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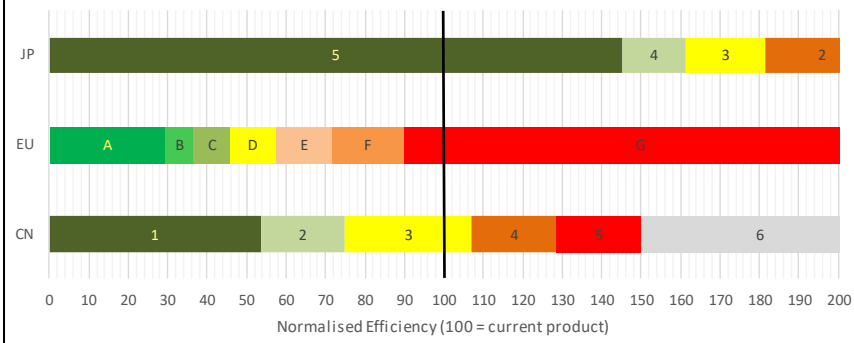
ColApp

Refrigerator testing
&
energy label calculation software

complying with
IEC 62552-1-2-3: 2015 based standards

Energy labels and MEPS	Evaluation Date:	1-May-2020	Volumes	Version 5.02



		Calculation basis:	Declared		
Europe		SAE	186.60 [kWh/y]	Frozen	49 [dm3]
		AE	260.00 [kWh/y]	Other	200 [dm3]
		EEI	139.3 [%]	Total	249 [dm3]
		Class	G [-]	Chill	0 [dm3]
EU: 2019/2019 and 2019/2016		Maximum EEI	125 [%]	Unfrozen	200 [dm3]
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China		SAE (Ebase)	535.47 [kWh/y]	Vadjusted	378 [dm3]
		AE (standard Es)	250.00 [kWh/y]		
		EEI (standard EEI)	46.69 [%]		
		Standard Class	3 [-]		
		AE (Total Es)	250.00 [kWh/y]		
		EEI (Total EEI)	46.69 [%]		
		Total Class	1 [-]		
GB 12021:2015 Characteristics		Emax	374.83 [kWh/y]		
Japan		SAE	348.23 [kWh/y]	Vadjusted	308 [dm3]
		AE	240.00 [kWh/y]		
		EEI	1.45		
		Class	5 star [-]		
JIS C 9801:2015					

Abbreviations

SAE	Standard Annual Energy	EEI	Energy Efficiency Index
AE	Annual Energy	Class	Energy Efficiency Class

ColApp in short

The Re/genT laboratory has developed measurement evaluation software called ColApp, which is successfully distributed to many refrigerator testing laboratories and refrigerator manufacturers all over the world. ColApp complies with the IEC 62552-1-2-3: 2015 standards and amendments, as well as regional standards derived from it such as the European EN 62552-1-2-3: 2020 standard. The software incorporates energy consumption and performance measurements for domestic refrigerators and contains all stabilization criteria. These criteria are not practical to be evaluated manually and require dedicated algorithms, which have been integrated into the ColApp software. Measurement results are being visualized with a transparent, graphical user interface.

Regional energy regulations (e.g. labels and limits) are being calculated automatically, which provides a clear overview of the different energy classes of a specific refrigerator based on the measurement results from a specific sample tested. ColApp is regularly updated to include regions with new energy regulations.

Background information

Re/genT is an ISO 17025 accredited testing laboratory. Testing the energy consumption and performance of domestic freezers and refrigerators is a daily activity, being performed by experienced testing engineers for more than 25 years. In order to facilitate its own testing process Re/genT has continuously improved and used its laboratory, software.

Mr. Martien Janssen, director of Re/genT, has been actively involved in the development of the IEC 62552-1-2-3: 2015 and EN 62552-1-2-3: 2020 testing standards for domestic refrigerators. His role as expert and convener of the IEC SC59M/MT2 technical committee has facilitated this activity. In parallel with the development of the standard, Re/genT has continuously used and updated its measurement software in order to keep the software compliant with the developed standard. This process finally resulted in measurement software named ColApp, which is:

ISO 17025 compliant and validated software for testing domestic refrigerators and freezers according to IEC 62552-1-2-3: 2015 based standards.

China, Japan and Europe have already decided to apply IEC 62552-1,-2,-3: 2015 to determine the energy efficiency classes; more countries will follow. ColApp automatically calculates the energy efficiency classes for the countries or regions using this standard. To keep the software compliant with the regulations, ColApp will be regularly updated with energy label and energy limit regulations all over the world.

ColApp and ColApp-lite

Two full functional software packages are available named: ColApp and ColApp-lite. The follow scheme explains the difference.

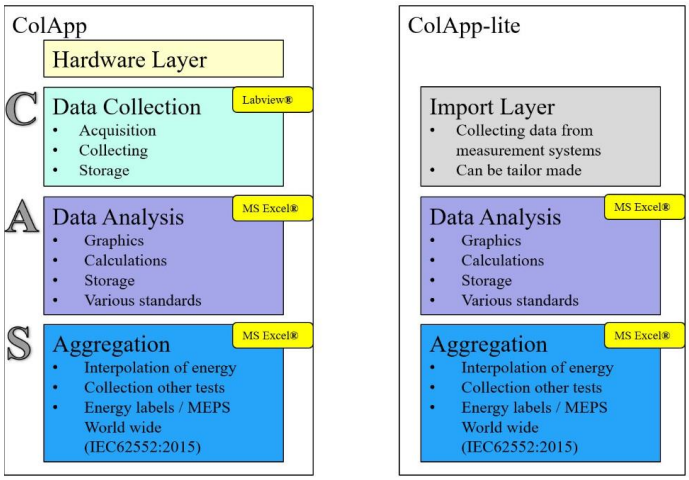

Figure 1; Overview of modules inside ColApp and ColApp-lite

The module ColApp-C has the functionality to automatically read measurement data using Labview based data communication. The software communicates with various state of the art temperature and power measurement data acquisition measurement hardware. ColApp-lite does not contain such a connection to measurement hardware, but contains an import tool for automatic reading of measurement data. This import tool can be adapted to the customer data acquisition and software system.

ColApp-A: Test analysis with automatic stability detection

ColApp has integrated functions to automatically evaluate stability for the following tests:

- Energy consumption test, SS1 case
- Energy consumption test, defrosts, D&F case
- Energy consumption test, SS2 case
- Storage test
- Freezing capacity test
- Cooling capacity test
- Pull down test
- Temperature rise

Stability compliance is automatically shown in a graphical format on your display screen, which make testing analysis practical, accurate and easy to do.

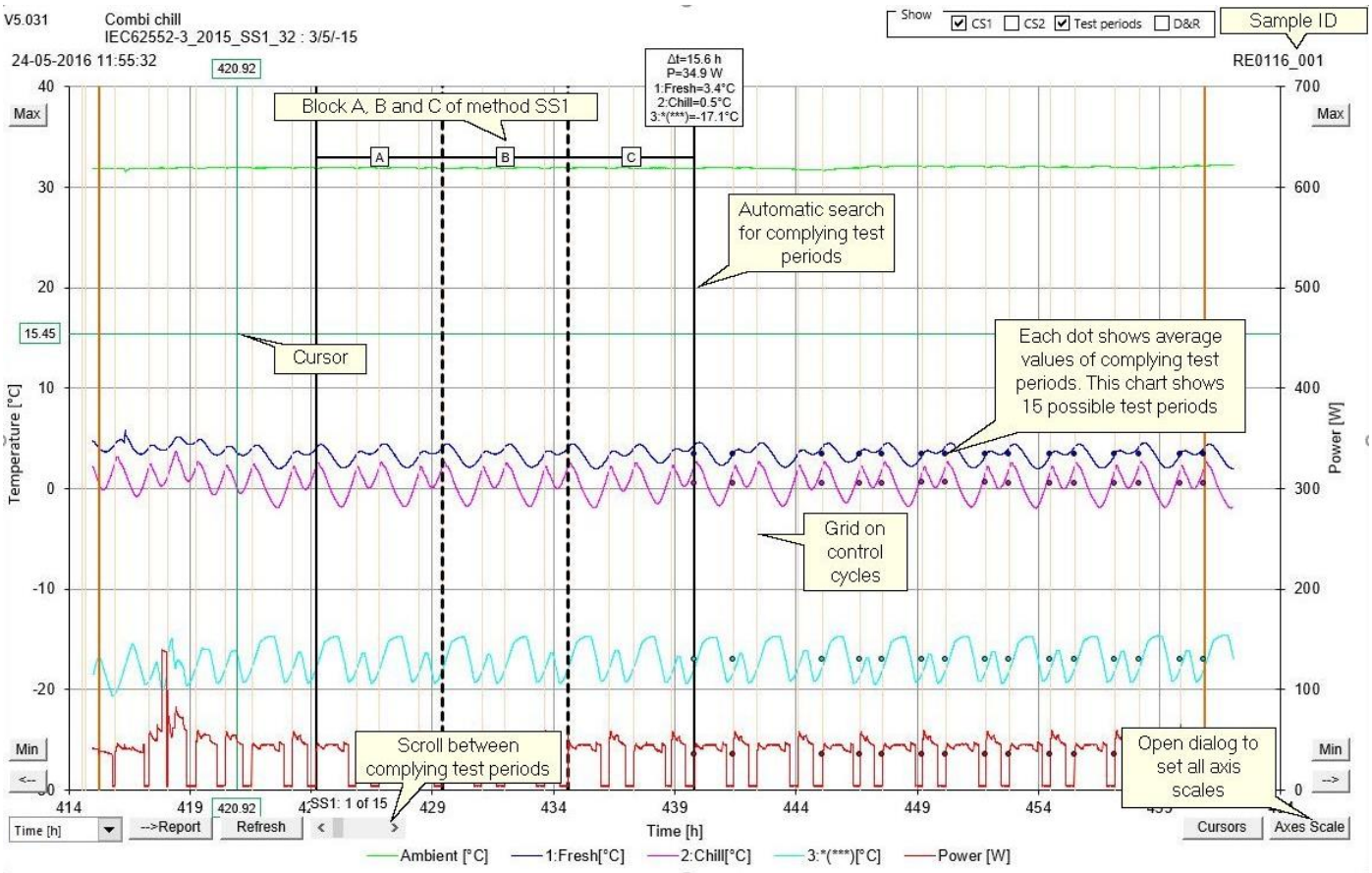

Figure 2; Example of a SS1 energy consumption test analysis

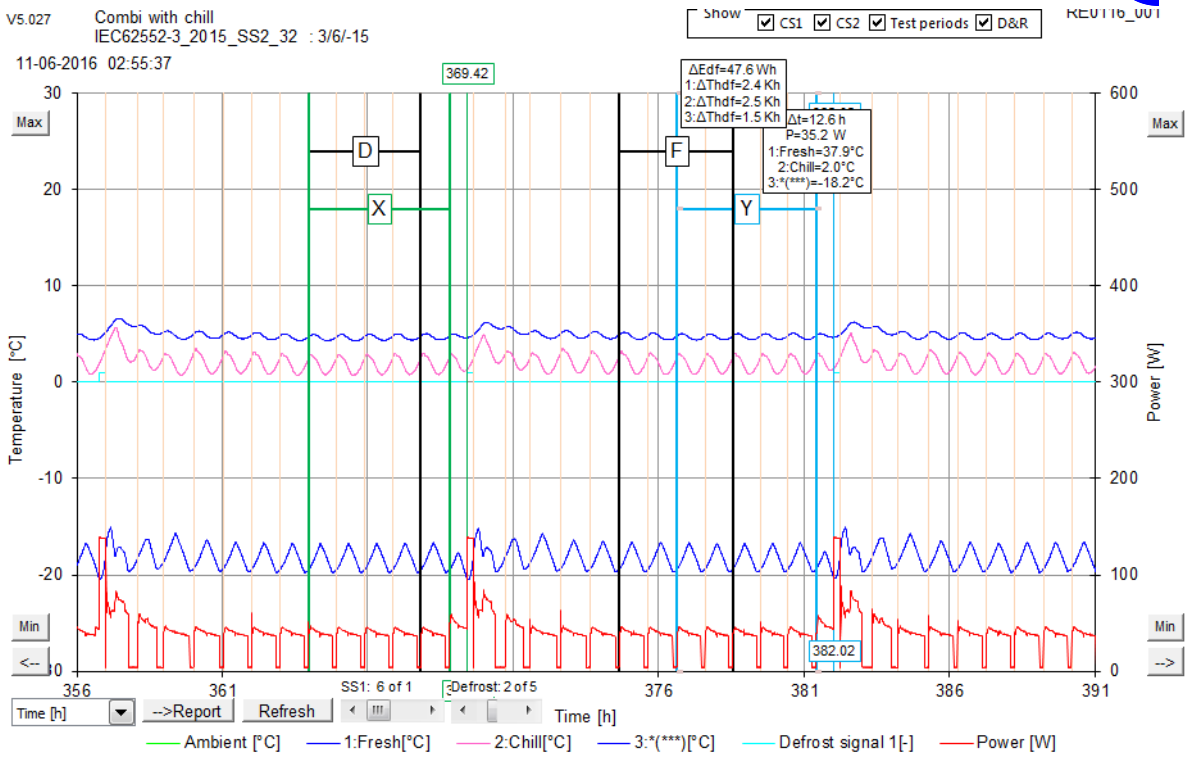

Figure 3; Example of a SS2 energy consumption test analysis which is combined with a D&F defrost analysis

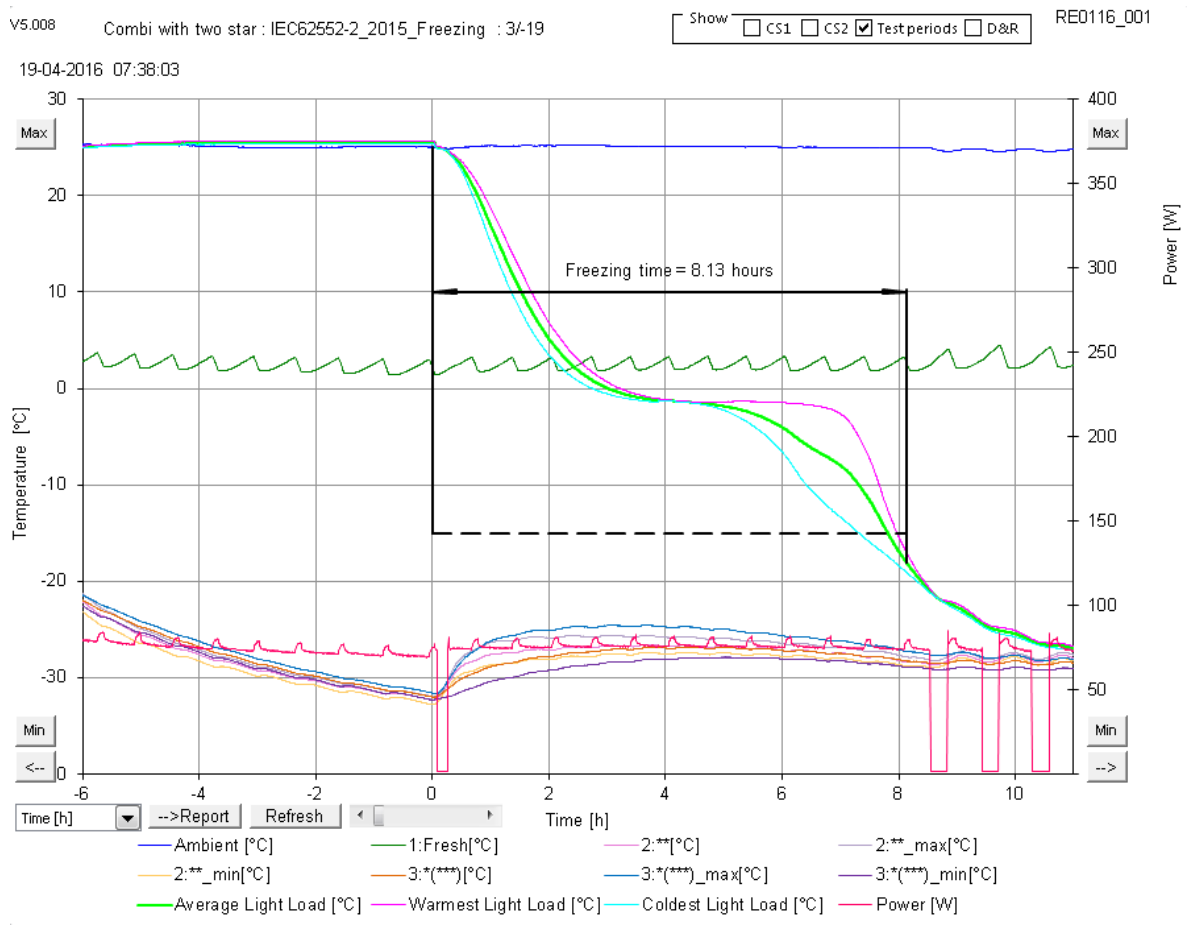

Figure 4; Example of a freezing capacity test

ColApp-S: Collection of multiple tests and interpolation tool consumption

ColApp contains a module which collects (aggregates) the energy consumption data of tests run at 16 and 32°C ambient temperature, this at different control settings. This module automatically interpolates refrigerators with up to 6 different compartments where each compartment can have its own temperature control. Interpolation results are visualized in a clear graphical format, which gives a perfect overview of the measurement points taken. Evaluation of the suitability of tested operating points, become visual immediately, thereby easing the decision process whether additional tests are required or not.

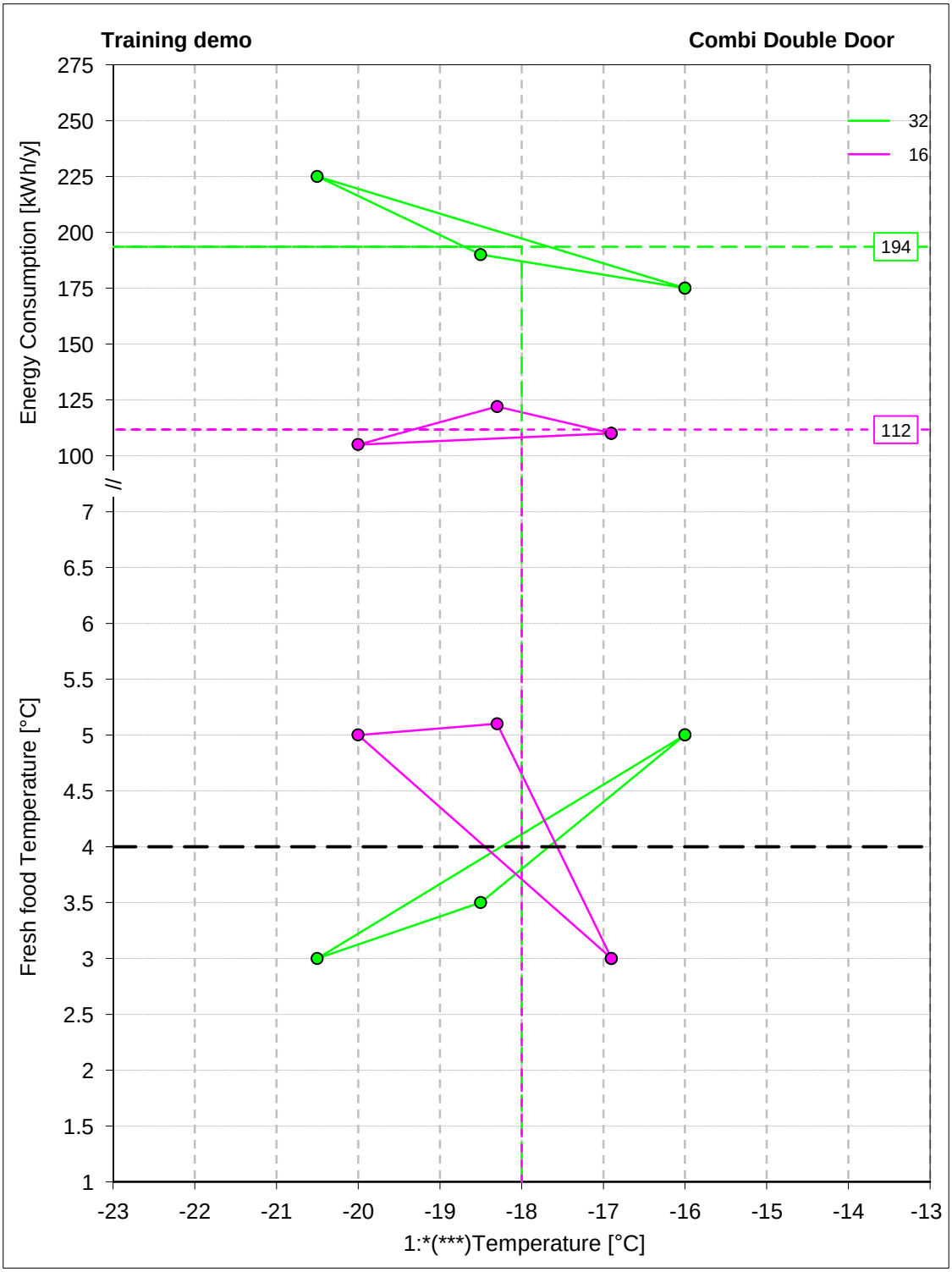

Figure 5; Interpolation example (triangulation) of a combi refrigerator with freezer and fresh food compartment control

ColApp-S: Reporting template

ColApp contains the default template of a report according EN62552-1:2020, which is automatically generated based on your measurement results.

EN Report	EN 62552-1:2020	Copy to report	Version 5.02

No.:	12345	Date:	dd/mmm/yyyy	Type:	SomeFreezer SF1234
Test report - Household refrigeration appliance		**Testing institute:**	Science lab Ltd. Anywhere	**Manufacturer:**	Man-U-Fact Ltd.
EN 62552-1,-2,-3:2020		**Approved by:**	Name department	**Tested by:**	Name department
		Name	.....	Name	.....

Supplier name:	Man-U-Fact Ltd.
Model identifier:	xyz1234

Low noise appliance:	No	Declared efficiency class:	G
Wine storage appliance:	No	Declared energy efficiency index EEI:	1.4
Other refrigerating appliance:	Yes	Standard annual energy consumption [kWh/a]:	186.60
Design type:	Free standing	Declared climate class:	SN/T
Number of external doors:	2	Minimum temperature [1]): [°C]	10
Number of compartments:	2	Maximum temperature [1]): [°C]	43
Winter setting:	No	Combi parameter:	1.471
Fast freezer facility:	No	Load factor:	1.0
Anti-condensation heater type:	No	Door compensation factor:	1.00

[1]) Minimum/Maximum ambient temperature [°C] for which the refrigerator appliance is suitable

Overall dimensions [mm]:	H	1234	x W	1234	x D	1234

All appliances	Declared	Tested
Total volume [L]:	249	270.75

Wine coolers	Declared	Tested
Bottle capacity [pcs]:	1234	1234
Temperature fluctuation test passed?		
Relative humidity test passed?		

Compartments [2])	Type	Defrosting type [auto=A,	Star rating	Declared Volume [L]	Tested Volume [L]	Difference	Recommended temperature setting [°C]	Storage test passed? High temp.	Storage test passed? Low temp.
1	Fresh food	A		200.0	222.8	11.4%	0 ≤ +4		
2	*(***) = 4 star/freezer	A	4	49.0	48.0	-2.0%	≤ -18		

Energy consumption 16°C ambient temperature	Tested [3])
Incremental defrost energy cons. ΔE_{df} [Wh]:	85.6 / 0.0
Defrost and recovery interval Δt_{df} [h]:	46.79 / 44.63
Daily energy consumption E16 [kWh/d]	0.406

Other performance characteristics	Tested	Passed?
Temperature rise time [h]:	0.0	
Freezing capacity [kg/24h]	0.0	
Noise emission [dB(A)]:	12.3	
Noise emission class:	D	
Ice making capacity [kg/24h]	0.0	

Energy consumption 32°C ambient temperature	Tested [3])
Incremental defrost energy cons. ΔE_{df} [Wh]:	94.3 / 0.0
Defrost and recovery interval Δt_{df} [h]:	23.39 / 22.31
Daily energy consumption E32 [kWh/d]:	1.037

Circumvention	Case
Circumvention measures suspected	
Tests carried out to evaluate possible circumvention devices?	

Auxiliary energy consumption [kWh/a]:	0.0	Calculated

	Declared	Tested	Difference	Passed?
Annual energy consumption AE [kWh/a]:	260.00	260.00	0.0%	

ColApp-S: Energy label and energy limit calculation

ColApp contains a module which calculates the energy efficiency label for regions using the IEC 62552-1-2-3: 2015 based standards for their label. Updates will be provided on a regular basis to include energy regulations anywhere around the world.

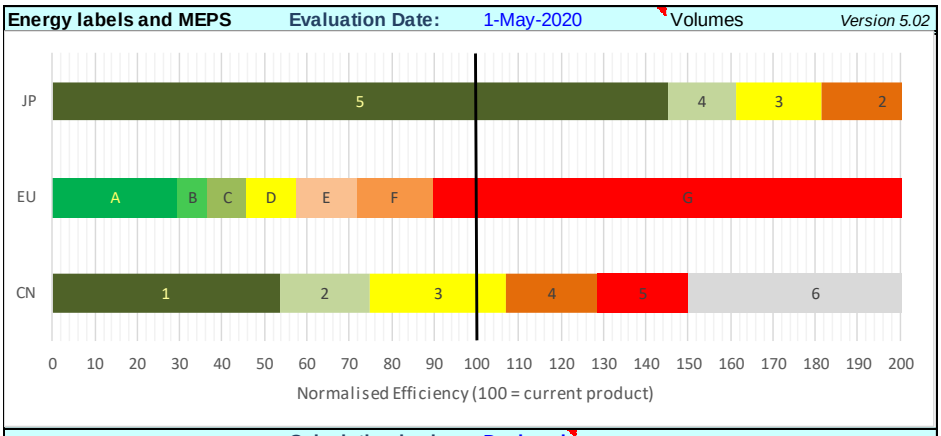

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Figure 6; Example of the energy label calculations for different regions or countries

ColApp training

Once ColApp is installed at the customer's testing location, Re/genT will educate ColApp users how to efficiently use the program. Demo test data for different domestic appliances has been developed specifically for these training purposes. Note that upon request such a ColApp training can be combined with a detailed training of the IEC 62552-1-2-3: 2015 based standards.