zones (for example) northern and southern. Many units are also mounted inside and would be subjected to 'air-on' temperature of 20 – 22C. Kitchens can often be 30C.

DG: Tests can offer a solution to costs incurred in testing. Computer modeling can greatly simplify methods of rating a refrigeration system and can be very repeatable and accurate.

Christoph Brouwers (CB): Evaporator temperature ('air-off') is also just as important as condenser temperature ('air-on'). These products are often used at different temperatures but the installation and operating conditions are critical for determining whether the equipment is operating as efficiently as it could.

Andy Pearson (AP): 420kW is too big, for 1:1 systems it is complicated to make a delimited value, but around 20-30kW is normal.

(CB): Rooftop units can go up to 40kW. 420kW is too big, upper size limit for RCU in refrigeration is 30-40kW.

JB: Are there any other characteristics besides power that would help delimit the scope of the RCU market?

AP and GK: In general also maximum of two compressors. A compressor rack is traditionally thought to have more (6 – 8) and is a different piece of equipment from a RCU (roof top packaged type). But there are companies which can label products up to 1000kW even.

JB: Are there any thoughts on water cooled unit?

GK: Not many in UK. Could be more useful on larger sizes above 40 or 50kW.

PRESENTATION OF REFRIGERATION SYSTEMS AND DISCUSSION RESULTS

Ian Kuwahara (IK): Presentation 3.25pm [6:38:00 on recording]

Jonathan Bain (JB): Discussion 3.40pm

Andy Pearson (AP): 10% leakage is low for an overall estimate. Between 12% and 15% is more reasonable. European bank of R22: 115000tonnes. Total sales over total bank and figure was 15%

Per Henrik Pedersen (PHP): 17% leakage before F gas directive taxes, and now the official number which is a guess is 10%.

Pascal Faidy (PF): Age of supermarket is also very important. Not only fugitive emission through leaks, there are also large release events where something breaks and significant charges are lost. Above 15% and improvement has been seen, so 12% - 15%. Northern Europe is also much better than southern Europe. All the countries shown on the presentation were from northern Europe.

PHP: 1000 supermarkets are cooled by CO2 and its growing in Scandinavia.

JB: Thank you. Our main concern is the number of supermarket systems in Europe and the energy savings possible.

David Gibson (DG): Use estimates from Lot 12 to determine how many refrigeration systems in Europe

AP: Percent loss is a dangerous way to express leaks from systems with increasingly smaller charges. As total refrigerant charge goes down, the apparent leakage by percentage will go up for the same leak rates. Smaller charges are in general desirable. 220g of refrigerant (134a) charge is required for a 600L service cabinet.

AP: Liquid Pressure Amplification (LPA) benefit is overstated, and in general it is only effective for bad systems, this should be corrected

PRESENTATION OF REFRIGERANTS AND DISCUSSION RESULTS

16h14: Refrigerants presentation Alvaro de Prado (AdP) [7:15:00 on recording]

16h40: Refrigerants discussion by Jonathan Bain

Erika Menosso (EM): Refrigerant charge in service cabinet base case might be too high: for a 600L service cabinet=220g of R134a. EN 3781 standard does have limits for refrigerant charge depending on the size of the room, due to the flammability

Per Henrik Pedersen (PHP): For a 600L service cabinet the refrigerant charge is around 100g R290, and in appliances with two doors, there should be two different refrigeration systems

Andrew Pearson (AP): In refrigerators, one and two doors are one system; in freezers, two doors are two systems. And for chillers it is the same: one door is one system; two doors are two systems, this is more expensive.

Chris Playford (CP): R600a is not used in commercial products.

PHP: R600a is used in Denmark, but only for small systems.

AP: There are some problems in the comparative table of refrigerants: "medium" should be "moderate", and a scale explaining what is "low", "moderate" and "high" should be given for a better understanding.

AP: CO2 is not high toxicity; I don't understand why in the table it appears as High Toxicity

AP: The table with the cost is confusing, are you meaning installation cost or cost of the fluid?

AP: Costs of the fluids: NH3 & CO2= low; water= low; HC= moderate; HFO=unknown

AP: Table with possible uses of refrigerants: for Blast Cabinets and Remote Condensing Units NH3 is not appropriate; HFO has not been proven yet; Water is appropriate in all these cases with the exception of chillers.

Pascal Faidy (PF): There is difference between running costs and initial costs (installation costs); running costs are related to energy efficiency and initial costs are related to the cost of the design of the system.

PF: There is an issue with HFO: the limitations are that it is mildly flammable and not suitable for low temperatures. HFCs and HFOs can be combined to be used in several applications. They have moderate characteristics.

AP: The flammability given says low for CO2 and Water (that is none) and low for HFC, but is not the same "low".

(CP): You should not only regard the impact on energy consumption but also the production of the refrigerant as if it was any other product, because the production of HFOs can be an issue.

David Gibson (DG): Do you know the conditions used for testing (or modelling) the COP of CO₂ cooling systems given in the MTP briefing note (BNCR37) used in the working document?

AdP: They are explained in the MTP report (ambient temperature 27°C)

DG: This figure is, in my opinion, unrealistically high. This is a complicated issue, be careful publishing such numbers.

AP: EN 3781 is not a “test” standard, there is a problem with terminology.

Anders Sjøgaard (AS): Ice machines are an issue, the market share is more important than blast chillers

PRESENTATION OF CHILLERS AND DISCUSSION RESULTS

Presentation by Raul Cervantes [7:32:30 on recording]

Discussion by Jonathan Bain

Andy Person (AP): The functional unit is missing an operating temperature. Base case temperature is reported as a range (-15 to +3), and at those 2 different temperatures the COP would be completely different. Chillers considered under EUROVENT consider the whole range, and the COP is a mixed. There is a difference between operating temperature and the range to which the liquid is being chilled. It affects the functional unit and the description of the base case.

Grahame Keeping (GK): Absorption chillers should be removed because they are not used in the lower temperature range.

David Gibson (DG): Referring to slide Base case BAT, they are too different. A chiller giving water at 7C would be completely different to a chiller giving -15C. A 100kW chiller at -15C would be a big chiller compared to an 86kW chiller providing +7C.

Philippe Riviere (PR): Are there manufacturers present who manufacture -15C chillers. In that case the data could be corrected, through the answers to the questionnaire.

Veerle De Smedt (VD): Chillers produced in my company can reach temperature lower than 3C, but I am not sure if they can reach -15C. I will verify this information.

Per Pedersen (PP): Maybe it is possible to find a better BAT in the threshold of Eurovent Certification Program, which are supposed to produce +7C cold water, which is also the case of the example in the presentation.

PR: There is no public data for lower temperature chillers. All chillers in the presentation are air conditioning from your catalogues or EN14511, which means that for refrigeration it is very difficult to find data.

GK: The reason for this lacking data is that the refrigerants are different. It is not water anymore.

AP: There is a further consideration about the description of low temperature and medium temperature chillers. The fluid is pulled from a much colder temperature because it is used to control a specific process such as a chilled room or a cold room where the temperature variation is much smaller. Air conditioners chill air from ambient temperature, pulling through a wider range and it is possible to have a much greater rise in the water temperature. Compared to the base case of the chiller, several other characteristics would be different, temperature range, and the fact that one is water and the other is a heat transfer fluid. The unit EER is confusing and should be avoided.

JB: It is not seasonal. It has been pointed out before that it should be consistent with European units.

Raul Cervantes (RC): EER is defined as the net cooling capacity in BTU/h divided by the applied energy in watts.

JB: Asked for more comments related to the difference in approach between air conditioning and process and other difference in classification or technical specifications.

AP: The large process chiller used in the range +2C to +15C might be identical to those used for air conditioning or might be specially constructed for the process to deal with tight temperature control requirements. To divide by temperature is a difficult problem, therefore either these should be included in that range or completely ignored. They exist but in a small number of units. For instance, chillers used to cool water are process chillers that are running at 6C, and require a very specific range of temperature that an air conditioner would not suit. They will need a specific standard of application.

GK: Also there is the case of chillers whose output temperature is close to 4C, they are very tightly controlled chillers. As they are part of the market, they need to be categorized somewhere.

PR: Is the industry able to define reference temperatures? One temperature for testing being representative of several processes.

GK: Agreed to look for the answer.

AP: Considered that chillers do not apply to the ecodesign since they do not fulfil criteria regarding to the number of sold units per year having a significant impact or improvement. Out of the 3 criteria, is it necessary that only one applies only or the 3 are required?

JB: One of them should apply.

Laure Baillargeon (LB): The threshold of 200 000 units was initially set with consumers goods in mind. The 3 criteria aim at avoiding useless regulations on niche markets, or on products without large energy consumption and low improvement potential, but for industrial products such as chillers, the sales volume might be low, however the aggregated energy consumption can be significant, as well as the improvement potential.

AP: Asked if the requirement of the directive is to be ignored, and only consider the significant impact and improvement.

LB: The requirement has an indicative character, and its applicability is a question of judgment.

AP: The directive is not clear if the conditions should be cumulated or only one conditions is enough, therefore this is a potential problem.

LB: If the energy consumption of a product group is high, but the improvement potential low, there may be no interest in addressing the product through a regulation.

AP: Sales of chillers are probably 10% of those stated for process chillers.

LB: Additionally the threshold is not specified for the base case or sub-categories of the products. It could very well be applied for the product group as a whole (namely, full scope of ENTR LOT 1). If products were divided into numerous categories, no product would fall into the scope of the Directive.

PP: A new study on air conditioning chillers for buildings conducted by PR is available. It is very important to coordinate the new study and the Lot 1, especially since some industrial chillers are identical to air conditioners chillers in the other study.

DG: The main issue of the first stakeholder meeting was whether process chillers and air conditioning chillers were identical, and if all chillers should all be treated in Lot 6 or be brought into this process. Defra's view is that all chillers should be included in Lot 1 due to their extremely high energy consumption; they should be under control as soon as possible.

LB: During the 1st stakeholder meeting, industry asked to have all chillers within a single regulation. But covering chillers in a single regulation does not mean that we have to cover them in a single preparatory study, which would not be possible in ENTR LOT 1 due to lack of knowledge, in addition to limited resources and high workload. It was agreed to share the duties between Lot 1 and Lot 6, meaning that the regulation will be developed after the completion of the Lot 6 study.

AP: There will problems if the regulation only considers high temperature chillers as air conditioners in all cases. Even when they are for processes, it requires some form of seasonal adjustment. The figures that will be used will not be appropriate. The process application is characterized by the load to be constant between summer and winter,

while for air conditioning the load varies a lot from summer to winter. A seasonal efficiency calculation meant to an office building, would be wrong for a factory.

JB: What about the development of a 2nd base case concerning high temperature process chillers.

AP: This could be useful, or even making 3 base cases for each temperature range. Not quoting the range, but a typical value within the range: -15C for the low, -5C for the medium and +5C for the high. The final regulation should be divided into process chillers and air conditioning chillers, according the needs.

CONCLUDING REMARKS

Jonathan Bain (JB) presented concluding remarks [8:24:00 on recording]

Tasks 1 – 5 are to be updated based on stakeholder comments. Tasks 6 and 7 are to be completed as next steps. Main Points to take away from each product group are:

Walk-in cold rooms:

- Forum to discuss testing standard
- Difference between 'mono-bloc' and larger product types
- Potential application of different testing methods to cover these two groups

Service cabinets:

- Forum for discussion of various testing standard developments
- Consideration of drawers
- R290 should not be considered as the most popular refrigerant

Blast cabinets:

- Difference between reach-in and walk-in variations
- Predominantly chillers, some larger products are freezing only
- Testing of products constructed on site
- Use of NF standard – potential inclusion of energy consumption within this
- Issue of variation of temp ranges per MS

Remote condensing units:

- Importance of air-on and air-off temperatures
- Consideration of maximum capacity of common packaged product type
- Meeting with Tecumseh to discuss market

Chillers:

- Sub Base Cases to be considered

Next Actions:

- Revise the Task reports 1-5
- Classifications (Task 1)



- Market shares (Task 2)
- More BOM (Task 4)
- Weighting (or sub-Base Cases where necessary) (Task 4)
- Update Base Cases to improve representativity (Task 4)
- More BAT and BNAT (Task 5)

Deadline for comments on working documents – **Monday June 21st**

September 2010 – 3rd stakeholder meeting (TBC)