

European Commission (DG ENTR)

SUSTAINABLE INDUSTRIAL POLICY

Building on the Eco-design Directive

Energy-Using Product Group Analysis/1

Lot 1: Refrigerating and freezing equipment:
service cabinets, walk-in cold rooms, chillers,
ice-makers, ice-cream and milkshake machines

[Contract N°S12.515749]

**Application of the Methodology for Eco-design
of Energy-using Products (MEEuP)**

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APPLICATION OF THE MEEUP METHODOLOGY (EXCEL SHEET)

To enable a coherent application of the MEEuP methodology, we provide here the key data requirements of the methodology report and give further clarification on how to make data entries.

Please find attached an abridged version of this excel spreadsheet, which is adapted to the requirements and entry options relevant for the product group “commercial refrigerators and freezers”.

1.1. MODULAR APPROACH

To enable the identification of technical and environmental improvement potential the link between material/component and function/functionality is needed (at least on a confidential basis). We want to make your (internal) data acquisition as easy as possible, but in case your data basis is more detailed than requested by us (e.g. component weights on BOM level instead of aggregated data), we would like to ask you to share this data with us for a better understanding and future discussion on improvement potentials (data on BOM level will not be published in the project reports). Please split up the product declaration in the following modules:

- **Housing**

The housing module aggregates the insulated casing (e.g. external housing¹, foam insulation, shelves/grids...) cabinet doors (if any) and the lighting system (light bulbs, lightbox and lighting ballast). Furthermore, the screw and rivets used in the entire product are listed under this module. If you cannot supply the bill of material for the lighting system components please provide their references in section 4.4 instead (in the second questionnaire).

- **Compression module**

The compression module is composed of the compressor and of the compressor motor. If you cannot supply the bill of material of these components, do not fill in the Excel sheet. Instead, please list their references in section 4.4 in the second questionnaire.

- **Condensation module**

This module contains the condenser, the related fans and fan motor and the liquid receiver. As in the evaporation unit, please list materials composing the frame and blades, and the motor. If you cannot supply the bill of material of the motor, please list its references in section 4.4 in the second questionnaire.

- **Evaporation module**

The evaporation module includes the evaporator used to absorb the heat from the internal air of the refrigerator or the freezer, the evaporator tray, and fans (fan motor, frame and blades) allowing the air circulation. If you cannot supply the bill of material

¹ The external housing comprises all the components which are part of the cabinet structure such as side/back panels, the machine cover, the evaporator cover, glass panels (if any)...

for the fan motor, please provide its references in section 4.4 in the second questionnaire and leave a blank in the Excel sheet.

- **Expansion valve module**

This module comprises the expansion device used in the refrigeration system.

- **Anti-condensation heater**

Anti-condensation heaters are used in some equipment to avoid moisture.

- **Defrost heater**

Electric defrost systems are used to remove the frost that forms on the evaporator's surface.

- **Electric assembly**

Please, list all components and materials existing in the electric panel. Moreover, this module contains all cables, including the power cable.

- **Packaging**

It is expected to provide all packaging materials used to deliver the product at the final point of sale. If some materials (e.g. wood) are not listed in the Excel sheet under any categories (columns F and G) please specify the material in column D (and weight in column E) and state "classification not possible".

- **Miscellaneous**

All pipes and coils included in the product should be listed in this module². Furthermore, all materials/components relevant for your product but not being part of the above mentioned seven groups should be stated under miscellaneous (e.g. temperature display systems...). If appropriate materials/components are not available in the MEEuP (columns F, G), enter a thorough description in column D (incl. weights in column E) and state "classification not possible".

1.2. GUIDANCE ON INDIVIDUAL DATASETS

If the material/component provided in the categories of MEEuP is insufficient to classify your data, please characterise distinct properties of your material/component.

The MEEuP excel-sheet Eco-Report consists of six sections, thereof the last one is not part of the attached excel file. Entries will be calculated on the basis of answers from this document, or default values are foreseen:

- (1) Materials: Extraction & Production
- (2) Manufacturing
- (3) Distribution
- (4) Use phase
- (5) Disposal & Recycling
- (6) *Inputs for EU-Totals & economic Life Cycle Costs*

² The pipes of the entire refrigerant loop to which the cabinet is attached are not taken into account, but only the coils and pipes that are located inside the remote refrigerated display cabinet

(1) Materials: Extraction & Production

In principle, four steps are necessary for acquisition of data concerning materials/components:

- a. Describe material/component in column “description of component”.
- b. Enter the weight for the items listed by you.
- c. Choose a category for your item by click and select in corresponding column “category”.
- d. Select a specific material or process in corresponding column “material or process”.

You must consider that the unit for weight is grams. It should be made clear if your entry differs from this unit.

In the following all kind of materials/components included in the product and that you can value via MEEuP methodology are described.

Plastics

Bulk plastics	TecPlastics
1-LDPE	11-PA 6
2-HDPE	12-PC
3-LLDPE	13-PMMA
4-PP	14-Epoxy
5-PS	15-Rigid PUR
6-EPS	16-Flex PUR
7-HI-PS	17-Talcum filler
8-PVC	18-E-glass fibre
9-SAN	19-Aramid fibre
10-ABS	

The materials listed above are most commonly used polymers. Probably not all plastics relevant for your product are listed here. In this case, please enter the commercial name of the used polymer and a short description of its characteristics. For PA6.6 you can select PA6.

If the fraction of plastics, fillers, and reinforcement are expressed in volume, please use the following table to calculate the associated weight.

Material	density in g/cm ³
LDPE	0.913
HDPE	0.96
PP	0.9
PMMA	1.28
PVC	1.38
PA6	1.12
PC	1.2

EP	1.08
PUR rigid	1.2
PS/ABS/SAN	1.05
Talc	1
E-glass	2.54
Aramid	1.58

Ferrous metals

Material	Description
21-St sheet galv.	<ul style="list-style-type: none"> • Cold rolled steel coil or sheet, hot-dip galvanized, with good surface quality (suitable for coating) • Typical steel-product for EuP-housing and some structural components • production-route: 100% blast furnace
22-St tube/profile	<ul style="list-style-type: none"> • sometimes used for structural components (frames), tubes are used in heating appliances • production route: 50% blast furnace, 50% electric arc furnace
23-Cast iron	<ul style="list-style-type: none"> • common grey (GG20) cast iron
24-Ferrite	<ul style="list-style-type: none"> • high-purity ferrite
25-Stainless 18/8 coil	<ul style="list-style-type: none"> • austenitic stainless steel

Non-ferrous metals

Material	Description
26-Al sheet/extrusion	<ul style="list-style-type: none"> • extruded and cold rolled Al sheet
27-Al die cast	<ul style="list-style-type: none"> • e.g. AlSi1 and AlMg5
28-Cu winding wire	<ul style="list-style-type: none"> • coated • e.g. for el. Motors
29-Cu wire	<ul style="list-style-type: none"> • typical for electrical wire
30-Cu tube/sheet	<ul style="list-style-type: none"> • tube: heating/hot water appliances • sheet: hot water tanks • (comment: we recommend to take this entry also for sheets used in electronic assemblies)
31-CuZn38 cast	<ul style="list-style-type: none"> • Cu with 38% Zn • general purpose brass • die-cast
32-ZnAl4 cast	<ul style="list-style-type: none"> • Zn with 4% Al • general purpose "Zamac"

	<ul style="list-style-type: none"> die-cast
33-MgZn5 cast	<ul style="list-style-type: none"> Mg with 5% Zn

Coating

Material	Description
38-pre-coating coil	<ul style="list-style-type: none"> Precoated steel or Al sheet with a 55µm layer of epoxy or PUR
39-powder coating	<ul style="list-style-type: none"> Powder coating with epoxy
40-Cu/Ni/Cr plating	<ul style="list-style-type: none"> electroplating with Cu, Ni and Cr
41-Au/Pt/Pd	<ul style="list-style-type: none"> plating with Au, Pt (e.g. HDD application), Pd (e.g. capacitors)

Electronics

For components listed below data acquisition on material level is not needed.

Material	Description
44-big caps & coils	<ul style="list-style-type: none"> Large capacitors (Al) and coils (Cu, Fe) components on a PWB No doped silicon, no precious metals Typical for power conversion function
46-IC's avg., 5% Si, Au	<ul style="list-style-type: none"> Second type assumed 5% core material and 0,2% gold content (exemplary package types: LBGA, TFBGA, LFBGA, VFQFPN, TQFP, LQFP, TSOP-1, VFBGA, TSSOP, SO, SSOP, PDIP)
47-IC's avg., 1% Si	<ul style="list-style-type: none"> Small SMD-type assumed 1% core material and 0,1% gold content (exemplary package types: SOT / SOD, DPAK, D2PAK, PPAK, P2PAK, SPAK, IPAK, I2PAK, SOT, HI-QUAD, POWER SO, PQFP, P-DIP, PowerDIP, PLCC, SOT, SOD, TOP, DOP, S-DIP, CLCC, JLCC, CPGA, CERDIP, SIL, FDIP, CQFP, TO-3, TO 220, TO)
48-SMD/ LED's avg.	<ul style="list-style-type: none"> Surface mounted devices (SMD, but no 46-, 47-ICs) Capacitors, diodes, thyristors, RF etc.

Miscellaneous

Material	Description
54-Glass for lamps	<ul style="list-style-type: none"> for lights
56-Cardboard	<ul style="list-style-type: none"> for packaging
57-Office paper	<ul style="list-style-type: none"> for manuals

(3) Distribution (incl. Final Assembly)

For the MEEuP only the final packaging of the product is important. Please enter the total volume of the packaged product in section “distribution”.