



Eurovent 14/6 - 2022

Interpretation of Regulation (EU) 2019/2018 and of Regulation (EU) 2019/2024

Second Edition

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Document history

This Eurovent Industry Recommendation / Code of Good Practice supersedes all of its previous editions, which automatically become obsolete with the publication of this document.

Modifications

This Eurovent publication was modified as against previous editions in the following manner:

Modifications as against	Key changes
1 st edition	Present document
2 nd edition	Addition of the Appendix A: FAQ

Preface

In a nutshell

This Eurovent Recommendation aims to provide a sound interpretation of Regulation (EU) 2019/2018 and of Regulation (EU) 2024/2019. Specifically, it aims to provide the European Commission with the industry input for the future European Commission guidelines accompanying Regulation (EU) 2019/2018 and Regulation (EU) 2024/2019.

Authors

This document was published by the Eurovent Association and was prepared in a joint effort by participants of the Product Group 'Commercial Refrigeration Equipment' (PG-RDC), which represents a vast majority of all manufacturers of these products active on the EU market.

Disclaimer

This Eurovent Recommendation does not replace the Regulation (EU) 2019/2018 or the Regulation (EU) 2024/2019. A finally binding interpretation of EU legislation may only be provided by the European Court of Justice.

In case of disputes with the translations of Regulation (EU) 2019/2018 or Regulation (EU) 2019/2024 into other languages, Eurovent holds that the English text supersedes all the other translations.

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Important remarks

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1 Background

Eurovent and its Members regard the European Ecodesign and Energy Labelling regulations as a powerful tool for achieving the European Union's energy saving targets, for ensuring a level playing field, and for contributing to the achievement of the EU vision of climate-neutrality by 2050.

This Eurovent Recommendation relates to Regulations (EU) 2019/2018 and 2024/2019 on Energy Labelling and Ecodesign requirements for refrigerating appliances having a direct sales function. With this paper Eurovent and its Members would like to provide input for the future European Commission Guideline Document covering the above-mentioned Regulations. In order to actively contribute to achieving the energy saving targets proposed, Eurovent and its Members deem an unambiguous interpretation of the requirements set out in these Regulations of fundamental importance.

2 Vocabulary

Backwall cabinet with integrated refrigerated reserve spaces with compartment volume ≥ 100 l/m:

A vertical refrigerated cabinet in assisted service, placed behind the serving personnel, with a refrigerated reserve space ≥ 100 l/m.

Cluster: A set of cabinets identified as one model for the purposes of Ecodesign, Energy Labelling and EPREL.

Deducted model: A set of cabinets having the EEI (and all the other parameters to be declared according to the Energy Labelling) extrapolated from the same tested reference model.

Extrapolation rules: Set of common rules to be used in order to derivate the EEI of the deducted model from the one of tested reference model.

Horizontal display cabinet¹: Refrigerated display cabinet with horizontal or slightly inclined display opening on its top and accessible from above, where the total vertical display height ($V_g + V_o$) is equal or less than 45 % of the total horizontal display depth ($H_g + H_o$).

Horizontal combined cabinet¹: Refrigerated display cabinet consisted of two horizontal counters one superimposed to the other where the top is generally used for assisted service and the bottom for self-service, where the total vertical display height ($V_g + V_o$) is equal or less than 45 % of the total horizontal display depth ($H_g + H_o$).

Multiplexable units: Units mainly intended to have a modular development without end walls (not stand-alone units). They are mechanically joined in store installations and create a combined refrigerated space. They represent a combination of one or more modules which creates only one common refrigerated containment.

Refrigeration circuit: Vapour compression system made of several components including a compressor (variable speed/not variable speed), an evaporator, a condenser, an expansion device, and refrigerant.

Integral cabinets: cabinet with incorporated air-cooled condensing unit refrigerated display cabinet that is designed to work with the condenser fully cooled by ambient air (other common terms include plug in cabinet, self-contained cabinet).

¹ According to the ongoing CEN TC44/WG1 activity

Semi-Plugin cabinets/cabinets with incorporated liquid cooled condensing unit²: refrigerated display cabinet with incorporated liquid cooled condensing unit that is designed to work with the condenser partially or fully cooled by a closed liquid circuit (e.g. water/glycol loop)

Semi vertical display cabinet²: Vertical refrigerated display cabinet whose overall height does not exceed 1,5 m and having either a vertical or inclined display opening, where the total display height (V_g+V_o) is greater than the 45 % of the total horizontal display depth (H_g+H_o).

Standard Configuration: The standard configuration defines the configuration to be used to perform tests, particularly the test for reference model, for the benefit of repeatability, decrease the number of potentially different models, to ease comparison and standardise the entry into extrapolation methods. The standard configuration fixes some geometrical parameter available in a range, the accessories to be used among the available ones, some setting or product configuration in the hand of the end-user (e.g. shelf position).

Tested reference model: Tested reference model means a cabinet representative of a group of cabinets in terms of energy consumption and intended to be used as reference for the extrapolation of the energy consumption data and/or the EEl of a group of deducted models.

3 Scope

3.1 Products in scope of the Regulations

Electric mains-operated refrigerating appliances with a direct sales function, including appliances sold for refrigeration of items other than foodstuffs, specifically:

- Supermarket refrigerating (freezer or refrigerator) cabinets
- Beverage coolers
- Ice-cream freezers
- Gelato scooping cabinets
- Refrigerated vending machines

3.2 Products not in scope of the Regulations

- Refrigerating appliances with a direct sales function that are only powered by energy sources other than electricity
- The remote components, such as the condensing unit, compressors or water condensed unit, to which a remote cabinet needs to be connected in order to function
- Food processing refrigerating appliances with a direct sales function
- Refrigerating appliances with a direct sales function specifically tested and approved for the storage of medicines or scientific samples
- Refrigerating appliances with a direct sales function that have no integrated system for producing cooling, and function by ducting chilled air that is produced by an external air chiller unit; this does not include remote cabinets, nor does it include category 6 refrigerated vending machines, as defined in Table 5 of Annex III
- Professional refrigerated storage cabinets, blast cabinets, condensing units and process chillers as defined in Regulation (EU) 2015/1095
- Wine storage appliances and minibars

² According to the ongoing CEN TC44/WG1 activity

3.3 Products covered by the resource efficiency and information requirements only

Refrigerating appliances having a direct sales function are tested according to:

- EN/ISO 23953-1-2 (Supermarket equipment)
- EN 16901 (Ice-cream freezers)
- EN 16902 (Commercial beverage coolers)
- EN 50597 (Vending Machines)

The above-listed standards provide clear testing methods on how to test, measure, and calculate the product performances and energy consumption.

It is not possible to calculate the standard energy consumption of the products (including those newly introduced to the market) not assessed within the above-mentioned standards.

Eurovent therefore holds that the requirements in points 1 and 3(k) of Annex II of Regulation (EU) 2019/2024 as well as those of Regulation (EU) 2019/2018 do not apply to the products not assessed or covered by any applicable standard.

Eurovent restates that according to the Annex II of the Regulation (EU) 2019/2024, the below-listed products are to be considered as covered only by the requirements in points 2 and 3 (not including point k) of:

- Refrigerating appliances with a direct sales function that do not use a vapour compression refrigeration cycle
- Refrigerating appliances with a direct sales function for the sale and display of live foodstuffs, such as refrigerating appliances for the sale and display of living fish and shellfish, refrigerated aquaria and water tanks
- Saladettes
- Horizontal serve-over counters with integrated storage designed to work at chilled operating temperatures
- Corner cabinets
- Vending machines designed to work at frozen operating temperatures
- Serve-over fish counters with flaked ice
- Backwall cabinets (remote and integral units, chilled and frozen) with integrated refrigerated reserve spaces having a compartment volume ≥ 100 l/m
- Fruit, vegetables or meat chilled cabinets (vertical and horizontal) using humidification systems
- Curved cabinets:
 - o resulting from the assembly of several corner cabinets (e.g. 30° - 45° - 90°)
 - o single-frame cabinets not mechanically separable into a linear part plus a corner
 - o not having a recognisable longitudinal axis.

3.4 Additional clarification

Concerning Horizontal combined chilled cabinets having two or more separate horizontal refrigerated chest one over the other, Eurovent holds that the M/N coefficients to be used are the same as for horizontal chilled products.

4 Cluster approach

4.1 Preamble

According to customer needs, supermarket refrigerated cabinets are fully customisable. This entails different EEI per product per sales order.

Having regard to EPREL requirements, the industry regards the related efforts as very significant in terms of internal data management, in terms of IT infrastructure, and in terms of data-handling at the European level. In this respect, Eurovent would like to propose the so-called 'cluster approach' which is presented in the following.

4.2 Description

Manufacturers can group different models into one model, which is representative of the highest EEI (i.e. worst score) of the listed family.

The EEI of the model having the highest consumption can:

- derive from energy or performances tests in laboratory (i.e. tested reference model); or
- derive from the EEI of the tested reference model (i.e. deducted model).

It is at the discretion of the manufacturer to follow or not to follow the cluster approach.

4.3 Remote supermarket cabinets

4.3.1 Reference model standard configuration for testing and declarations

According to the product classification defined in the Regulations, the following standard configurations per product set of cabinets have been defined.

The standard configuration defines the configuration to be used to perform tests, particularly the test for reference model, for the benefit of repeatability, decrease the number of potentially different models, to ease comparison and standardise the entry into extrapolation methods. The standard configuration fixes some geometrical parameter available in a range, the accessories to be used among the available ones, some setting or product configuration in the hand of the end-user (e.g. shelf position).

The below-listed parameters provide the most used configuration.

4.3.1.1 Remote vertical/semi- vertical open supermarket refrigerators

Parameter	Configuration
Number of shelf rows	Declared front opening height [mm] divided by 300, rounded up to next near integer
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid
Lighting	If undershelf lighting option is available: Canopy lighting and undershelf lighting shelf (number of shelves equal to the listed number of shelves) 12hrs on and 12 hrs off if the cabinet is equipped with night covers
	If undershelf lighting option is not available: Canopy lighting only
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Night covers	Yes, if only delivered with night covers
Price ticket holder	40-60 mm
Evaporator defrost	Electrical defrost if available

4.3.1.2 Remote vertical/semi- vertical closed supermarket refrigerators

Parameter	Configuration
Number of shelf rows	Declared front opening height [mm] divided by 300, rounded up to next near integer
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid
Lighting	If undershelf lighting option is available: Canopy lighting and undershelf lighting shelf (number of shelves equal to the listed number of shelves)
	If mullion lighting option is available: Canopy lighting and vertical lighting (maximum available vertical lighting)
	If undershelf and vertical lighting option are not available: Canopy lighting only
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Price ticket holder	40-60 mm
Doors	Hinged if available
Evaporator defrost	Electrical defrost if available
Door antifog/antimist system	Antifog/antimist heaters if available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water

4.3.1.3 Remote vertical/semi-vertical closed supermarket freezers

Parameter	Configuration
Number of shelf rows	Declared front opening height [mm] divided by 300, rounded up to next near integer
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid
Lighting	If undershelf lighting option is available: Canopy lighting and undershelf lighting shelf (number of shelves equal to the listed number of shelves)
	If mullion lighting option is available: Canopy lighting and vertical lighting (maximum available vertical lighting)
	If undershelf and mullion lighting option are not available: Canopy lighting only
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Price ticket holder	40-60 mm
Doors	Hinged if available
Evaporator defrost	Electrical defrost if available
Door antifog/antimist system	Antifog/antimist heaters if available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water

4.3.1.4 Remote horizontal supermarket refrigerator (service and self-service serve over counters)

Parameter	Configuration
Number of shelves	Base shelf + maximum number of available refrigerated shelves
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid
Lighting	Superstructure lighting if available (or foreseen as accessory) 12hrs on and 12 hrs off if the cabinet is equipped with night covers
	Undershelf lighting if available (or foreseen as accessory) 12hrs on and 12 hrs off if the cabinet is equipped with night covers
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Night covers	Yes, if only delivered with night covers
Evaporator defrost	Electrical defrost if available
Glass antifog/antimist system	Antifog/antimist heaters if available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water
Antifog fan	Antifog fan if available
	The declared EEI shall refer to the supplied antifog configuration which has to take into account the supplied wiring equipment

4.3.1.5 Remote horizontal supermarket refrigerators/freezers (islands open)

Parameter	Configuration
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
End walls	Solid
Lighting	Handrail lighting if available (or foreseen as accessory) 12hrs on and 12 hrs off
	Air discharge lighting if available (or foreseen as accessory) 12hrs on and 12 hrs off
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Night covers	Yes, if only delivered with night covers
Evaporator defrost	Electrical defrost if available
Glass antifog/antimist system	Antifog/antimist heaters if available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water
Antifog fan	Antifog fan if available
	The declared EEI shall refer to the supplied antifog configuration which has to take into account the supplied wiring equipment

4.3.1.6 Remote horizontal supermarket refrigerators/freezers (islands closed)

Parameter	Configuration
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
End walls	Solid
Lighting	Handrail lighting if available (or foreseen as accessory)
	Air discharge lighting if available (or foreseen as accessory)
	Lid lighting if available (or foreseen as accessory)
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Evaporator defrost	Electrical defrost if available
Glass antifog/antimist system	Antifog/antimist heaters if available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water
Antifog fan	Antifog fan if available
	The declared EEI shall refer to the supplied antifog configuration which has to take into account the supplied wiring equipment

4.3.1.7 Remote vertical open Roll-In cabinets

Parameter	Configuration
Number of shelf rows	Loading height from bottom to upper load limit -1300mm (pallet + goods) divided next near integer, rounded up to next near integer
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m or 2,88 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid
Lighting	<p>If undershelf lighting option is available: Canopy lighting and undershelf lighting shelf (number of shelves equal to the listed number of shelves) 12hrs on and 12 hrs off if the cabinet is equipped with night covers</p> <p>If undershelf lighting option is not available: Canopy lighting only 12hrs on and 12 hrs off if the cabinet is equipped with night covers</p> <p>The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)</p>
Night covers	Yes, if only delivered with night covers
Price ticket holder	40-60 mm

4.3.1.8 Remote Vertical/Semi-Vertical Roll-In cabinets with doors

Parameter	Configuration
Number of shelf rows	Loading height from bottom to upper load limit -1300mm (pallet + goods) divided next near integer, rounded up to next near integer
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m or 2,88 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid
Lighting	If undershelf lighting option is available: Canopy lighting and undershelf lighting shelf (number of shelves equal to the listed number of shelves)
	If mullion lighting option is available: Canopy lighting and vertical lighting (maximum available vertical lighting)
	If undershelf and vertical lighting option are not available: Canopy lighting only
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Price ticket holder	40-60 mm
Doors	Hinged if available
Evaporator defrost	Electrical defrost if available
Door antifog/antimist system	Antifog/antimist heaters if available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water

4.3.2 Extrapolation rules

4.3.2.1 Background

The below-presented extrapolation rules apply only to products having the same kind of refrigeration system (remote units) and can be used for extrapolating the related TEC and/or EEI.

The following extrapolation rules are based on the approach followed by the European Commission consultant JRC-IPTS in the preparatory study of Regulation (EU) 2019/2018 and of the Regulation (EU) 2024/2019.

$$EEI = \frac{AEC}{SAEC} = \frac{TEC*365}{P*(M+N*TDA)*C*365} \quad [1]$$

4.3.2.2 Length

The tested reference model should be always of a length of 2,5 m or the closest one (e.g. 2,44 m).

According to the above formula (1) the EEI_L results to be:

$$EEI_L = \frac{AECL}{SAECL} = \frac{TECL*365}{P*(M+N*TDA_L)*C*365} \quad [2]$$

$$TEC_L = TEC_{2,50} \times \frac{M+N*TDA_L}{M+N*TDA_{2,50}} \quad [3]$$

By replacing [3] into [2] it is possible to conclude that $EEI_L = EEI_{2,50}$

Conclusion

According to the above-presented extrapolation rules the Energy Efficiency Index (EEI) of a cabinet having its length different from 2,5 m can be assumed as equal to the EEI of the same cabinet of a length of 2,5 m ($EEI_L = EEI_{2,50}$).

4.3.2.3 Delta front opening height [remote vertical (open/closed) supermarket refrigerator/freezers]

This extrapolation rule applies under the following conditions:

- Reference model and deducted model must belong to the same product segmentation (e.g. same M and N coefficients)
- Reference model and deducted model have the same air discharge and air return geometry
- Deducted model has air ducts shortened in length only
- Reference model and deducted model have the same temperature class
- Δ height = [+0; -10 %]
- Δ height = $\Delta(V_0 + V_g)$ (as EN/ISO23953-2 ANNEX A)

According to the above formula (1) the EEI of a deducted model (EEI_{DED}) results to be:

$$EEI_{DED} = \frac{AEC_{DED}}{SAEC_{DED}} = \frac{TEC_{DED}*365}{P*(M+N*TDA_{DED})*C*365} \quad [4]$$

$$TEC_{DED} = TEC_{REF} \times \frac{M+N*TDA_{DED}}{M+N*TDA_{REF}} \quad [5]$$

Where:

- TEC_{REF} = TEC Reference model
- TDA_{REF} = TDA Reference model

- TEC_{DED} = TEC Deducted model
- TDA_{DED} = TDA Deducted model

By replacing [4] into [5] it is possible to conclude that $EEL_{DED} = EEL_{REF}$

Conclusion

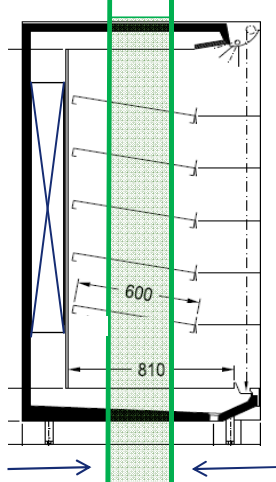
According to the above-presented extrapolation rules and conditions, it is possible to assume that the Energy Efficiency Index of a deducted cabinet can be assumed as equal to the EEL of the reference one ($EEL_{DED} = EEL_{REF}$).

4.3.2.4 Delta depth [remote vertical (open/closed) supermarket refrigerator/freezers]

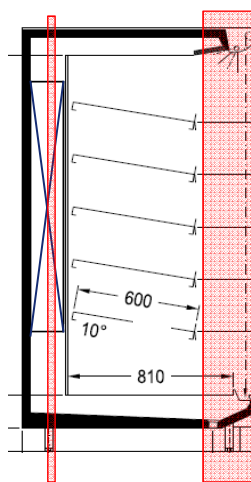
This extrapolation rule applies under the following conditions:

- Reference model and deducted model must belong to the same product segmentation (e.g. same M and N coefficients)
- Reference model and deducted model have the same air discharge and air return grid geometry and position to each other
- Reference model and deducted model have the same refrigeration components, and same backpanel pattern
- Reference model and deducted model have the same number of fans, same type of fans, and same fan speed
- The reduction of the depth of the cabinet must keep the same distance between air outlet and the load limit line
- Air ducts are shortened in length only
- Reference model and deducted model have the same temperature class
- $\Delta\text{depth} = [+0; -30 \%$
- Δdepth = delta internal depth of the base shelf

Depth reduction with same reference model



Depth reduction results in new model



Conclusion

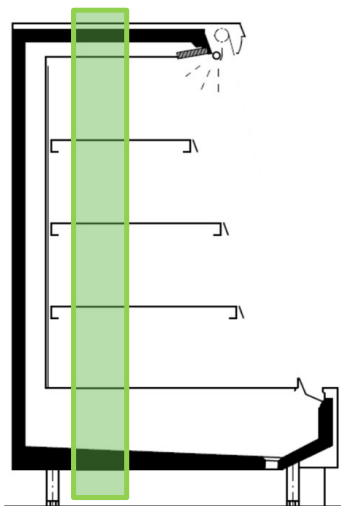
Under the above-presented conditions it is possible to conclude that the TEC of a deducted cabinet can be assumed as equal to the TEC of the reference one ($TEC_{DED} = TEC_{REF}$).

4.3.2.5 Delta depth [remote semi-vertical refrigerator]

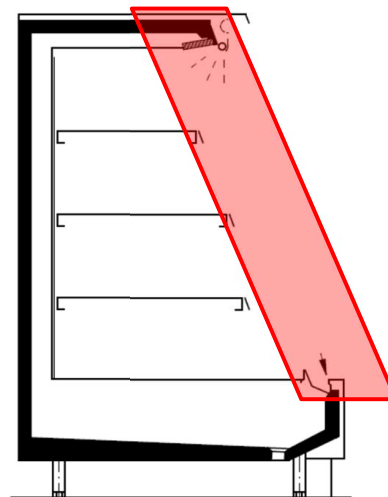
This extrapolation rule applies to both multiplexable and non-multiplexable units under the following conditions:

- Reference model and deducted model must belong to the same product segmentation (e.g. same M and N coefficients)
- Reference model and deducted model have the same air discharge and air return grid geometry and position to each other
- Reference model and deducted model have the same refrigeration components, and same backpanel pattern
- Reference model and deducted model have the same number of fans, same type of fans, and same fan speed
- The reduction of the depth of the cabinet must keep the same distance between air outlet and the load limit line
- Air ducts are shortened in length only
- Reference model and deducted model have the same temperature class
- $\Delta\text{depth} = [+0; -30\%]$
- Δdepth = delta internal depth of the base shelf

Depth reduction with same reference model



Depth reduction results in new model



Conclusion

Under the above-presented conditions it is possible to conclude that the TEC of a deducted cabinet can be assumed as equal to the TEC of the reference one ($\text{TEC}_{\text{DED}} = \text{TEC}_{\text{REF}}$).

4.4 Integral supermarket cabinets

4.4.1 Reference model standard configuration for testing and declarations

According to the product classification defined in the Regulations, the following standard configurations per product set of cabinets have been defined.

The standard configuration defines the configuration to be used to perform tests, particularly the test for reference model, for the benefit of repeatability, decrease the number of potentially different models, to ease comparison and standardise the entry into extrapolation methods. The standard configuration fixes some geometrical parameter available in a range, the accessories to be used among the available ones, some setting or product configuration in the hand of the end-user (e.g. shelf position).

The below-listed parameters provide the most used configuration.

4.4.1.1 Integral vertical/semi- vertical open supermarket refrigerators

Parameter	Configuration
Number of shelf rows	Declared front opening height [mm] divided by 300, rounded up to next near integer
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid (if available)
Lighting	If undershelf lighting option is available: Canopy lighting and undershelf lighting shelf (number of shelves equal to the listed number of shelves)
	If undershelf lighting option is not available: Canopy lighting only
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Night covers	Yes, if only delivered with night covers
Price ticket holder	40-60 mm
Evaporator defrost	Electrical defrost if available

4.4.1.2 Integral vertical/semi- vertical closed supermarket refrigerators

Parameter	Configuration
Number of shelf rows	Declared front opening height [mm] divided by 300, rounded up to next near integer
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid (if available)
Lighting	If undershelf lighting option is available: Canopy lighting and undershelf lighting shelf (number of shelves equal to the listed number of shelves)
	If mullion lighting option is available: Canopy lighting and vertical lighting (maximum available vertical lighting)
	If undershelf and vertical lighting options are not available: Canopy lighting only
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Price ticket holder	40-60 mm
Doors	Hinged if available
Evaporator defrost	Electrical defrost if available
Door antifog/antimist system	Antifog/antimist heaters if available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water

4.4.1.3 Integral vertical/semi-vertical closed supermarket freezers

Parameter	Configuration
Number of shelf rows	Declared front opening height [mm] divided by 300, rounded up to next near integer
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid (if available)
Lighting	If undershelf lighting option is available: Canopy lighting and undershelf lighting shelf (number of shelves equal to the listed number of shelves)
	If mullion lighting option is available: Canopy lighting and vertical lighting (maximum available vertical lighting)
	If undershelf and vertical lighting options are not available: Canopy lighting only
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Price ticket holder	40-60 mm
Doors	Hinged if available
Evaporator defrost	Electrical defrost if available
Door antifog/antimist system	Antifog/antimist heaters if available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water

4.4.1.4 Integral horizontal supermarket refrigerator (service and self-service serve over counters)

Parameter	Configuration
Number of shelves	Base shelf + maximum number of available refrigerated shelves
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
End walls	Solid (if available)
Lighting	Superstructure lighting if available (or foreseen as accessory)
	Undershelf lighting if available (or foreseen as accessory)
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Night covers	Yes, if only delivered with night covers
Glass antifog/antimist system	Antifog/antimist heaters if available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water
Antifog fan	Antifog fan if available
	The declared EEI shall refer to the supplied antifog configuration which has to take into account the supplied wiring equipment

4.4.1.5 Integral horizontal supermarket refrigerators/freezers (islands open)

Parameter	Configuration
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
End walls	Solid (if available)
Lighting	Handrail lighting if available (or foreseen as accessory)
	Air discharge lighting if available (or foreseen as accessory)
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Night covers	Yes, if only delivered with night covers
Evaporator defrost	Electrical defrost if available
Glass antifog/antimist system	Antifog/antimist heaters if available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water
Antifog fan	Antifog fan if available
	The declared EEI shall refer to the supplied antifog configuration which has to take into account the supplied wiring equipment

4.4.1.6 Integral horizontal supermarket refrigerators/freezers (islands closed)

Parameter	Configuration
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
End walls	Solid (if available)
Lighting	Handrail lighting if available (or foreseen as accessory)
	Air discharge lighting if available (or foreseen as accessory)
	Lid lighting if available (or foreseen as accessory)
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Evaporator defrost	Electrical defrost if available
Glass antifog/antimist system	Antifog/antimist heaters if available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water
Antifog fan	Antifog fan if available
	The declared EEI shall refer to the supplied antifog configuration which has to take into account the supplied wiring equipment

4.4.1.7 Integral vertical open Roll-In cabinets

Parameter	Configuration
Number of shelf rows	Loading height from bottom to upper load limit -1300mm (pallet + goods) divided next near integer, rounded up to next near integer
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m or 2,88 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid
Lighting	If undershelf lighting option is available: Canopy lighting and undershelf lighting shelf (number of shelves equal to the listed number of shelves)
	If undershelf lighting option is not available: Canopy lighting only
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Night covers	Yes, if only delivered with night covers
Price ticket holder	40-60 mm
Evaporator defrost	Electrical defrost if available

4.4.1.8 Integral Vertical/Semi-Vertical Roll-In cabinets with doors

Parameter	Configuration
Number of shelf rows	Loading height from bottom to upper load limit -1300mm (pallet + goods) divided next near integer, rounded up to next near integer
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m or 2,88 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid
Lighting	If undershelf lighting option is available: Canopy lighting and undershelf lighting shelf (number of shelves equal to the listed number of shelves)
	If mullion lighting option is available: Canopy lighting and vertical lighting (maximum available vertical lighting)
	If undershelf and vertical lighting option are not available: Canopy lighting only
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Price ticket holder	40-60 mm
Doors	Hinged if available
Evaporator defrost	Electrical defrost if available
Door antifog/antimist system	Antifog/antimist heaters if available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water

4.4.2 Extrapolation rules

4.4.2.1 Background

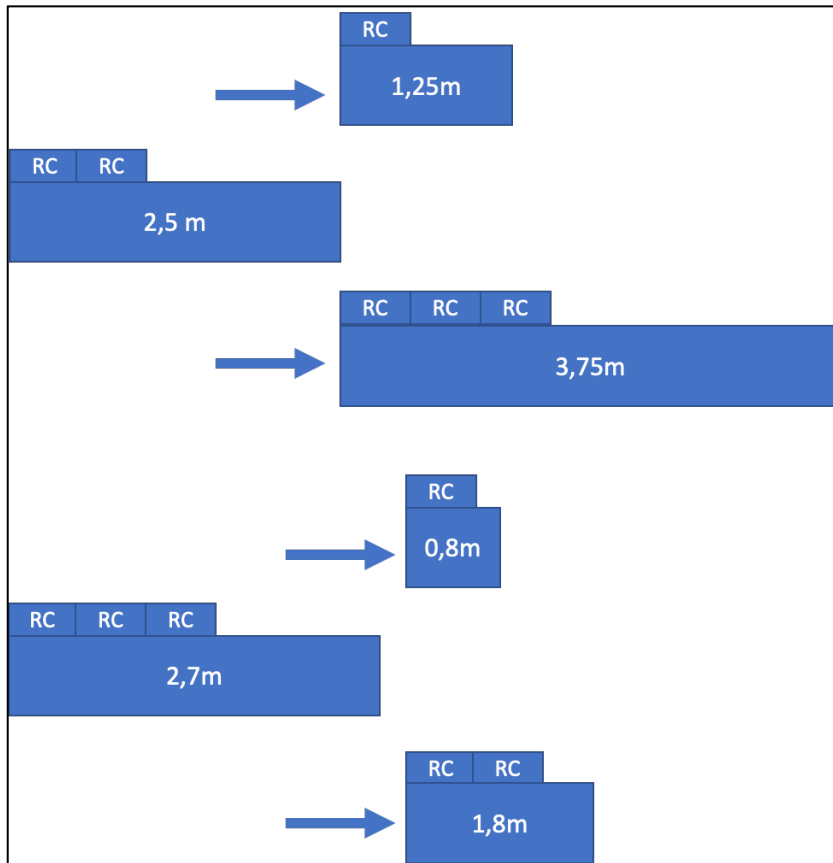
The following extrapolation rules are based on the approach followed by the European Commission consultant JRC-IPTS in the preparatory study of Regulation (EU) 2019/2018 and of the Regulation (EU) 2024/2019.

$$EEI = \frac{AEC}{SAEC} = \frac{TEC*365}{P*(M+N*TDA)*C*365} \quad [6]$$

4.4.2.2 Length

This extrapolation rule in terms of length **applies to multiplexable units only**.

The rule shall be used only **under the condition that the number of identical refrigeration circuits is modular and proportional with the cabinets' length** (the below-reproduced picture is to be intended just as indicative).



Where:

- RC = Refrigeration Circuit

The tested reference model should always be of a length of 2,5 m or the closest one (e.g. 2,7 m).

According to the above formula (1) the EEL_L results to be:

$$EEL_L = \frac{AEC_L}{SAEC_L} = \frac{TEC_L * 365}{P * (M + N * TDA_L) * C * 365} \quad [7]$$

$$TEC_L = TEC_{2,50} \times \frac{M + N * TDA_L}{M + N * TDA_{2,50}} \quad [8]$$

By replacing [3] into [2] it is possible to conclude that $EEL_L = EEL_{2,50}$

Conclusion

According to the above-presented extrapolation rules the Energy Efficiency Index (EEI) of a cabinet having its length different from 2,5 m can be assumed as equal to the EEI of the same cabinet of a length of 2,5 m ($EEL_L = EEL_{2,50}$).

4.4.2.3 Delta front opening height [integral vertical (open/closed) supermarket refrigerator/freezers]

This extrapolation rule applies to both multiplexable and non-multiplexable units under the following conditions:

- Reference model and deducted model must belong to the same product segmentation (e.g. same M and N coefficients)
- Reference model and deducted model have the same air discharge and air return geometry
- Deducted model has air ducts shortened in length only
- Reference model and deducted model same temperature class
- $\Delta\text{height} = [+0; -10\%]$
- $\Delta\text{height} = \Delta(V_0 + V_g)$ (as EN/ISO23953-2 ANNEX A)
- Reference model and deducted model must have the same refrigeration circuit

According to the above formula (1) the EEI of a deducted model (EEL_{DED}) results to be:

$$EEL_{DED} = \frac{AEC_{DED}}{SAEC_{DED}} = \frac{TEC_{DED} * 365}{P * (M + N * TDA_{DED}) * C * 365} \quad [9]$$

$$TEC_{DED} = TEC_{REF} \times \frac{M + N * TDA_{DED}}{M + N * TDA_{REF}} \quad [10]$$

Where:

- TEC_{REF} = TEC Reference model
- TDA_{REF} = TDA Reference model
- TEC_{DED} = TEC Deducted model
- TDA_{DED} = TDA Deducted model

By replacing [4] into [5] it is possible to conclude that $EEL_{DED} = EEL_{REF}$

Conclusion

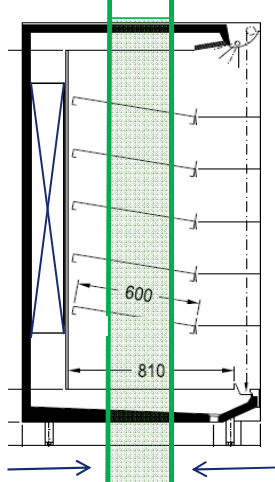
According to the above-presented extrapolation rules and conditions, it is possible to assume that the Energy Efficiency Index of a deducted cabinet can be assumed as equal to the EEI of the reference one ($EEI_{DED} = EEI_{REF}$).

4.4.2.4 Delta depth [integral vertical (open/closed) supermarket refrigerator/freezers]

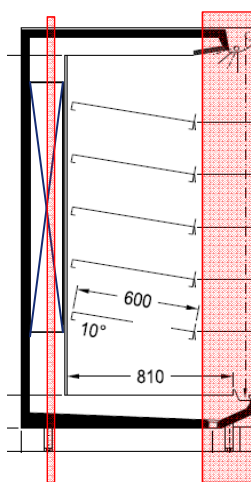
This extrapolation rule applies to both multiplexable and non-multiplexable units under the following conditions:

- Reference model and deducted model must belong to the same product segmentation (e.g. same M and N coefficients)
- Reference model and deducted model have the same air discharge and air return grid geometry and position to each other
- Reference model and deducted model have the same refrigeration components, and same backpanel pattern
- Reference model and deducted model have the same number of fans, same type of fans, and same fan speed
- The reduction of the depth of the cabinet must keep the same distance between air outlet and the load limit line
- Air ducts are shortened in length only
- Reference model and deducted model have the same temperature class
- $\Delta\text{depth} = [+0; -30\%]$
- $\Delta\text{depth} = \text{delta internal depth of the base shelf}$
- Reference model and deducted model have the same refrigeration circuit

Depth reduction with same reference model



Depth reduction results in new model



Conclusion

Under the above-presented conditions it is possible to conclude that the TEC of a deducted cabinet can be assumed as equal to the TEC of the reference one ($TEC_{DED} = TEC_{REF}$).

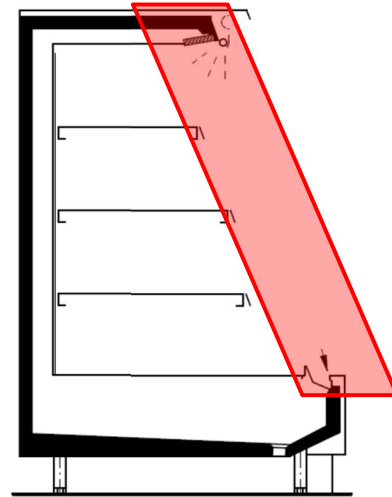
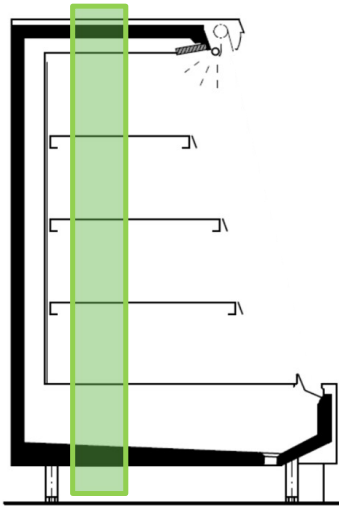
4.4.2.5 Delta depth [integral semi-vertical refrigerator]

This extrapolation rule applies to both multiplexable and non-multiplexable units under the following conditions:

- Reference model and deduced model must belong to the same product segmentation (e.g. same M and N coefficients)
- Reference model and deduced model have the same air discharge and air return grid geometry and position to each other
- Reference model and deduced model have the same refrigeration components, and same backpanel pattern
- Reference model and deduced model have the same number of fans, same type of fans, and same fan speed
- The reduction of the depth of the cabinet must keep the same distance between air outlet and the load limit line
- Air ducts are shortened in length only
- Reference model and deduced model have the same temperature class
- $\Delta\text{depth} = [+0; -30\%]$
- Δdepth = delta internal depth of the base shelf
- Reference model and deduced model must have the same refrigeration circuit

Depth reduction with same reference model

Depth reduction results in new model



Conclusion

Under the above-presented conditions it is possible to conclude that the TEC of a deduced cabinet can be assumed as equal to the TEC of the reference one ($\text{TEC}_{\text{DED}} = \text{TEC}_{\text{REF}}$).

4.5 Semi-plugin supermarket cabinets

4.5.1 Reference model standard configuration for testing and declarations

According to the product classification defined in the Regulations, the following standard configuration per product set of cabinets have been defined.

The standard configuration defines the configuration to be used to perform tests, particularly the test for reference model, for the benefit of repeatability, decrease the number of potentially different models, to ease comparison and standardise the entry into extrapolation methods. The standard configuration fixes some geometrical parameter available in a range, the accessories to be used among the available ones, some setting or product configuration in the hand of the end-user (e.g. shelf position).

The below-listed parameters provide the most used configuration.

4.5.1.1 Semi-plugin vertical/semi- vertical open supermarket refrigerators

Parameter	Configuration
Number of shelf rows	Declared front opening height [mm] divided by 300, rounded up to next near integer
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid
Lighting	If undershelf lighting option is available: Canopy lighting and undershelf lighting shelf (number of shelves equal to the listed number of shelves)
	If undershelf lighting option is not available: Canopy lighting only
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Night covers	Yes, if only delivered with night covers
Price ticket holder	40-60 mm
Evaporator defrost	Electrical defrost if available

4.5.1.2 Semi-plugin vertical/semi- vertical closed supermarket refrigerators

Parameter	Configuration
Number of shelf rows	Declared front opening height [mm] divided by 300, rounded up to next near integer
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid
Lighting	If undershelf lighting option is available: Canopy lighting and undershelf lighting shelf (number of shelves equal to the listed number of shelves)
	If mullion lighting option is available: Canopy lighting and vertical lighting (maximum available vertical lighting)
	If undershelf and vertical lighting options are not available: Canopy lighting only
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Price ticket holder	40-60 mm
Doors	Hinged if available
Evaporator defrost	Electrical defrost if available
Door antifog/antimist system	Antifog/antimist heaters if available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water

4.5.1.3 Semi-plugin vertical/semi-vertical closed supermarket freezers

Parameter	Configuration
Number of shelf rows	Declared front opening height [mm] divided by 300, rounded up to next near integer
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid
Lighting	If undershelf lighting option is available: Canopy lighting and undershelf lighting shelf (number of shelves equal to the listed number of shelves)
	If mullion lighting option is available: Canopy lighting and vertical lighting (maximum available vertical lighting)
	If undershelf and mullion lighting options are not available: Canopy lighting only
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Price ticket holder	40-60 mm
Doors	Hinged if available
Evaporator defrost	Electrical defrost if available
Door antifog/antimist system	Antifog/antimist heaters if available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water

4.5.1.4 Semi-plugin horizontal supermarket refrigerator (service and self-service serve over counters)

Parameter	Configuration
Number of shelves	Base shelf + maximum number of available refrigerated shelves
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid
Lighting	Superstructure lighting if available (or foreseen as accessory)
	Undershelf lighting if available (or foreseen as accessory)
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Night covers	Yes, if only delivered with night covers
Evaporator defrost	Electrical defrost if available
Glass antifog/antimist system	If available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water
Antifog fan	Antifog fan if available
	The declared EEI shall refer to the supplied antifog configuration which has to take into account the supplied wiring equipment

4.5.1.5 Semi-plugin horizontal supermarket refrigerators/freezers (islands open)

Parameter	Configuration
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
End walls	Solid
Lighting	Handrail lighting if available (or foreseen as accessory)
	Air discharge lighting if available (or foreseen as accessory)
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Night covers	Yes, if only delivered with night covers
Evaporator defrost	Electrical defrost if available
Glass antifog/antimist system	If available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water
Antifog fan	Antifog fan if available
	The declared EEI shall refer to the supplied antifog configuration which has to take into account the supplied wiring equipment

4.5.1.6 Semi-Plugin horizontal supermarket refrigerators/freezers (islands closed)

Parameter	Configuration
Length	2,5 m or the closer length (e.g. 2,44 m)
Product temperature	Lowest applicable product temperature
End walls	Solid
Lighting	Handrail lighting if available (or foreseen as accessory)
	Air discharge lighting if available (or foreseen as accessory)
	Lid lighting if available (or foreseen as accessory)
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Night covers	Yes, if only delivered with night covers
Evaporator defrost	Electrical defrost if available
Glass antifog/antimist system	If available and required for safe and reliable operation under ISO23953 climate class rating conditions
Other heaters	If available, the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions. Other heaters and auxiliary systems may include optional heaters or other devices to support the drain water
Antifog fan	Antifog fan if available
	The declared EEI shall refer to the supplied antifog configuration which has to take into account the supplied wiring equipment

4.5.1.7 Semi-Plugin vertical open Roll-In cabinets

Parameter	Configuration
Number of shelf rows	Loading height from bottom to upper load limit -1300mm (pallet + goods) divided next near integer, rounded up to next near integer
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m or 2,88 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid
Lighting	If undershelf lighting option is available: Canopy lighting and undershelf lighting shelf (number of shelves equal to the listed number of shelves)
	If undershelf lighting option is not available: Canopy lighting only
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Night covers	Yes, if only delivered with night covers
Price ticket holder	40-60 mm
Evaporator defrost	Electrical defrost if available

4.5.1.8 Semi-Plugin Vertical/Semi-Vertical Roll-In cabinets with doors

Parameter	Configuration
Number of shelf rows	Loading height from bottom to upper load limit -1300mm (pallet + goods) divided next near integer, rounded up to next near integer
Shelf depth	Maximum shelf depth allowed by the cabinet's load limit line
Length	2,5 m or the closer length (e.g. 2,44 m or 2,88 m)
Product temperature	Lowest applicable product temperature
Shelf inclination	0° unless differently specified by the manufacturer
End walls	Solid
Lighting	If undershelf lighting option is available: Canopy lighting and undershelf lighting shelf (number of shelves equal to the listed number of shelves)
	If mullion lighting option is available: Canopy lighting and vertical lighting (maximum available vertical lighting)
	If undershelf and vertical lighting option are not available: Canopy lighting only
	The declared EEI shall refer to the supplied lighting system which has to take into account the supplied wiring equipment (if the cabinet is prepared to have lighting, the EEI shall reflect it)
Price ticket holder	40-60 mm
Doors	Hinged if available
Evaporator defrost	Electrical defrost if available
Door antifog/antimist system	Antifog/antimist heaters if available
	The declared EEI shall refer to the supplied antifog configuration which has to take into account the supplied wiring equipment
Other heaters	If available the EEI shall refer to the maximum configuration for safe and reliable operation under ISO 23953 climate class rating conditions, taking account the supplied wiring equipment

4.5.2 Extrapolation rules

4.5.2.1 Preamble

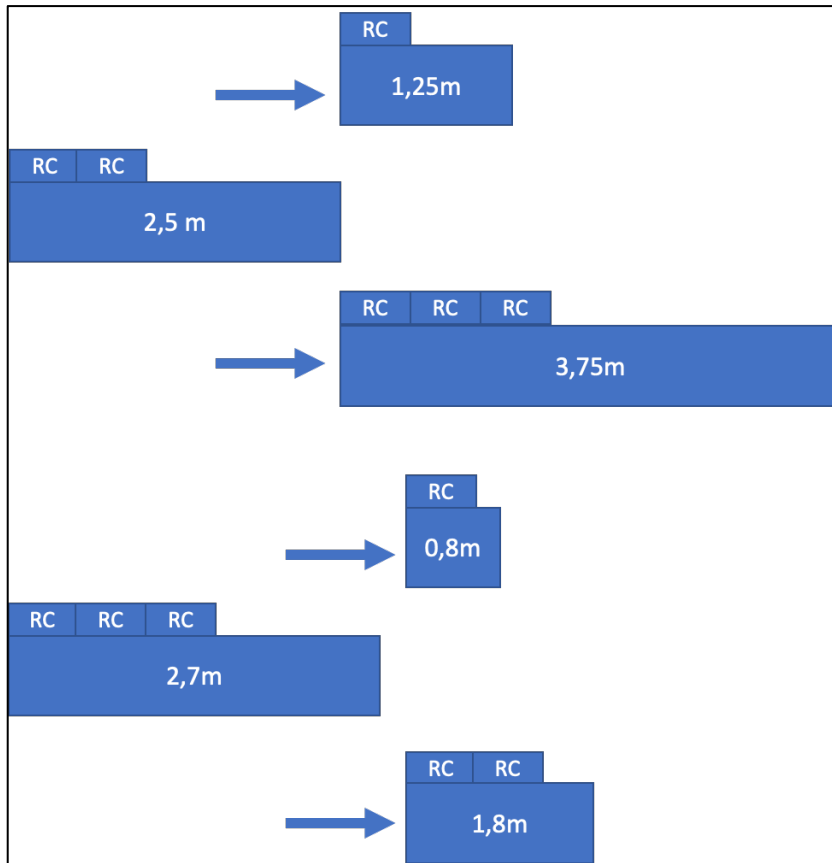
The following extrapolation rules are based on the approach followed by the European Commission consultant JRC-IPTS in the preparatory study of Regulation (EU) 2019/2018 and of the Regulation (EU) 2024/2019.

$$EEI = \frac{AEC}{SAEC} = \frac{TEC*365}{P*(M+N*TDA)*C*365} \quad [11]$$

4.5.2.2 Length

This extrapolation rule in terms of length **apply to multiplexable units only**.

The rule shall be used only **under the condition that the number of identical refrigeration circuits is modular and proportional with the cabinets' length** (the below-reproduced picture is to be intended just as indicative).



Where:

- RC = Refrigeration Circuit

The tested reference model should always be of a length of 2,5 m or the closest one (e.g. 2,7 m).

According to the above formula (1) the EEL_L results to be:

$$EEL_L = \frac{AEC_L}{SAEC_L} = \frac{TEC_L * 365}{P * (M + N * TDA_L) * C * 365} \quad [12]$$

$$TEC_L = TEC_{2,50} \times \frac{M + N * TDA_L}{M + N * TDA_{2,50}} \quad [13]$$

By replacing [3] into [2] it is possible to conclude that $EEL_L = EEL_{2,50}$

Conclusion

According to the above-presented extrapolation rules the Energy Efficiency Index (EEI) of a cabinet having its length different from 2,5 m can be assumed as equal to the EEI of the same cabinet of a length of 2,5 m ($EEL_L = EEL_{2,50}$).

4.5.2.3 Delta front opening height [semi-plugin vertical (open/closed) supermarket refrigerator/freezers]

This extrapolation rule applies to both multiplexable and non-multiplexable units under the following conditions:

- Reference model and deducted model must belong to the same product segmentation (e.g. same M and N coefficients)
- Reference model and deducted model have the same air discharge and air return geometry
- Deducted model has air ducts shortened in length only
- Reference model and deducted model same temperature class
- Δ height = [+0; -10%]
- Δ height = $\Delta(V_0 + V_g)$ (as EN/ISO23953-2 ANNEX A)
- Reference model and deducted model must have the same refrigeration circuit.

According to the above formula (1) the EEI of a deducted model (EEL_{DED}) results to be:

$$EEL_{DED} = \frac{AEC_{DED}}{SAEC_{DED}} = \frac{TEC_{DED} * 365}{P * (M + N * TDA_{DED}) * C * 365} \quad [14]$$

$$TEC_{DED} = TEC_{REF} \times \frac{M + N * TDA_{DED}}{M + N * TDA_{REF}} \quad [15]$$

Where:

- TEC_{REF} = TEC Reference model
- TDA_{REF} = TDA Reference model
- TEC_{DED} = TEC Deducted model
- TDA_{DED} = TDA Deducted model

By replacing [4] into [5] it is possible to conclude that $EEL_{DED} = EEL_{REF}$

Conclusion

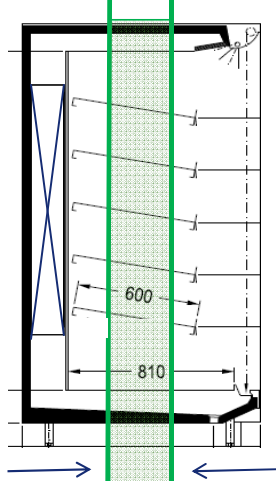
According to the above-presented extrapolation rules and conditions, it is possible to assume that the Energy Efficiency Index of a deducted cabinet can be assumed as equal to the EEL of the reference one ($EEL_{DED} = EEL_{REF}$).

4.5.2.4 Delta depth [semi-plugin vertical (open/closed) supermarket refrigerator/freezers]

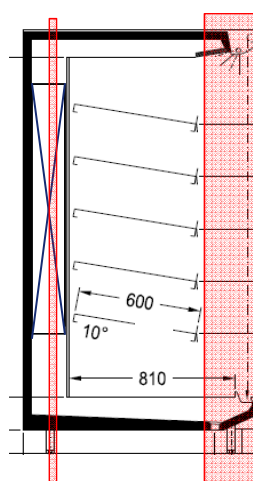
This extrapolation rule applies to both multiplexable and non-multiplexable units under the following conditions:

- Reference model and deducted model must belong to the same product segmentation (e.g. same M and N coefficients)
- Reference model and deducted model have the same air discharge and air return grid geometry and position to each other
- Reference model and deducted model have the same refrigeration components, and same backpanel pattern
- Reference model and deducted model have the same number of fans, same type of fans, and same fan speed
- The reduction of the depth of the cabinet must keep the same distance between air outlet and the load limit line
- Air ducts are shortened in length only
- Reference model and deducted model have the same temperature class
- $\Delta\text{depth} = [+0; -30\%]$
- Δdepth = delta internal depth of the base shelf
- Reference model and deducted model have the same refrigeration component

Depth reduction with same reference model



Depth reduction results in new model



Conclusion

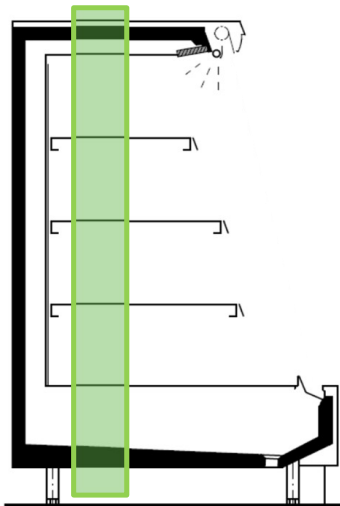
Under the above-presented conditions it is possible to conclude that the TEC of a deducted cabinet can be assumed as equal to the TEC of the reference one ($TEC_{DED} = TEC_{REF}$).

4.5.2.5 Delta Depth [semi plug-in semi-vertical refrigerator]

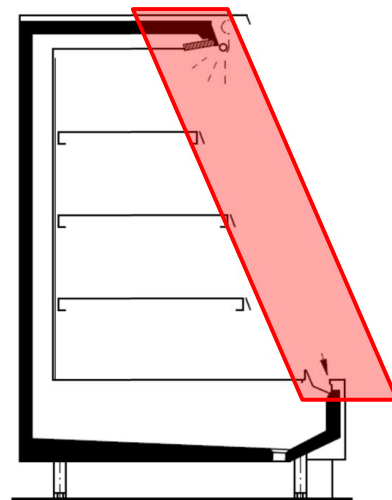
This extrapolation rule applies to both multiplexable and non-multiplexable units under the following conditions:

- Reference model and deducted model must belong to the same product segmentation (e.g. same M and N coefficients)
- Reference model and deducted model have the same air discharge and air return grid geometry and position to each other
- Reference model and deducted model have the same refrigeration components, and same backpanel pattern
- Reference model and deducted model have the same number of fans, same type of fans, and same fan speed
- The reduction of the depth of the cabinet must keep the same distance between air outlet and the load limit line
- Air ducts are shortened in length only
- Reference model and deducted model have the same temperature class
- $\Delta\text{depth} = [+0; -30\%]$
- Δdepth = delta internal depth of the base shelf
- Reference model and deducted model have the same refrigeration circuits

Depth reduction with same reference model



Depth reduction results in new model



Conclusion

Under the above-presented conditions it is possible to conclude that the TEC of a deducted cabinet can be assumed as equal to the TEC of the reference one ($\text{TEC}_{\text{DED}} = \text{TEC}_{\text{REF}}$).

5 P Coefficient

In line with the Ecodesign and Energy Labelling Regulations, Eurovent holds that the below-proposed coefficient shall be used:

- Remote units and semi plug-in units: $P = 1$

- Integral units: P = 1,1

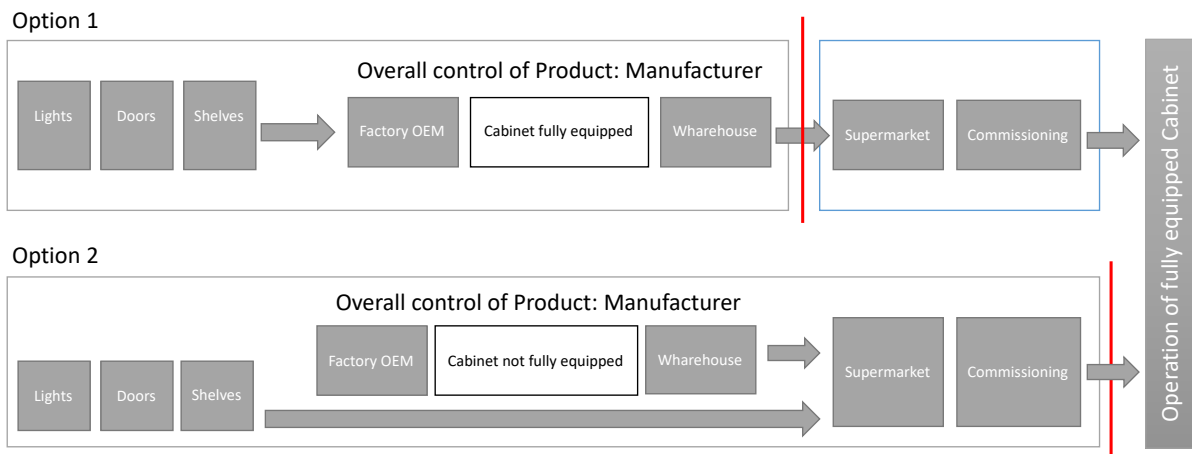
6 Incomplete delivery

According to article 2 of the Ecodesign Directive (2009/125/EC) and the related European Commission FAQ document, what is placed on the European market must meet the requirements (and it is subjected to the CE declaration of conformity). It is not possible to place products on the market which could meet the minimum requirements only in a later stage. The related product documentation (Energy Label, sales order, invoices, etc.) must relate to (and meet the requirements at) the time of placing on the market of the product itself.

With reference to the Ecodesign Directive and the related FAQ document, as well as the Blue Guide of the Machinery Directive, Eurovent holds that two different options of determining the time of placing on the market are foreseeable (see diagram below). Eurovent holds that according to article 2.6 of the above-recalled Ecodesign Directive (2009/125/EC), the manufacturers of refrigerating appliances having a direct sales function are responsible for the conformity of the product placed on the market.

To ensure this conformity and allow MSAs verifications, the manufacturers' product documentation, CE declaration of conformity, sales order and associated invoices, must relate to the specific product as it is placed on the market. This documentation shall include all the components and accessories influencing the EEL of the specific unit at the time of placing on the market. For EPREL declaration and Energy Labelling the cluster approach and reference model standard configuration for testing and declaration may be applied.

The below diagram summarises the overall process.



Time of handling the overall control of products= product is made available on the European Market

Option 1: The manufacturer provides the finished product "at the ramp" of its own factory and the customer picks it up there (or organizes the delivery with its logistic partner).

Option 2: The scope of the manufacturers' supply includes the product itself, the delivery, the unpacking, the installation and commissioning of the unit and the EEI relevant accessories. The single point in time where the product is made available for the first time is the handover to the customer at the end of the commissioning process. Absolute precondition is that the manufacturer does not make the product available to his customer prior to that.

Appendix A: F.A.Q.

This section contains some frequently asked questions concerning the interpretation of Regulation (EU) 2019/2018 and of Regulation (EU) 2019/2024.

1. How detailed must the documents uploaded to public and private website/EPREL have to be (explosion view, cross sections)?
 - Explosion views, cross sections etc. are not considered as mandatory and do not need to be uploaded on EPREL (for more information please see also the EPREL Manual).
2. In which language do we need to supply all the documentation, is there a general rule or is it individual to the interpretation of the various UE countries to mandate a certain document language?
 - All the documentation must be supplied, at least, in one of the official languages of the European Union
3. Can the data uploaded in EPREL be updated in the event of changes or evolutions of the product?
 - Yes, it possible, as foreseen also in the EPREL manual. Of course the date of the changes is recorded.
4. Can a manufacturer define its own calculation method to estimate energy consumption of products derived from the tested ones?
 - Manufacturers can include their own calculation/extrapolation rules in the products' documentation.
5. As an importer/dealer, which documentation should I upload to the EPREL website? CE declaration, product fiche and technical data. Anything else to upload?
 - Importers are natural or legal person established in the Community who places a product from a third country on the Community market in the course of his/her business, the obligations are (see art.4 Directive 2009/125/UE):
 - (a) to ensure that the product placed on the market and/or put into service complies with the Ecodesign Directive 2009/125/UE and the applicable implementing measures (Ecodesign Regulation 2019/2024 UE and Energy labelling Regulation 2019/2018/UE); and
 - (b) to keep and make available the EC declaration of conformity and the technical documentation. The technical documentation to be loaded in EPREL is specified in Article 4 of Ecodesign Regulation 2019/2024 UE.
6. We, as refrigeration equipment producer located outside the EU, in order to bring our product into the EPREL database need to have an authorised representative in the EU. After the product is registered by our authorised representative in EPREL database, can we sell our product directly to the customers? Or we can do it only through the authorised representative?

- For importing products into EU, independently from Ecodesign and EPREL an authorized representative inside EU is required.
7. What is the obligation of manufactures for refrigerated display cabinets with integrated lighting concerning EPREL registration of the lighting?
- The obligation of the manufacturer of a refrigerated display cabinet with integrated lighting is limited to declaring the Energy Label within the EPREL registration of the cabinet.
 - It is the obligation of the manufacturer of the lighting to register the lighting into the EPREL data base for light sources and provide the Energy Label. The moment when the lighting is sold to the manufacturer of the refrigerated display cabinet is seen as the moment of placing the first time to the market.
8. Does the regulation take into account that there are also counters that perform in the temperature class 3M0, if not how will they be tested, when sold to a client in 3M0?
- The Regulations (EU) 2021/341 and (EU) 2021/340 define Ecodesign and Energy Labelling requirements for M0 cabinets.
9. What kind of Energy Labelling must be in a cabinet for direct sales if this cabinet is for mix temperatures, freezer/refrigerator (L1/M0)?
- This product belongs to the multi-temperature family and the related energy label has to be produced accordingly. For switchable cabinets the Energy Label has to be provided for the coldest temperature, so for this example 3L1.
10. What happens to products that do not reach H class in cc3?
- Cabinets that are not designed to meet at least ISO temperature class 3H2 are not covered by the Ecodesign and Ecolabelling requirements.
 - Within the ED and EL regulation, there are no factors defined to calculate the SAE for these cabinets, so they are considered as out of scope.
11. Does a cabinet have to meet at least the cabinet classification 3H according to ISO23953?
- Products covered by the regulation shall follow the testing requirements as in the table 3 of the Regulation (EU) 2019/2024
 - A cabinet not meeting at least the cabinet classification 3H is not considered as a refrigerating appliance having a direct sales function.
12. How shall I consider a switchable temperature cabinet, e.g. a chest freezer switchable to positive temperature?
- The cabinets shall meet the requirements related to the minimum achievable temperature.

13. Is it possible to provide more detailed insight on calculation methods of factors P, M, N and other factors?
- M and N represent respectively the point of intersection with the ordinate and the angular coefficient (slope) of a straight line of interpolation of the laboratory test results according to ISO 23953 standard, reported on a graph having in the ordinate the TEC value (kWh / day) and in the abscissa the cabinet TDA (m²).
 - Each interpolation line is specific for the product temperature class (i.e. 3M1, 3M2 ...) and for the type of cabinet (horizontal, vertical, combined, etc..).
 - P is a coefficient that is applied to the calculation formula of EEI only for plugin cabinets or cabinets with incorporated condensing units. This increasing of 10% of the SAEC value is due to the boundary conditions applying to the units.
14. If a cabinet whose EEI was previously calculated and is then tested in the future, can its new EEI be modified in EPREL, or a new input should be done?
- Yes, it possible, as foreseen also in the EPREL manual. Of course the date of the changes is recorded
15. To calculate the EEI for service counter, in the 2019/2024 there are no values for this type. Which one do we use? They are only for wall cabinets. For non-plug-in service counter and the calculation for the EEI, do we have to use only the energy from the product itself or also the energy from the colling system?
- Service counters are included in the regulation 2019/2024 and are classified as HC1 in the EN ISO 23953 (Chilled, serve-over counter open service). Therefore, coefficients M and N to be adopted for EEI calculations are those for chilled horizontal cabinets (3,7 and 3,5 respectively).
16. How do you change energy efficiency class from one to another if design changes take place?
- Products having different energy consumption, EEI, TDA or internal volume and temperature class are considered different models.
17. Do the requirements apply to refrigerated equipment only or also to side consumption? Such as exterior illumination for instance.
- Regulation establishes requirements for the labelling of, and the provision of supplementary product information on, electric mains-operated refrigerating appliances with a direct sales function, including appliances sold for refrigeration of items other than foodstuffs.
 - Other external consumption are not included.
 - e.g. External store roof lighting are excluded
 - e.g. Energy consuming auxiliary devices (e.g. condensate removal heaters, anti-mist heaters or fans) required to pass all the tests specified in this standard at climate class 3 shall be operated. If they are required to avoid condensation out of climate class 3 are excluded.

18. The C coefficient refers to the product temperature class. Does the Ecodesign regulation introduce products temperature classes different to the ones at the EN/ISO 23953-2?
- Products temperature classes are the same as in the EN 23953.
19. How should we round up the highest temperature 5.4°C? Should it be round up to 5°C on energy label, so it means the cabinet is working in 3M1?
- 5,49 °C = 5, so compliant to M1 product temperature class.
20. How do you calculate the energy consumption of equipment with commodity storage?
- Horizontal serve-over counters with integrated storage designed to work at chilled operating temperatures are excluded from the (EU) 2019/2018 directive (Energy Labelling). ('horizontal serve-over counter with integrated storage' means a horizontal cabinet for assisted service, which includes refrigerated storage which is of at least 100 litres (L) per meter (m) length, and which is normally placed at the serve-over counter's base).
21. How is the energy consumption of the remote compressor rack factored into the consumption of the remote supermarket cabinet?
- Remote supermarket cabinets are rated according to the EN/ISO 23953 which also accounts for the energy consumption of the refrigeration cooling pack.
22. Which is the rationale behind the different "p" values (1 or 1,1) for remote / semi plug-in / integral cabinets?
- The P factor takes into account the boundary conditions applying to Remote/Semi plug-in/Integral units
23. How about efficiency classes for remote and plug in cabinets: are they comparable? Are there examples where one is discriminated?
- Plug in or integral cabinets are not discriminated vs. Remote cabinets; this has been analysed in the Ecodesign Preparatory Study and is reflected in the calculation of the Standard Annual Energy Consumption (SAE).
 - In the SAE formular this is considered in the correction factor P:
 - $SAE = 365 \times P \times (M+N+Y) \times C$
 - P=1,1 for Integral and plug in cabinets
 - P=1,0 for Remote cabinets
24. Is a certification also needed on bespoke counters or prototypes (quantity 1-10Pcs Not produced on stock)?

- No, mandatory third-party certification is not strictly required for products covered by the Regulation (EU) 2019/2018 and of Regulation (EU) 2019/2024. However, these are also covered by the requirements of the ED/EL regulations.

25. Do you have any detailed information on changes that will happen to Ecodesign in 2023?

- New Ecodesign tiers will start applying from 1 September 2023:

	1 March 2021	1 September 2023
All except ice cream freezers	≤ 100	≤ 80
Ice cream freezers	≤ 80	≤ 50

26. What about a manufacture which made only custom-made products, do they also have to make energy label for every single product? Do they have to build a testing room after EN ISO 23953 to test single products?

- Regulation (EU) 2019/2018 and Regulation (EU) 2019/2024 apply to every product within their scope, even a one single piece must comply and not necessary a specific testing room has to be built (even if suggestable) because reference test can be done in any external laboratory.

27. The backbar/counter units with glass door are affected by the 2019/2024 directive? Or under 2019/2019? Or maybe to none of those.

- If such products are not included in the scope of Ecodesign Regulation for professional refrigerated appliances (Regulation 2015/1095 EU) and are not in the scope of Regulation 2019/2024 for the exclusions (f) or (g) in Art. 1 point 2, it is possible that they fall in the scope of Regulation 2019/2019 for domestic appliance.

28. In terms of disposal of products recovery and recycling, is this the responsibility of the manufacturer or is this still the responsibility of the user? Are there guidelines on correct disposal?

- This is part of the WEEE directive.

29. Why is the use of glass doors in all refrigeration cabinets not mandatory?

- The European Ecodesign and Energy Labelling Regulations do not prescribe any technical solution or product feature and must be technologically neutral. However, the Ecodesign sets the minimum energy efficiency requirements and creates a selection of products according to their energy performance and the energy labels will drive the market to privilege the most efficient products with the best energy class. This will be the main driver of innovation.

30. What standard should be followed for testing gelato-scooping cabinets?
- The terminology and testing methods of Ecodesign and Energy Labelling directives are consistent with the terminology and testing methods adopted in the EN 16838 Refrigerated display scooping cabinets and pozzetto for gelato - Classification, requirements, performance and energy consumption testing.
31. Who is responsible for Ecodesign compliance and Energy labelling requirements for a cabinet with a compressor which is not provided by the manufacturer of the cabinet?
- The EEI refers to the final product incorporating all the components (e.g. including the compressor for Integral and Semi Plug-in cabinets). For remote cabinets the energy consumption of the compressor is a calculated value according to the procedure defined in ISO 23953).
 - In any case the manufacturers of the finished products are responsible for the compliance of the Ecodesign and Energy labelling requirements.
32. Does the manufacturer have to label corners or curved cabinets if there are multiple corners in a row?
- Corner/curved cabinets are not in the scope of the Energy labelling regulation.
33. Must the Climatic room where you execute the test be certified or is it possible to apply self-declaration of performance?
- The Climatic room shall be compliant with the EN/ISO standard prescribing the test methods; however the climatic room does not require a third-party certification. The compliance of a model to Ecodesign requirements shall follow the CE marking rules related also to the verification of "the type" of a product.
34. What is the agreement with the EFTA states? Is the energy label also required?
- Ecodesign and Energy labelling regulations apply to EU-27
35. Given the fact that the fast-moving consumer goods industry places own (i.e. branded) cabinets with commercial end-customers, will these cabinets also need to carry the EEI label at point of sale (at least with initial placement)?
- Yes. The supplier of the cabinet shall ensure that each refrigerating appliance with a direct sales function, is supplied with a printed label. There is no exemption for the fast-moving consumer goods industry.
36. How do you translate these labelling A-G into specific requirements with regard to component selection, e.g. thermostatic expansion valve versus electronic expansion valve, performance requirements on used condensing units when integrated approach, regulations on defrosting...?

- Tests are performed on the energy efficiency of the refrigerated display cabinets outlined by EN/ISO standards, where inlet and outlet conditions (inlet and outlet enthalpy) are taken into account for remote systems (central cooling system/condensing unit is out of scope). For integral solutions overall electric energy consumption is measured to determine the EEI.
 - When the energy consumption differs between units of the same model with different components either a separate EEI must be declared for each specific model with unequivocal identification or the highest EEI can be declared for one model with unequivocal identification.
 - The regulation aims to challenge manufacturers to develop more efficient refrigerated display cabinets with the best selection of components for the lowest possible EEI.
37. Do you know/have information of who will be the market surveillance for any of the EU member states (responsible office)?
- The list of all the European national market surveillance authorities by product category is available at: [Organisation \(europa.eu\)](https://europa.eu)
38. What happens if the product tested during market surveillance deviates from the energy label beyond the allowed tolerance? Does manufacturer need to recall all products from the market or stop selling this model, but still leave in the market the already placed products?
- Products failing the verification procedures are subjected to the related penalties/procedures.
39. If compliance of products is organised at a local level, is there a risk of a non-uniform approach?
- Market surveillance is in the responsibility of the member countries, this may happen. The use of international standards mitigates this risk
40. The Eurovent guidance should be very useful to give options for manufacturers to demonstrate that their products comply. Could you say a little more about how the Eurovent guidance stands separate to the regulation, and does not amend the regulation (MSAs have a duty to assess against the regulation)?
- The Eurovent Recommendation is not a legally binding document, it provides the industry interpretation of Regulation (EU) 2019/2018 and of Regulation (EU) 2019/2024.
41. It was certainly necessary to have a rational and recognised way to do the extrapolations, to help suppliers demonstrate that their products comply. To ensure the document is not misinterpreted, may it be worth clarifying the legal status of the Eurovent document, pointing out that products will be assessed by MSAs against the requirements of the regulation itself?
- The Eurovent Recommendation is not a legally binding document, it provides the industry interpretation of Regulation (EU) 2019/2018 and of Regulation (EU) 2019/2024.
42. According to the normative, you need 3 pieces of every product family or an equivalent in case of a control. How are small and medium sized enterprises able to stock 3 pieces of every product family or equivalent?

- 2019/2018 ANNEX IX Determines the verification procedure for market surveillance purposes, item 2(c) states the MSA can test a specific model. According to item 4: If the result referred to in point 2(c) is not achieved, the Member State authorities shall select three additional units of the same model for testing.
 - A manufacturer should make an equivalent model available to the MSA for testing accordingly.
43. How do you round the EEI (e.g. is 79,9 considered as F class?)
- 79,9 is lower than 80 so it is Energy Label class F. EEI shall be rounded to the first decimal place.
 - As defined in the reference model standard configuration for testing and declarations in paragraph 4.3, 4.4 and 4.5, external lighting that is powered by the cabinet (e.g. from a power socket provided by the cabinet) has to be reflected in the EEI. The max. allowed power output for the socket has to be defined by the manufacturer and properly indicated.
44. Please clarify what is definition 'placed in the market'? is it point when cabinet is sold or when delivered?
- For the purposes of Union harmonization legislation, a product is placed on the market when it is first made available on the EU market. This operation is reserved to the manufacturer or importer, who are the only economic operators placing products on the market.
 - When a manufacturer or importer supplies a product to a distributor or end user for the first time, this operation is always referred to in legal terms as 'placing on the market'. Any subsequent operation, for example from distributor to distributor or from distributor to end user, is referred to as 'making available'. For our kind of products, the moment in time when the product is placed on the market is when the client acquires the overall control on the product's, i.e. when the products are at client's disposal.
45. With regard to the changes made to the cabinets: if a new accessory is used to display goods in the cabinet (for instance extra podium of promotion stands), initiated by the end customer (supermarket), who is responsible for the new label?
- To ensure the conformity and allow MSAs verifications, the manufacturer's product documentation, EPREL declaration, Energy Label, CE declaration, sales order, and associated invoices, must relate to the specific product as it is placed on the market. This documentation shall include all the components/accessories influencing the EEI of the specific unit at the time of placing on the market.
 - The product modifications done after the placing on the market do not require a new energy label.
46. If the commissioning is not carried out by the manufacturer, but is done by a third party, who is responsible for the compliance of the cabinets with the Ecodesign and Energy labelling requirements?

- Placing on the market means making a product available for the first time on the European market.
 - There are two possibilities to place product on the European market:
 - Option 1 – The manufacturer provides the finished product ex works at its own factory (on the ramp of its warehouse),
 - Option 2 – Manufacturer is responsible for the product itself, the delivery, download, unpacking, finish assembling – including the EEI relevant accessories, the installation and the commissioning. The time of placing products on the market is the handover to the customer at the end of the commissioning process. Absolute precondition is that the manufacturer doesn't make the product available to his customer prior to that.
47. Is there any problem if delivering, downloading, unpacking, finish assembling, the installation and the commissioning is done by a third party?
- No. Provided that the manufacturer's product documentation, EPREL declaration, Energy Label, CE declaration, sales order, and associated invoices relate to the specific product, as it is placed on the market. Also reminding that it is not possible to place on the market products which could meet the minimum requirements only in a later stage.
48. Can you clarify, if a company supplies cabinets into another country, are they responsible for supplying and issuing the documentation and not the receiving company that installs the cabinet?
- The companies placing the products in the European market are responsible for the correct application of the Ecodesign and Energy labelling requirements.
49. Shall the Energy Labelling and Ecodesign Regulation appear on the CE Declaration?
- The CE declaration of Conformity shall include Ecodesign compliance only.
50. Is it possible to sell a vertical cabinet without shelves?
- No, a vertical cabinet cannot be placed on the market without shelves. Shelves are to be directly supplied and invoiced by the OEM. The same applies to any accessory or option directly contributing to the EEI (see chapter 6: incomplete delivery).
51. Is it possible to sell a closed vertical cabinet without doors?
- No, a closed vertical cabinet cannot be placed on the market without doors directly supplied and invoiced by the OEM. The same applies to any accessory or option directly contributing to the EEI (see chapter 6: incomplete delivery).
52. Does the label need to be glued on the product or it can be simply supplied together with the product, but it is for end user to decide whether to have it visible to consumers or not? Referring to beverage coolers as example.

- The energy label does not necessarily need to be affixed on the products. However the energy label must be delivered in printed format with the product.
53. If an end user ordered multiple cabinets for the same model, do they all need a label or just one?
- Every cabinet placed on the EU market needs its own energy label.
54. Does the supplier have to be able to prove that he delivered the energy label? It could happen that the installer throws away the energy label together with the cabinet's packaging after assembly.
- The supplier shall have a digital copy of the label that can prove through the QR code that the product to which it refers is registered in EPREL data base and must be available to supply a copy of the energy label if requested.
55. Is it mandatory to affix the energy label on the appliance (Ice cream freezer/cabinet)?
- The dealer or manufacturer of display cabinets does not have to affix the Energy Label to the cabinet, and it is not mandatory to display the label at the cabinet during operation, but it has to be delivered with each cabinet.
 - At the point of sales of display cabinets incl. trade fairs, the Energy Label has to be clearly visible on the outside of the front or top of the appliance.
56. Where is the QR code supposed to lead to?
- QR code leads the reader to the relevant product data in the EPREL public data base.
57. Label has point VII and IX. Can you please clarify what is needed there? TDA or refrigerated shelf area?
- Point VII for refrigerated vending machines is the sum of the net volumes of all compartments with chilled operating temperatures (expressed in litres (L) and rounded to the nearest integer), and for all other refrigerating appliances with a direct sales function it is the sum of the display areas (TDA) according to ISO 23953 with chilled operating temperatures (expressed in square meters (m²) and rounded to two decimal places).
 - Point IX for refrigerating appliances with a direct sales function is the sum of the display areas (TDA) with frozen operating temperatures, expressed in square meter (m²) and rounded to two decimal places. The pictogram and the values are omitted in the case of vending machines that are designed to work at frozen operating temperatures because they are excluded from the Energy Labelling Regulation.
58. What are the requirements for where the energy label should be placed on the refrigeration equipment? Is it a demand that customers in the stores should be able to see the energy labelling?
- The energy label must be clearly displayed in any point of sale of the refrigerating appliance with direct sales function, such as showrooms, trade fairs, online sales, etc., i.e. wherever the potential cabinet buyer may consider purchasing the appliance itself.

- Regarding the position of the label, there is no precise requirement for the position but the fact that it shall be clearly visible at any time for the client.
 - There is no obligation for food retailers to display the energy label in their stores.
59. In what place of the unit / cabinet shall the energy label be displayed? can it be attached inside of the cabinet or strictly outside on the glass panel or equipment's frame?
- Suppliers (manufacturers) shall ensure that each refrigerating appliance is supplied with a printed label (not mandatory to be stuck)
 - Dealers shall ensure that each refrigerating appliance, at the point of sale, including at trade fairs, bears the label provided by suppliers, with the label displayed for built-in appliances in such a way to be clearly visible, and for other refrigerating appliances in such a way as to be clearly visible on the outside of the front or top of the refrigerating appliance.
60. How will manufacturers ensure that their partnering importers / dealers will have all relevant information and labels on hand?
- Regarding Energy Labelling, Regulation (EU) 2019/2018 set out obligations for suppliers in Article 3, and for dealers on Article 4.
 - Suppliers shall ensure that following items are available for dealers:
 - product information sheet in printed form or electronic format
 - electronic label
61. If retailers have a choice whether or not to apply the energy labelling on the cabinets, does this not limit the potential effectiveness of this initiative?
- No, because the energy label must be clearly displayed on the cabinet itself in every point of sale (showrooms, fairs, quotations, etc.).
62. Are there any European dates and guidelines for the application of the circular economy to products? Should life cycle assessment be included?
- At present, the aspects related to the circular economy are only the resource efficiency requirements defined in the Regulation EU 2019/2024, any life cycle assessment is not required.
63. What happens if foreign manufacturers supply cabinets directly into EU markets (i.e. to key accounts) and are not able to provide spares within the required time?
- To supply cabinets into the EU market, it is mandatory to meet the resources requirements set out in Annex II of Regulation (EU) 2019/2024.
64. Do the glycol cabinets need an energy label?
- Yes, they do. The glycol cabinets are not excluded from the scope of the Regulations therefore they must bear the energy label.

65. Can Remote CO2 counters also be tested with R448 instead of CO2?

- The manufacturer is responsible that the EEI will not differ more than 10% from the given value of the unit that is placed on the market.

66. What is meant precisely when the regulation refers to “equivalent” models, who declares what is equivalent?

- Equivalent model means a model which has the same technical characteristics relevant for the technical information to be provided, but which is placed on the market or put into service by the same manufacturer, importer or authorised representative as another model with a different model identifier.

67. Is the test according to your interpretation to be performed with every energy consuming add-on available?

- The tests are to be performed according to the relevant EN/ISO standards. It is at the discretion of the manufacturer to follow the cluster approach as indicated in Chapter 4.2

68. When the cluster approach is used, the worst EEI should be used, but what TDA should be printed on the label? The one corresponding to the EEI?

- The TDA of the cabinet representative of the cluster, which is the one having the worst EEI.

69. How are different configurations handled? Do all the configurations need their own energy label? That will lead to tens of thousands of labels

- With reference to the requirements and obligations for the supplier stated in the Regulations, any product that differs from another for basic characteristics, product temperature class, TDA/volume or energy consumption must be labelled individually.
- However, the Eurovent Interpretation Guideline introduces the “cluster” approach, i.e. a set of cabinets identified by the manufacturer as one model for the purposes of Ecodesign, Energy Labelling and EPREL. Manufacturers can group different models into one model, which is the representative of the cluster and which has the highest EEI (i.e. worst score) of the listed family.

Appendix B: Testing method

Testing method will be addressed by changes in the related CEN/ISO standards due to technical update or by EC standardisation request. This appendix reports the view of industry on some specific detail undergoing endorsement in an official published standard. Standards published after the date of publishing of this recommendation may contain modified requirements due to the process of approval. Most recent standards always overcome this Appendix.

Rounding of temperature measurements³

Concerning the temperature tests, it is to be reminded that, according to EN ISO23953-2 Table 1, the M-Package temperatures are to be reported (in the temperature test report) rounded up to the nearest integer (0,5 K shall be rounded up).

Example: 4.4 °C is rounded to 4 °C; 4.5 °C is rounded to 5 °C.

Semi plug-in cabinets: testing methods³

Total Energy Consumption (TEC)

For cabinets with an incorporated liquid cooled condensing unit the total daily energy consumption (TEC) is equal to the direct daily electrical energy consumption (DEC) plus the Heat Removal Energy Consumption (HREC): $TEC = DEC + HREC$

Direct Electrical Energy Consumption (DEC)

The DEC is to be measured as described in EN 23953-2 Annex D.

Heat Removal Energy Consumption (HREC)

The HREC for a cabinet with an incorporated liquid cooled condensing unit shall be measured during the temperature test.

The HREC is defined as the contribution of the Cooling System (Dry Cooler) and the energy consumption of the pump(s):

$$HREC = CSEC + CPEC$$

Where:

- CSEC: Cooling System Energy Consumption
- CPEC: Energy Consumption of the pump(s)

The inlet and outlet temperatures of the cooling liquid at the condenser shall be measured using temperature sensors directly inserted into the pipe or inserted into pockets (and not clamped between the piping and a copper recovery half-sleeve) on the inlet and outlet pipe-lines positioned no further than 150 mm from the cabinet.

The sensor cables shall be arranged such that external influences on the connection cables are eliminated by the use of insulation.

A flow measuring device (flow meter) shall be installed in the liquid inlet supply line to the cabinet in order to measure the flow rate of the liquid coolant.

Test conditions:

³ According to the ongoing CEN TC44/WG1 activity

- Liquid coolant composition: water with 40 % ± 5 % propylene glycol
- The liquid inlet temperature θ in shall be maintained constant at 30 °C ± 1K
- The pump shall run continuously during the test and provide a constant flow rate (in kg/h) within ±3 % of that declared by the manufacturer.
- The declared mass flow rate shall be reported in the technical documentation and in the test report.
- The liquid outlet temperature: θ out: measured 5 minutes after at least one compressor starts the temperature difference between brine inlet and outlet shall be at least 3K.
- Accuracy on θ out - θ in measurement shall be ± 0,1 K

CSEC is calculated with the formula:

$$CSEC = P_{fact} * \sum_{n=1}^{n=N_{max}} (q_L * (cp_{out} * \theta_{out} - cp_{in} * \theta_{in}) \Delta t)$$

Where:

- θ_{in} : instant brine inlet temperature
- θ_{out} : instant brine outlet temperature
- q_L : instant value of the mass flow of liquid coolant in kg/s
- cp_{in} : liquid specific heat capacity at θ_{in}
- cp_{out} : liquid specific heat capacity at θ_{out}
- P_{fact} : Cooling System factor = 0,007 (based on a highly energy efficient dry cooler design)

The pumping electrical energy consumption is not measured and is dependent on the practical design of the cooling liquid circuit.

As a conventional rule, the pumping daily energy consumption (CPEC) in kilowatt hours per 24 h period is calculated using the following equation, assuming a pressure drop in the system equalling 2,5 times the pressure drop over the cabinet and a pump efficiency of 0,5.

$$CPEC = \sum_{n=1}^{n=N_{max}} \left(\frac{2,5 * v * q_{L,n} (p_{irun,n} - p_{orun,n})}{0,5} \right) \Delta t$$

Where:

- $p_{irun,n} - p_{orun,n}$: instant value of pressure drop between inlet and outlet of cabinet during turn, in kPa
- v : specific volume of secondary refrigerant, in cubic metres per kilogram (simplification: $v = \text{const.} = 0,001 \text{ m}^3/\text{kg}$)
- $q_{L,n}$: instant value of the mass flow of liquid coolant during test period in kg/s. The maximum sampling period shall be 180

The HREC shall be determined from temperature, pressure and flow rate readings which allow a resulting accuracy of ± 5 %.

TDA Calculation⁴

This section aims to complement the current EN/ISO 23953-2 Annex A and refers to the ongoing CEN TC44/WG1 activity.

The TDA is determined by the sum of vertical and horizontal projected areas from visible foodstuff as marked by the load limit line, in square metres. For multi-deck and semi-vertical cabinets, the horizontal projected area is measured from a plane located at 1,55 m from the ground in order to take into account the visible foodstuffs located on the shelves (see Figure A.4). If the shelves are tilted and the loading is for sensitive foodstuffs, the horizontal projected area shall be calculated applying H_o measured from a plane located at 1,55 m from the ground and its intersection with the shelf (see Figure A.6).

If the cabinet has adjustable feet, they shall be positioned in the middle of the range when measuring the geometry for the TDA calculation.

In the case the shelves are of different depth the horizontal projected area is affected by the height of the cabinet when the load limit line is above or below in respect of the plane located at 1,55 m from the ground as shown in Figure A.1.

For cabinets with any transparent part (rear, front, top or sides), TDA shall be calculated by the sum of vertical and horizontal projected areas from visible foodstuff from positions of the customers or service personnel. Examples of TDA calculation are given in from Figure A.1 to A.20.

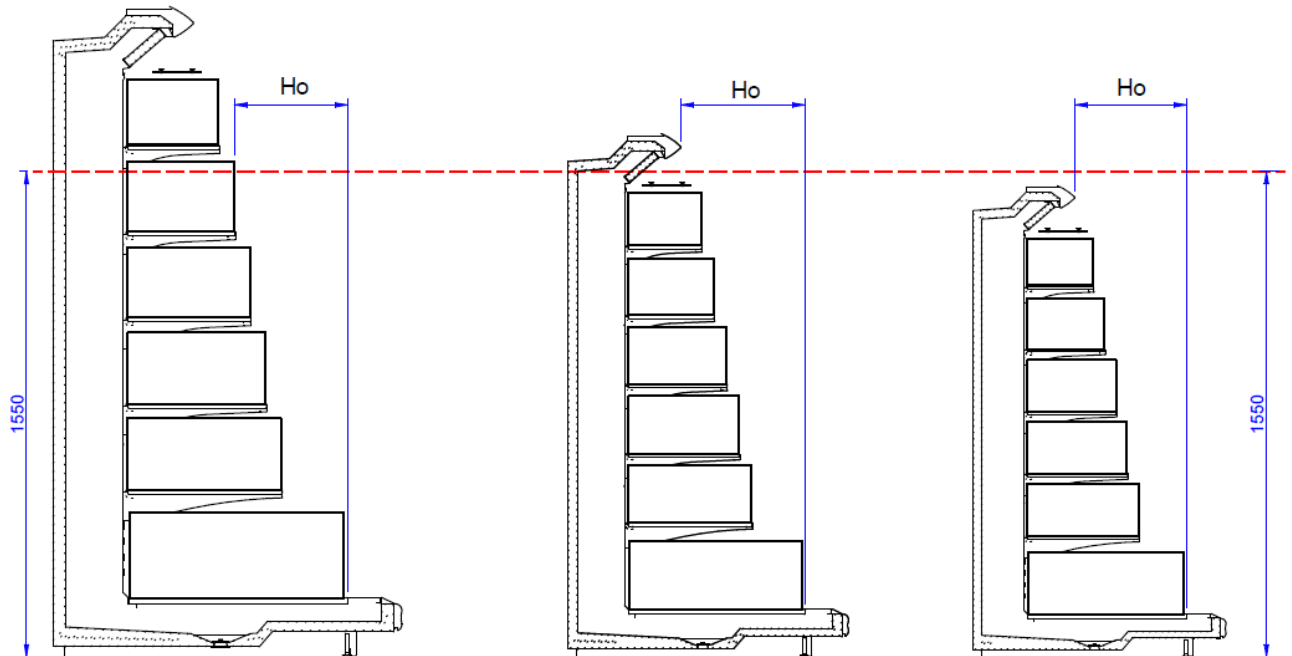


Figure A.1: Example of TDA calculation

⁴ According to the ongoing CEN TC44/WG1 activity

Measurement of TDA in a refrigerated display cabinet
Calculation of TDA

The total display area shall be calculated as in the Formula (A.1):

$$TDA = (H_o \times L_{oh}) + (H_g \times L_{gh}) + (V_o \times L_{ov}) + (H_g \times L_{gh}) \quad [A.1]$$

where:

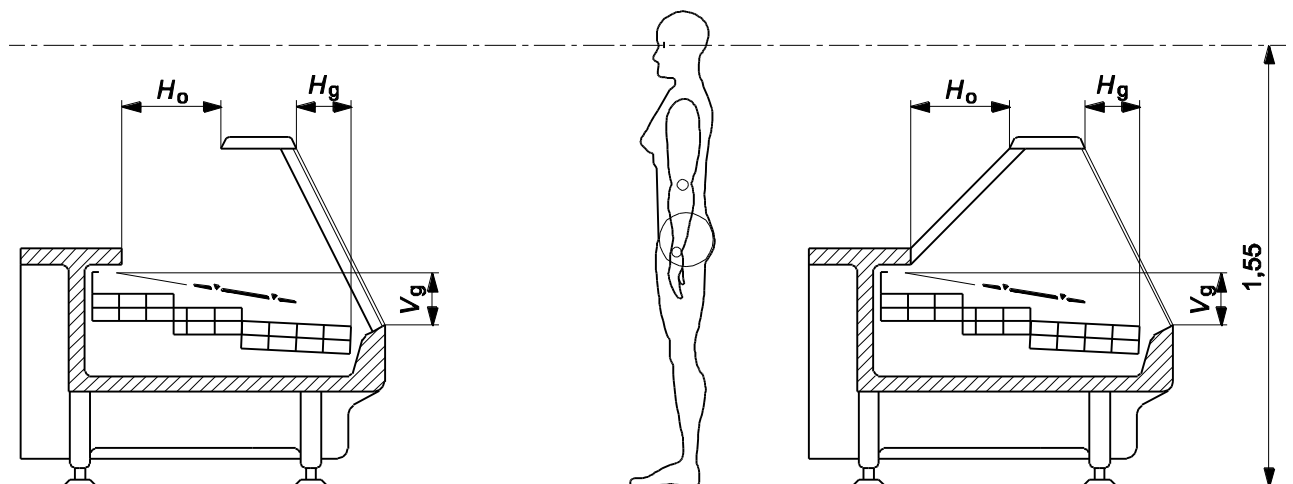
- H: Horizontal projection, in metres
- V: Vertical projection, in metres
- L: Cabinet length without end walls, in metres
- Index o: is the open
- Index g: is the glazed
- Index h: is the horizontal
- Index v: is the vertical
- Index t: is the top
- Index b: is the base
- Index r: is the rear
- Index f: is the front
- Index w: is the end wall

Price marking rail ticket holders in the front of the shelf are not deducted from the TDA measurement providing that they are 60 mm or less in height. If higher than 60 mm they shall be completely deducted.

Opaque areas of frames, handrails, handles, air guides or front risers that obstruct the view of the product shall have the projected area deducted from the measurement of the TDA.

Figures A.1 to A.16 illustrate the calculation for the most common cabinets with a length of 2,5 m.

Dimensions in metres

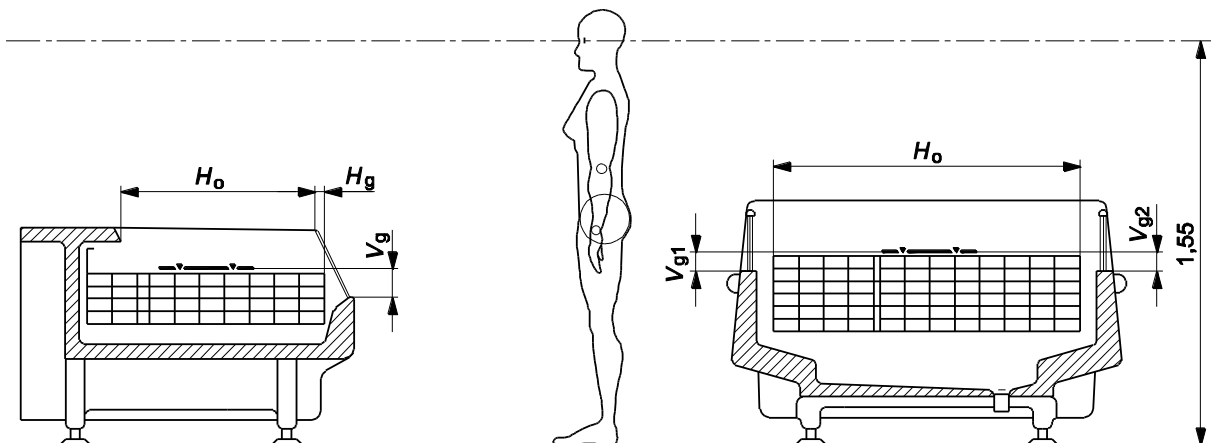


Loh = 2,500	Ho = 0,291	Loh = 2,400	Ho = 0,350
Lgh = 2,500	Hg = 0	Lgh = 2,500	Hg = 0,194

$L_{ov} = 2,500$	$V_o = 1,367$	$L_{ov} = 2,500$	$V_o = 0$
$L_{gv} = 2,500$	$V_g = 0$	$L_{gv} = 2,500$	$V_g = 0,185$
$TDA = (H_o \times L_{oh}) + (H_g \times L_{gh}) + (V_o \times L_{ov}) + (V_g \times L_{gv})$		$TDA = (H_o \times L_{oh}) + (H_g \times L_{gh}) + (V_o \times L_{ov}) + (V_g \times L_{gv})$	
1,785		1,788	

Figure A.2—Horizontal, serve-over counters

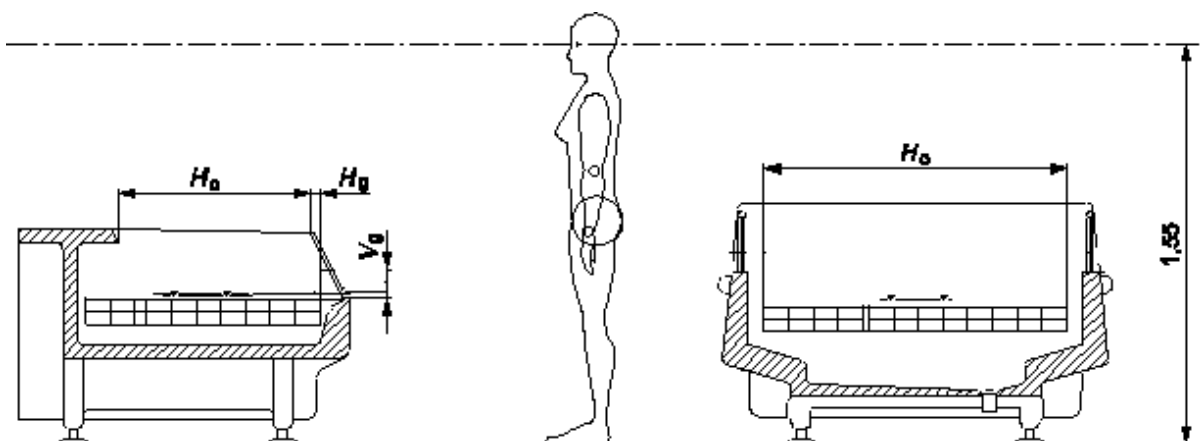
Dimensions in metres



		$L_{oh} = 2,500$	$H_o = 1,176$
$L_{oh} = 2,500$	$H_o = 0,770$	$L_{gh} = 2,500$	$H_g = 0$
$L_{gh} = 2,500$	$H_g = 0,012$	$L_{ov} = 2,500$	$V_o = 0$
$L_{ov} = 2,500$	$V_o = 0$	$L_{gv1} = 2,400$	$V_{g1} = 0,058$
$L_{gv} = 2,500$	$V_g = 0,090$	$L_{gv2} = 2,400$	$V_{g2} = 0,058$
$TDA = (H_o \times L_{oh}) + (H_g \times L_{gh}) + (V_o \times L_{ov}) + (V_g \times L_{gv})$		$TDA = (H_o \times L_{oh}) + (H_g \times L_{gh}) + (V_o \times L_{ov}) + (V_{g1} \times L_{gv1}) + (V_{g2} \times L_{gv2})$	
2,18		3,218	

Figure A.3—Horizontal, open, wall-site and island cabinets

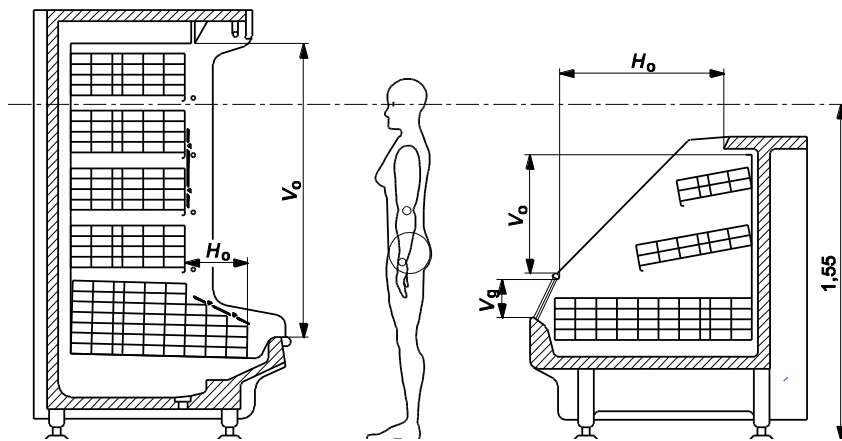
Dimensions in metres



		Loh = 2,500	Ho = 1,176
Loh = 2,500	Ho = 0,770	Lgh = 2,500	Hg = 0
Lgh = 2,500	Hg = 0,012	Lov = 2,500	Vo = 0
Lov = 2,500	Vo = 0	Lgv1 = 2,400	Vg1 = 0
Lgv = 2,500	Vg = 0,010	Lgv2 = 2,400	Vg2 = 0
TDA = (Ho × Loh) + (Hg × Lgh) + (Vo × Lov) + (Vg × Lgv)		1,98	TDA = (Ho × Loh) + (Hg × Lgh) + (Vo × Lov) + (Vg1 × Lgv1) + (Vg2 × Lgv2)
			2,928

Figure A.3.1—Horizontal, open, wall-site and island cabinets with sensitive foodstuff load

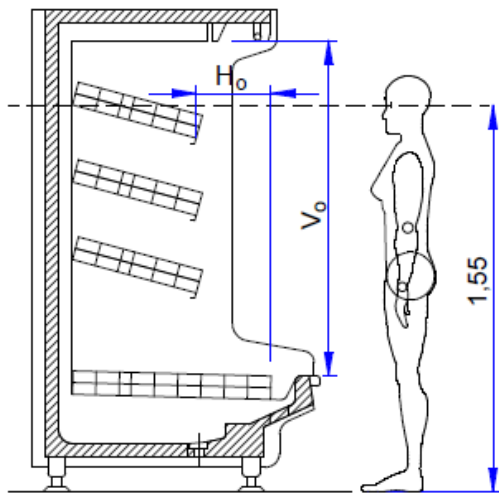
Dimensions in metres



Loh = 2,500	Ho = 0,291	Loh = 2,500	Ho = 0,761
Lgh = 2,500	Hg = 0	Lgh = 2,500	Hg = 0
Lov = 2,500	Vo = 1,367	Lov = 2,500	Vo = 0,546
Lgv = 2,500	Vg = 0	Lgv = 2,400	Vg = 0,175
TDA = (Ho × Loh) + (Hg × Lgh) + (Vo × Lov) + (Vg × Lgv)		4,145	TDA = (Ho × Loh) + (Hg × Lgh) + (Vo × Lov) + (Vg × Lgv)
			3,688

Figure A.4—Vertical, multi-deck and semi-vertical cabinets

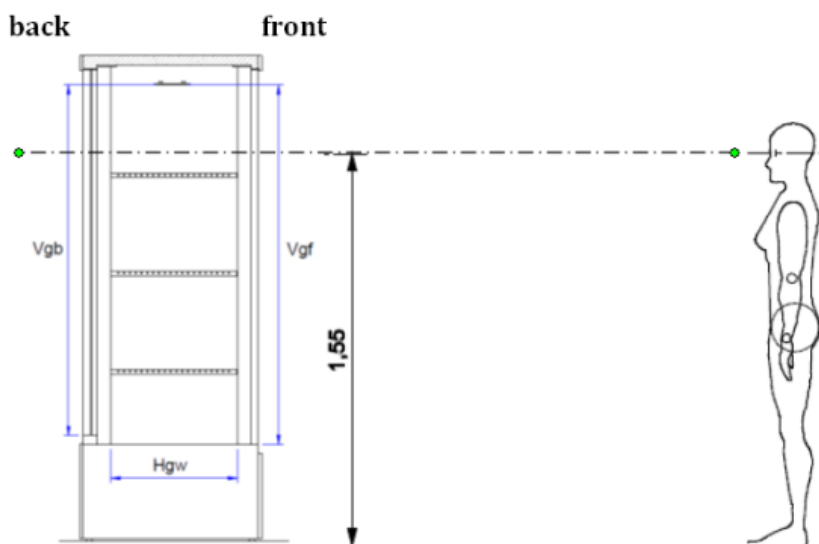
Dimensions in metres



Loh = 2,500	Ho = 0,321
Lgh = 2,500	Hg = 0
Lov = 2,500	Vo = 1,367
Lgv = 2,500	Vg = 0
TDA = (Ho × Loh) + (Hg × Lgh) + (Vo × Lov) + (Vg × Lgv)	
4,220	

Figure A.4.1—Vertical, multi-deck with tilted shelves and sensitive foodstuffs

Dimensions in metres



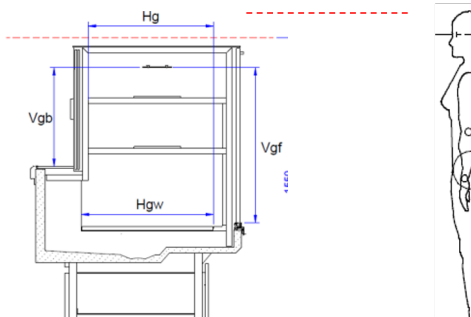
$TDA = (Vgb \times Lgvb) + (Vgf \times Lgvf) + 2 \times (Hgw \times Vgb)$

Fig.A.4.2: Transparent back, front and sides cabinet

Dimensions in metres

back

front



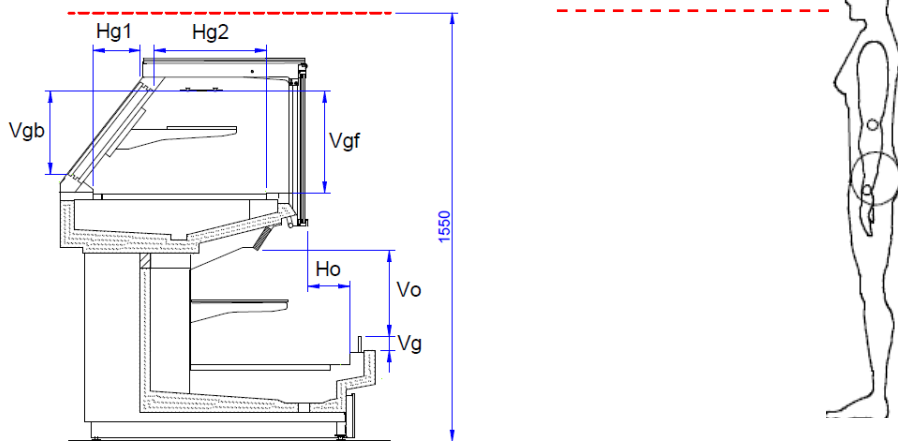
$$TDA = (Vgb \times Lg_{vb}) + (Vgf \times Lg_{vf}) + (Hg \times Lgh) + 2 \times (Hgw \times Vgf)$$

Fig.A.4.3 Transparent cabinet back, front, sides and top

Dimensions in metres

back

front

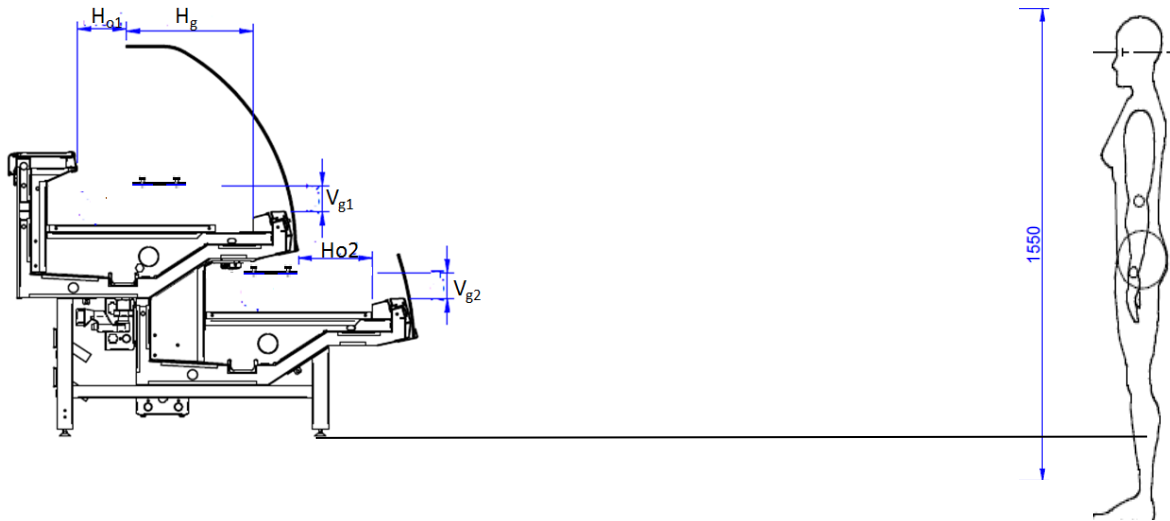


$$(Vo + Vg + Vgb + Vgf) \geq 0,45 * (Hg1 + Hg2 + Ho)$$

$$TDA = (Vgb \times Lg_{vb}) + (Vgf \times Lg_{vf}) + (Vo + Vg) \times Lv + (Hg1 \times Lgh1) + (Hg2 \times Lgh2)$$

Fig. A.5 Vertical combined - YC3 Chilled, glass door top, open bottom

Dimensions in metres

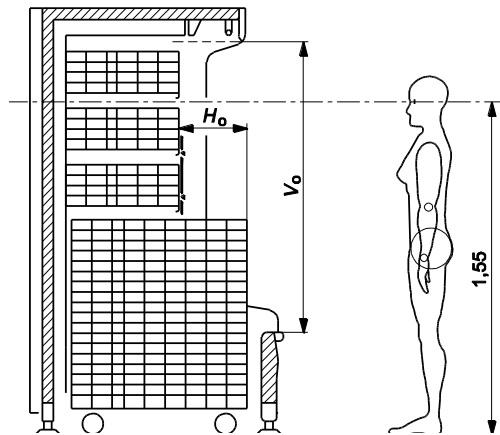


$$|V_{g2} + V_{g1}| \leq 0,45 * (H_{o1} + H_g + H_{o2})$$

$$TDA = (V_g 2 \times L_{g2}) + (V_g 1 \times L_{g1}) + (H_{o1} \times L_{h_{o1}}) + (H_g \times L_{h_g}) + (H_{o2} \times L_{h_{o2}})$$

Fig. A.6 Horizontal combined refrigerated cabinet - YC1 Chilled, open top, open bottom

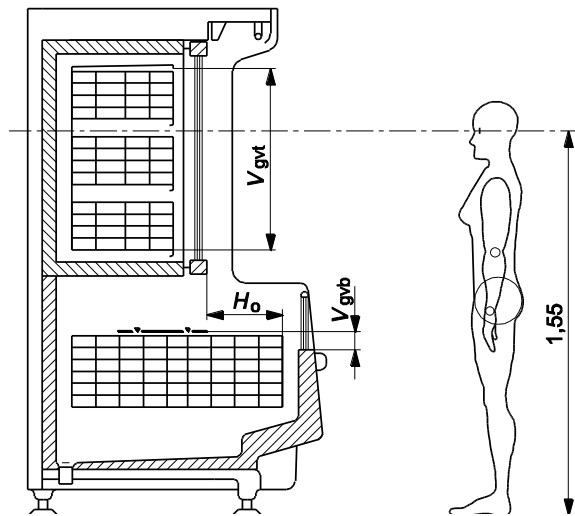
Dimensions in metres



Loh = 2,500	Ho = 0,321
Lgh = 2,500	Hg = 0
Lov = 2,500	Vo = 1,367
Lgv = 2,500	Vg = 0
TDA = (Ho × Loh) + (Hg × Lgh) + (Vo × Lov) + (Vg × Lgv)	4,220

Figure A.7—Vertical, roll-in cabinet

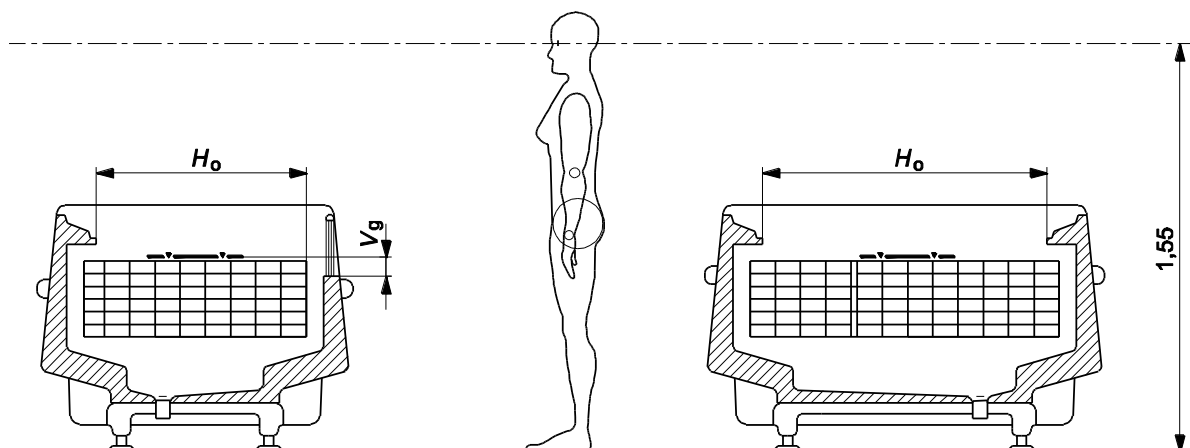
Dimensions in metres



Loh = 2,500	Ho = 0,306
Lgh = 2,500	Hg = 0
Lov = 2,500	Vo = 0
Lgvt = 2,250	Vgt = 0,731
Lgvb = 2,400	Vgb = 0,058
TDA = (Ho x Loh) + (Hg x Lgh) + (Vo x Lov) + (Vgt x Lgvt) + (Vgb x Lgvb)	
2,549	

Figure A.8—Combined, glass door top, open bottom, cabinet

Dimensions in metres

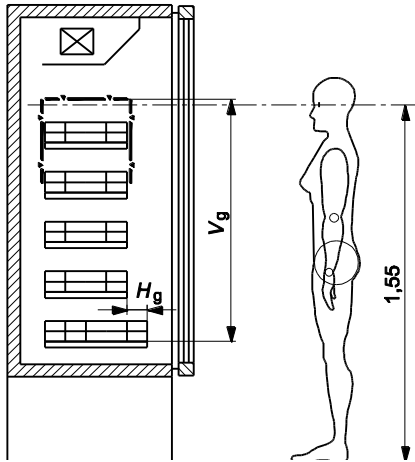


Loh = 2,500	Ho = 0,800	Loh = 2,500	Ho = 1,084
Lgh = 2,500	Hg = 0	Lgh = 2,500	Hg = 0
Lov = 2,500	Vo = 0	Lov = 2,500	Vo = 0
Lgv = 2,400	Vg = 0,058	Lgv = 2,500	Vg = 0

$TDA = (Ho \times Loh) + (Hg \times Lgh) + (Vo \times Lov) + (Vg \times Lgv)$	2,139	$TDA = (Ho \times Loh) + (Hg \times Lgh) + (Vo \times Lov) + (Vg \times Lgv)$	2,710
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Figure A.9—Horizontal, open, island cabinets

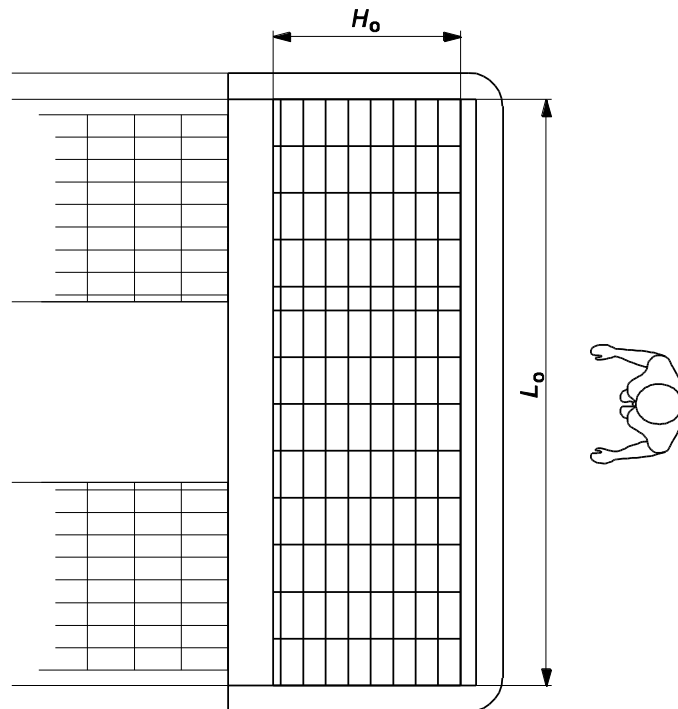
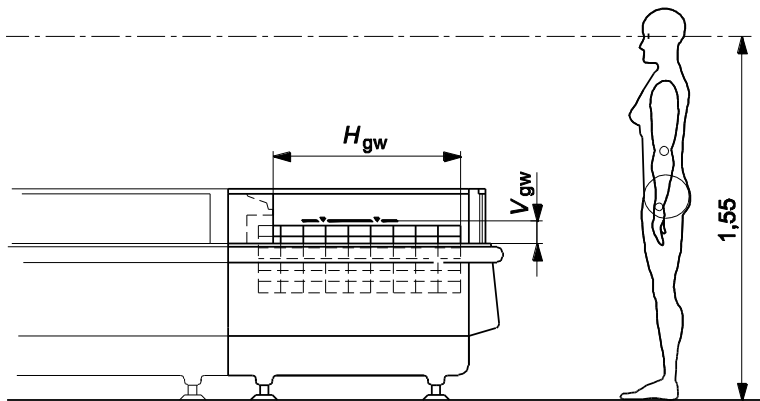
Dimensions in metres



$Loh = 2,500$	$Ho = 0$
$Lgh = 2,500$	$Hg = 0,25$
$Lov = 2,500$	$Vo = 0$
$Lgv = 2,250$	$Vg = 1,053$
$TDA = (Ho \times Loh) + (Hg \times Lgh) + (Vo \times Lov) + (Vg \times Lgv)$	2,994

Figure A.10—Vertical, glass door, cabinet

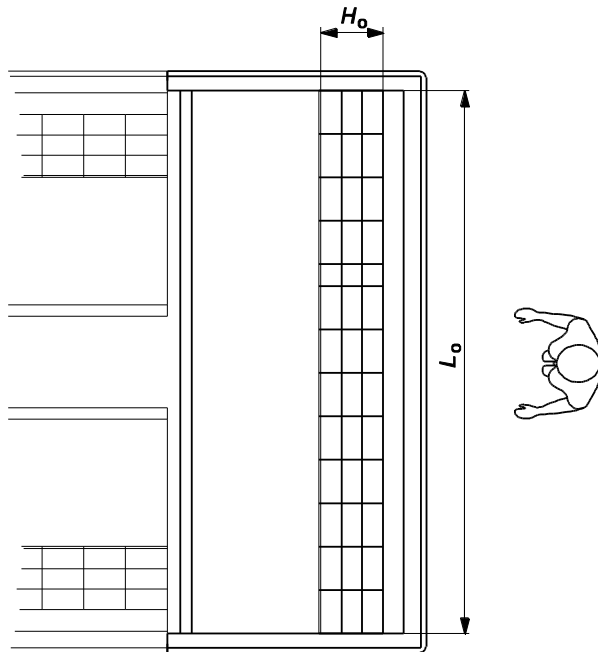
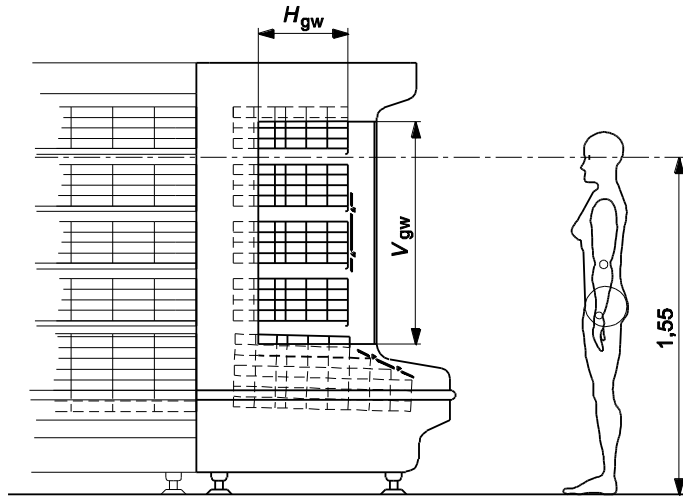
Dimensions in metres



Loh = 2,500	Ho = 0,800
Lgh = 2,500	Hg = 0
Lov = 2,500	Vo = 0
Lgv = 2,400	Vg = 0,058
Vgw = 0,058	Hgw = 0,800
TDA = [Ho × Loh] + [Hg × Lgh] + [Vo × Lov] + [Vg × Lgv] + [2 × Vgw × Hgw]	
2,232	

Figure A.11—Horizontal, open, island end cabinet

Dimensions in metres



$L_{oh} = 2,500$	$H_o = 0,291$
$L_{gh} = 2,500$	$H_g = 0$
$L_{ov} = 2,500$	$V_o = 1,367$
$L_{gv} = 2,500$	$V_g = 0$
$V_{gw} = 1,022$	$H_{gw} = 0,415$
$TDA = (H_o \times L_{oh}) + (H_g \times L_{gh}) + (V_o \times L_{ov}) + (V_g \times L_{gv}) + [2 \times V_{gw} \times H_{gw}]$	4,993

Figure A.12—Vertical, multi-deck end cabinet

For semi vertical end cabinets or standalone cabinets with a transparent side wall, the side area shall be calculated as the area resulting from the orthogonal projection of the load limit line, the base deck line and the rear panel line. In case shelves have limitation of loading with respect to full loading, each shelf shall be calculated as a separate area. Any overlapping non transparent area, like silkscreen, shall be subtracted (see Figures A.13, A.14 and A.15, where the green area represents side TDA).

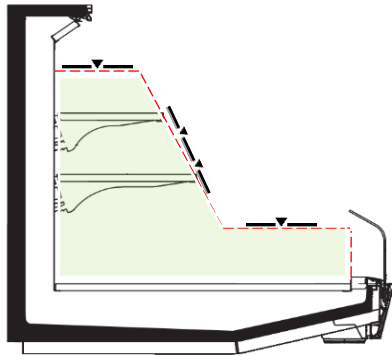


Figure A.13—Semi vertical, transparent end wall with oblique load limit line

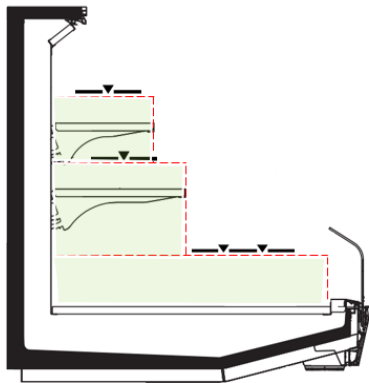


Figure A.14 —Semi vertical, transparent end wall with horizontal load limit line

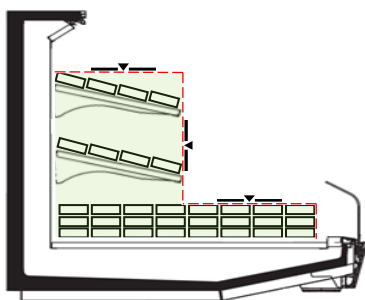
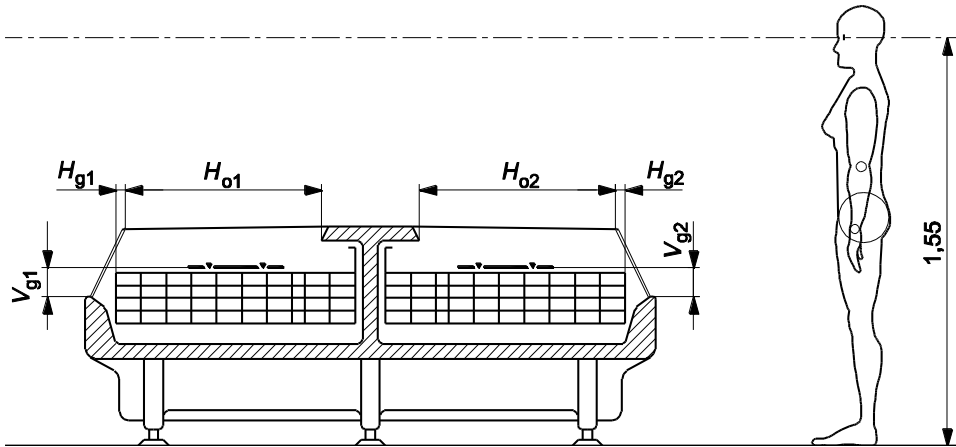


Figure A.15 —Semi vertical, transparent end wall with vertical load limit line with sensitive foodstuff on top shelf

Dimensions in metres



Loh1 = 2,500	Ho1 = 0,770
Loh2 = 2,500	Ho2 = 0,770
Lgh1 = 2,400	Hg1 = 0,012
Lgh2 = 2,400	Hg2 = 0,012
Lgv1 = 2,400	Vg1 = 0,090
Lgv2 = 2,400	Vg2 = 0,090
TDA = (Ho1 × Loh1) + (Ho2 × Loh2) + (Hg1 × Lgh1) + (Hg2 × Lgh2) + (Vg1 × Lgv1) + (Vg2 × Lgv2)	
4,340	

Figure A.16—Island with air discharge in the middle

About Eurovent

Eurovent is Europe's Industry Association for Indoor Climate (HVAC), Process Cooling, and Food Cold Chain Technologies. Its members from throughout Europe represent more than 1.000 organisations, the majority small and medium-sized manufacturers. Based on objective and verifiable data, these account for a combined annual turnover of more than 30bn EUR, employing around 150.000 people within the association's geographic area. This makes Eurovent one of the largest cross-regional industry committees of its kind. The organisation's activities are based on highly valued democratic decision-making principles, ensuring a level playing field for the entire industry independent from organisation sizes or membership fees.

Our Member Associations

Our Member Associations are major national sector associations from Europe that represent manufacturers in the area of Indoor Climate (HVAC), Process Cooling, Food Cold Chain, and Industrial Ventilation technologies.

The more than 1.000 manufacturers within our network (Eurovent 'Affiliated Manufacturers' and 'Corresponding Members') are represented in Eurovent activities in a democratic and transparent manner.

→ For in-depth information and a list of all our members, visit www.eurovent.eu