

TECHNICAL SPECIFICATIONS OF ETA ELECTRIC UNWIRED CABINETS

Besides the functional and aesthetic quality of its products, ETA guarantees their safety through certification according to the main industry directives and standards, and approval by certified institutes, as specified on the namaplate.

SYSTEM CERTIFICATIONS



PRODUCT CERTIFICATIONS

BIONIQ BIONIQ LIGHT	BQC BQLC BST	IP55		NEMA1						
SUITE CABINETS	ARETA ARETX ASSEMBLED	IP55	IK10	NEMA1,12	AREAS 1,2,21,22 (2GD)					
	ARETA FLAT-PACK	IP55	IK10	NEMA1,12	AREAS 1,2,21,22 (2GD)					
BOXES WITH BLANK DOOR	ST STX	IP66	IK10	NEMA1,12, 4,4X	AREAS 1,2,21,22 (2GD)					
COMPACT ENCLOSURES	CS CSX	IP55	IK10	NEMA1,12	AREAS 1,2,21,22 (2GD)					
BOXES WITH GLAZED DOOR AND DOUBLE DOOR	STP STPX ST STX	IP66	IK10	NEMA1,12	BLANK DOOR ONLY: AREAS 1,2,21,22 (2GD)					
TERMINAL BOXES	SDV SDF SDX	IP66	IK10	NEMA1,12 4, 4X	AREAS 1,2,21,22 (2GD)					
CONTROL DESKS	AE AEX ME MEX	IP55	IK10	NEMA1,12						
MONOBLOC DESKS	ZBA ZBX SBA SBX	IP55	IK10	NEMA1,12						
SUITE CABINETS	E.GO E.GOX	IP55	IK10	NEMA1,12	AREAS 1,2,21,22 (2GD)					
MONOBLOC CABINETS	ATB8 ATBX	IP66 (single door) IP55 (double door)	IK10	NEMA1,12	AREAS 1,2,21,22 (2GD)					
PC CABINETS	ATPC	IP55	IK10							
RACK BOXES	CR	IP55	IK10							
EMC	ARETZ STE SDVE	IP55	IK10	NEMA1						
FANS AND FILTERS	WT	IP54		NEMA1,3R, 12						
PRODUCTS	NOTE: FOR ATEX G=GAS D=DUST					USA CANADA	GERMANY	ITALY	EUROPE	EUROPE
						UL508A UL50 C22.2 n. 14 95 and CAN/CSA C22.2 n. 94-M91	IEC EN 62208	naval industry standards part C - machines, plants and protection against fire CHAPT. 3 SECT. 6 tab. 1 item 12	IEC EN 62208	DIRECTIVE ATEX

NAMEPLATE INFORMATION (EC MARKING)

Nameplate information (EC marking). Each cabinet, enclosure and control desk is provided with a nameplate where the trademark, the model and the marks of the certification bodies are specified. Mandatory EC marking on the nameplate is the "visual proof of the product's conformity to the requirements of applicable directives".

LAWS AND REFERENCE STANDARDS

LAWS

- Law 186/68
- LAW DECREE 22 January 2008 , No. 37: Regulation for the enforcement of Article 11 (14th revision), Paragraph 13, Point a of Law No. 248 of 2 December 2005, concerning the reorganization of regulations for the installation of plants inside buildings (canceling and replacing Law 46/90 and DPR 447/91). These state the obligation to build state-of-the-art equipment and plants and include the assumption that equipment and plants in compliance with IEC standards are "state of the art".
- Low Voltage directive 2006/95/EC (relating to electrical equipment designed for use within certain voltage limits). The electrical material regulated by this directive can only be distributed if manufactured according to the state of the art in terms of safety, and must be provided with EC marking, certifying its compliance to applicable laws (the manufacturer is liable for such certification).
- Electromagnetic compatibility directive 2004/18/EC (EMC)

REFERENCE STANDARDS

- EN 60 439-1 (CEI 17-13/1) (basic standard for type-tested and partially type-tested switchgear assemblies)
- EN 60 439-3 (CEI 17-13/3) (for ASD equipment)
- EN 60439-4 (17-13/4) (for ASC equipment)
- CEI 23-51 (household and similar use)
- CEI 17-43 (method for the determination of temperature-rise)
- CEI 17-52 (method for the determination of short circuit resistance)
- CEI EN 62208 (IEC EN 62208) (basic standard for unwired electrical cabinets)
- CEI EN 60529 (CEI 70-1) (degrees of protection provided by enclosures)
- CEI EN50102 (CEI 70-3) (degrees of protection provided by enclosures for electrical equipment against external mechanical impact - Code IK)



FOCUS ON TESTS PRESCRIBED FOR EN 60439-1

TESTS	REF.	TYPE-TESTED	PARTIALLY TYPE-TESTED
TEMPERATURE-RISE LIMITS	8.2.1	VERIFICATION OF TEMPERATURE-RISE LIMITS THROUGH TESTS (TYPE TESTING)	VERIFICATION OF TEMPERATURE-RISE LIMITS THROUGH TESTS OR EXTRAPOLATION FROM TYPE-TESTED EQUIPMENT (AS) THAT HAVE PASSED TYPE TESTING
DIELECTRIC PROPERTIES	8.2.2	VERIFICATION OF DIELECTRIC PROPERTIES THROUGH TESTS (TYPE TESTING)	VERIFICATION OF DIELECTRIC PROPERTIES ACCORDING TO 8.2.2 OR 8.3.2, OR VERIFICATION OF INSULATION RESISTANCE ACCORDING TO 8.3.4 (SEE NO. 11)
SHORT CIRCUIT WITHSTAND STRENGTH	8.2.3	VERIFICATION OF SHORT CIRCUIT RESISTANCE THROUGH TESTS (TYPE TESTING)	VERIFICATION OF SHORT CIRCUIT RESISTANCE THROUGH TESTS OR EXTRAPOLATION FROM SIMILAR TYPE-TESTED EQUIPMENT (AS) THAT HAVE PASSED TYPE TESTING
PROTECTION CIRCUIT EFFICIENCY	8.2.4		
EFFECTIVE CONNECTION BETWEEN THE EXPOSED CONDUCTIVE PARTS OF THE ASSEMBLY AND THE PROTECTIVE CIRCUIT	8.2.4.1	VERIFICATION OF THE EFFECTIVE CONNECTION BETWEEN THE EXPOSED CONDUCTIVE PARTS AND THE PROTEC. CIRCUIT, THROUGH INSPEC. OR RESISTANCE MEASUREMENT (TYPE TESTING)	VERIFICATION OF THE EFFECTIVE CONNECTION BETWEEN THE EXPOSED CONDUCTIVE PARTS AND THE PROTECTIVE CIRCUIT, THROUGH INSPECTION OR RESISTANCE MEASUREMENT
SHORT CIRCUIT WITHSTAND STRENGTH OF THE PROTECTIVE CIRCUIT	8.2.4.2	VERIFICATION OF WITHSTAND STRENGTH OF THE PROTECTIVE CIRCUIT THROUGH TESTS (TYPE TESTING)	VERIFICATION OF WITHSTAND STRENGTH OF THE PROTECTIVE CIRCUIT THROUGH TESTS OR ADEQUATE DESIGN AND ARRANG. OF THE PROTECTIVE LEAD (7.4.3.1.1 LAST PARAGRAPH)
CLEARANCES AND CREEPAGE DISTANCES	8.2.5	VERIFICATION OF CLEARANCES AND CREEPAGE DISTANCES (TYPE TESTING)	VERIFICATION OF CLEARANCES AND CREEPAGE DISTANCES
MECHANICAL OPERATION	8.2.6	VERIFICATION OF MECHANICAL OPERATION (TYPE TESTING)	VERIFICATION OF MECHANICAL OPERATION
PROTECTION DEGREE	8.2.7	VERIFICATION OF PROTECTION DEGREE (TYPE TESTING)	VERIFICATION OF PROTECTION DEGREE
WIRING, ELECTRICAL OPERATION	8.3.1	EQUIPMENT INSPECTION INCLUDING WIRING INSPECTION AND, IF NECESSARY, ELECTRICAL OPERATION TESTING (INDIVIDUAL TEST)	EQUIPMENT INSPECTION INCLUDING WIRING INSPECTION AND, IF NECESSARY, ELECTRICAL OPERATION TESTING
INSULATION	8.3.2	DIELECTRIC TEST (INDIVIDUAL TEST)	DIELECTRIC TEST OR VERIFICATION OF INSULATION RESISTANCE ACCORDING TO 8.3.4 (SEE NO. 11)
PROTECTIVE MEASURES	8.3.3	VERIFICATION OF PROTECTIVE MEASURES AND ELECTRICAL CONTINUITY OF THE PROTECTION CIRCUIT (INDIVIDUAL TEST)	VERIFICATION OF PROTECTIVE MEASURES
INSULATION RESISTANCE	8.3.4		VERIFICATION OF THE INSULATION RESISTANCE WHEN TESTS HAVE NOT BEEN EXECUTED ACCORDING TO 8.2.2 OR 8.3.2 (SEE NO. 2 AND NO.9)

FOCUS ON TESTS PRESCRIBED FOR EN 62208

TESTS	REF.	NOTES
VERIFIC. OF NAMEPLATE INFOR.	9.2	
STATIC LOADS	9.3	
LIFTING	9.4	
VERIFICATION OF THE AXIAL LOADS OF INSERTS	9.5	
VERIFICATION OF PROTECTION DEGREE AGAINST IMPACT (IK)	9.6	
VERIFICATION OF PROTECTION DEGREE (IP)	9.7	
VERIFICATION OF HEAT STABILITY	9.8.1	
VERIFICATION OF HEAT RESISTANCE	9.8.2	
VERIFICATION OF RESISTANCE TO ABNORMAL HEAT AND TO FIRE	9.8.3	
VERIF. OF DIELECTRIC STRENGTH	9.9	
VERIFICATION OF CONTINUITY OF THE PROTECTION CIRCUIT	9.10	
VERIFICATION OF WEATHER RESISTANCE	9.11	INDOOR AND OUTDOOR USE
VERIFICATION OF CORROSION RESISTANCE	9.12	OUTDOOR USE

IP PROTECTION DEGREE (ACCORDING TO EN60529, CEI 70/1)

The IEC EN 60439-1 standard defines the enclosure as "element designed to ensure equipment protection against specific external influence and protection in all directions from direct contact with a protection degree at least equal to IP2X".

The IEC 64-8 standard also accepts IPXXB (finger) as protection degree besides IP2X.

Protection against indirect contacts with metal enclosures is carried out by grounding.

The enclosure manufacturer guarantees the protection degree of his product as sold, i.e. empty. Additional openings or holes, made to introduce cables and/or install equipment, can change the IP degree remarkably. Therefore, all drillings must be carried out according to the "state of the art", using seals to ensure the preservation of initial conditions. If this is not possible, the protection degree shall be de-classified.

Protection against indirect contact is enabled through enclosure and grounding (see paragraph page 266) and by cutting off power supply. No protection degree can be assigned without carrying out tests according to ICE 70-1.

The IP protection degree is basically indicated by a two-digit figure.

IP SEALS

Standard seal: the closing panels of enclosures (doors, sides, backs and covers) are provided with closed-cell polyurethane seals on all edges. The seal features HF1 fire resistance degree (for UL94 standard).

EMC seal: In this case, the seal consists of 3 parts: an EPDM core (ensuring an IP55 protection degree), a metal fabric coating (ensuring dielectric continuity between structure and panels) and a bi-adhesive unwoven tissue, very tough and applied on one side (ensuring adherence and resistance).

Optimal environmental conditions for use: temperature:
 $-40^{\circ}\text{C} < T < 80^{\circ}\text{C}$

Refer to table on page 260 to know the protection degrees of ETA products.



IK DEGREE (ACCORDING TO EN50102, CEI 70/3)
























This standard indicates the degree of protection offered by the enclosure to the equipment against harmful mechanical impact. The test is carried out applying impact energy, as shown in the diagram.

After the test, no failure or deformation shall occur that might compromise the IP degree.

All ETA products are marked with the maximum degree IK10.



CLASSIFICATION OF PROTECTION DEGREES

IP 1ST DIGIT		IP 2ND DIGIT		IK	
0	 NO PROTECTION	0	 NO PROTECTION	0	 NO PROTECTION
1	 PROTECTION AGAINST SOLID BODIES ABOVE 50MM (E.G. INVOLUNTARY HAND CONTACT)	1	 PROTECTION AGAINST VERTICALLY FALLING WATER DROPS	1-5	 IMPACT < 1 JOULE
2	 PROTECTION AGAINST SOLID BODIES ABOVE 12MM (E.G. FINGER)	2	 PROTECTION AGAINST WATER DROPS FALLING WITH UP TO 15° INCLINATION	6	 500 g IMPACT 1 JOULE 20 cm
3	 PROTECTION AGAINST SOLID BODIES ABOVE 2.5MM (TOOLS, WIRES)	3	 PROTECTION AGAINST RAIN FALLING AT UP TO 60° INCLINATION	7	 500 g IMPACT 2 JOULE 40 cm
4	 PROTECTION AGAINST SOLID BODIES ABOVE 1MM (THIN TOOLS, THIN THREADS)	4	 PROTECTION AGAINST WATER SPLASHES FROM ALL DIRECTIONS	8	 1,7 kg IMPACT 5 JOULE 29,5 cm
5	 PROTECTION AGAINST DUST (NO NOXIOUS DEPOSITS)	5	 PROTECTION AGAINST JETS OF WATER FROM ALL DIRECTIONS	9	 5 kg IMPACT 10 JOULE 20 cm
6	 TOTAL TIGHTNESS TO DUST	6	 PROTECTION AGAINST WATER SPLASHES SIMILAR TO SEA WAVES	10	 5 kg IMPACT 20 JOULE 40 cm
		7	 PROTECTION AGAINST IMMERSION		
		8	 PROTECTION AGAINST SUBMERSION		

NEMA (TYPE)

For Canada and America, the protection degree is defined as NEMA or TYPE and it also indicates the type of use (indoor and outdoor), not only protection from solids and liquids. Refer to table on page 260 to know the protection degrees of ETA spa products.

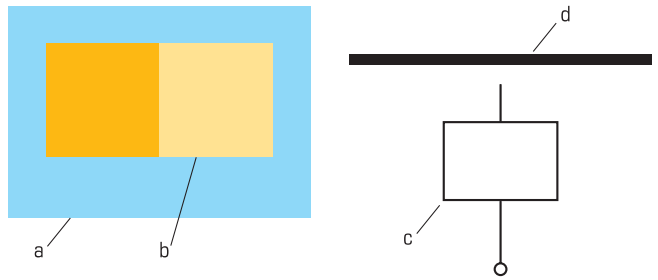
NEMA CLASSIFICATION

NEMA TYPE	NEMA NATIONAL ELECTRIC MANUFACTURES ASSOCIATION (NEMA 250) ED EEMAC ELECTRICAL AND ELECTRONIC MANUFACTURES ASSOCIATION OF CANADA UL UNDERWRITERS LABORATORIES, INC.
1	INDOOR USE. PROTECTION OF CONTACT WITH INTERNAL EQUIPMENT.
4	INDOOR AND OUTDOOR USE. PROTECTION AGAINST RAIN, SNOW AND WIND-BLOWN DUST, SPRAYED AND DIRECT WATER, AND DAMAGE DUE TO EXTERNAL ICING.
12	INDOOR USE. PROTECTION AGAINST DUST, FALLING DIRT AND NON-CORROSIVE DRIPPING FLUIDS.
3R	OUTDOOR USE. PROTECTION AGAINST HEAVY RAIN AND LIGHT SNOW. IT PREVENTS ICE FORMATION ON THE INSIDE.
4X	INDOOR AND OUTDOOR USE. PROTECTION AGAINST CORROSION, WIND-BLOWN DUST, RAIN, WATER SPRAYS AND WATER JETS FROM HOSES. IT PREVENTS ICE FORMATION ON THE INSIDE.

SEPARATION

The separation of different units inside the cabinets is achieved by means of barriers that prevent accidental contacts. Standard EN 60439-1 defines the barrier as the part that ensures protection against direct contact from any common access direction (minimum IP2X) and against arcs from disconnecting equipment and similar, if existing.

The separation rules and different modes are dealt with in Art. 7.7 of standard IEC EN 60439-1 (see following page and attached diagrams). The standard considers 7 types of separation by means of barriers or diaphragms, starting from no separation, i.e. no internal barriers between functional units and/or bars, up to form 4b, with progressive configurations: separation of busbars including distribution bars from the functional units and terminals for external conductors; separation of all functional units from another; separation of terminals for external conductors from the functional units; terminals not in the same compartment as associated unit. Using ETA enclosures and structures, you can make all separations prescribed by the standards.



- Legend**
- a Enclosure
 - b Internal separation
 - c Functional Units, including terminals for associated external wires
 - d Bars, including distribution bars

FORM 1
No internal separation

FORM 2
Separation of busbars from the functional units

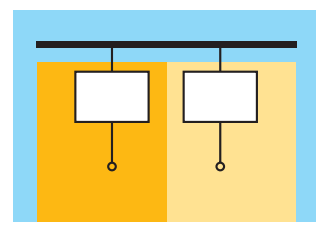
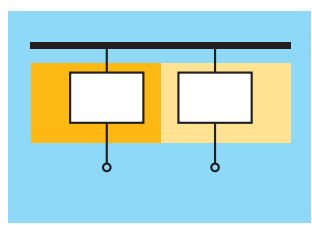
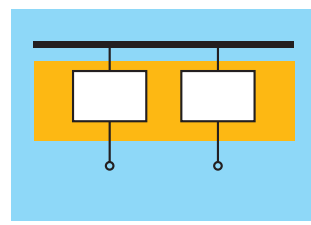
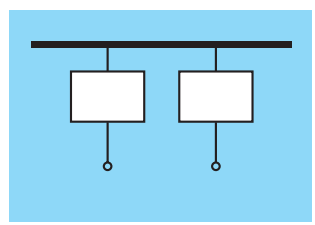
FORM 2A
Terminals not separated from the busbars

FORM 3
Separation of the busbars from the functional units, plus separation of the functional units from one another

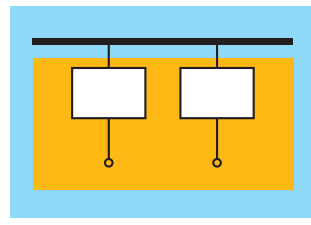
FORM 3A
Terminals not separated from the busbars

FORM 4
Separation of the busbars from the functional units, plus separation of the functional units from one another, plus separation of the terminals from one another

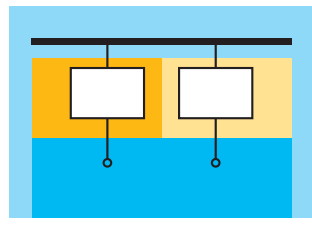
FORM 4A
Terminals in the same compartment as an integral part of the functional unit



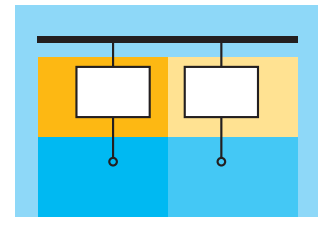
FORM 2B
Terminals separated from the busbars



FORM 3B
Terminals separated from the busbars



FORM 4B
Terminals not in the same compartment as an integral part of the functional unit



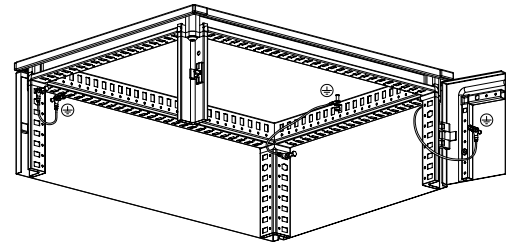
CONDENSATE FORMATION

With very high relative humidity conditions (e.g. outdoor applications where relative humidity can reach 100% at 25 °C), the cabinet can be subject to condensate formation, which negatively affects the equipment inside the cabinet: in this case, adequately sized heating resistors shall be used. Refer to the Ethermo catalogue.

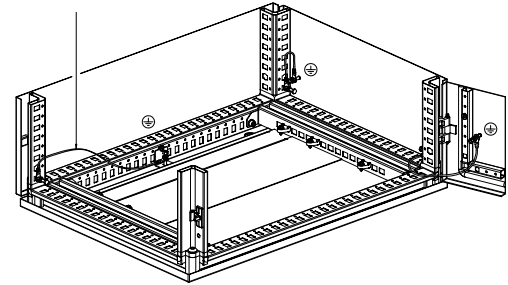
GROUNDING (PROTECTION CIRCUIT CONTINUITY)

The electric cabinet, consisting of an enclosure with equipment and connection wires, in order to be protected from indirect contact, shall have all masses grounded through a protection circuit. Any accessible portion of the enclosure where equipment is installed or that might be under voltage in case of failure (for instance, insulation failure of the cable etc.), it is necessary to ground such portion with a lead of adequate section. If no equipment is installed, it is enough to make contact with screws and metal hinges between the structure and the panel in order to achieve equipotential. All external metal parts that are not likely to get in contact with internal live parts, or that cannot be touched, do not need grounding connections. The product packaging includes the grounding material (screws, nuts and washers) and the instructions for correct mounting.

Considering the Areta cabinet, its structure can be used as a conductor, provided you tighten the screws properly using the toothed washer, which pierces the paint layer and creates electric continuity between the welded joint portion on the upright and the welded portion on the crosspieces. The cabinet manufacturer can connect the panels to the structure electrically, then the structure to the equipotential bar of the main protection circuit, and the latter to the grounding system. In this way, all enclosure masses, identified as such by the cabinet manufacturer, will be grounded and equipotential to each other. The measurement methods are specified in Art. 9.10 of standard IEC EN 62208. The same test has been carried out by CESI, as reported in the table on page 268.



sec. $\sigma \geq 4\text{mm}^2$



APPLICATIONS IN EXPLOSIVE ATMOSPHERE (ATEX)

ATEX, an acronym for ATmosphere EXplosive, requires to analyze the risks associated to the presence of DUST and GAS in different types of industrial and handicraft businesses. Basically, the directive requires to:

- Identify hazardous areas (hence the need to classify such areas and the related materials to use).
- Put the plants in security, both electrically and mechanically (hence the need of cabinet installers to use suitable components to be installed in certain areas).

ETA's products comply with the ATEX directive as described in the table on page 260.



EMC - ELECTROMAGNETIC COMPABILITY

The electromagnetic compatibility directive concerns the components that release electromagnetic (EM) waves. As our products are not EM wave sources, they are not subject to the EMC Directive, however they can provide a barrier (see charts) to EM waves propagating from the internal or external source, and significantly reduce the intensity of such EM waves and the related disturbance to equipment. In detail, the EMC cabinet with all its structural characteristics specified below, can significantly reduce the intensity of the electromagnetic field (including the electric and the magnetic component), thus supporting the customer in complying with the electromagnetic compatibility Directive.

It is not necessary to check EMC when:

- the cabinet does not incorporate electronic equipment
- installed electronic equipment is EC-marked

Also stainless steel cabinets can effectively reduce electromagnetic waves.

See charts on page 228.

PAINTING

- (1) Degreasing with ECOCOMPATIBLE hydrogen-carbonate-based product and cleaning at 40°C
 - (2) (3) Rinse with water at room temperature
 - (4) Flash drying in one final stage and blowing
 - (5) Drying in oven at 140°C
 - (6) (7) (8) Electrostatic painting with epoxy-polyester powders applied with a layer of approx. 90 micron
 - (9) Polymerization in oven at 185°C
- End of line: inline visual inspection and laboratory tests.

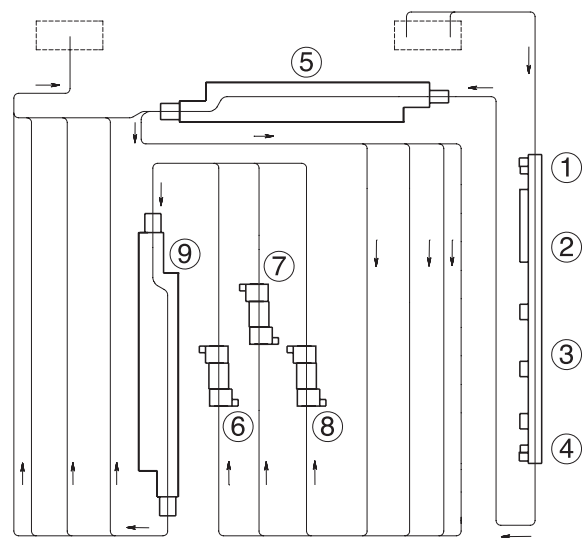
The degreasing and rinsing stages are very critical and they are executed to clean and passivate steel so as to support the adhesion of powder and protect the surface from corrosion due to weather agents (rain, sand, wind...), mechanical impact (scratches, bumps) and chemical stress (processes using 5%-diluted acids and bases and oils).

The quality and durability of our paint are guaranteed by periodical laboratory tests as well as inline inspection.

For OUTDOOR applications we have to consider environmental factors (ice, snow, rain, sunlight, wind) and select a cabinet with a suitable IP protection degree, and if necessary, install a protection roof.

The use of polyester powder paints is recommended for products installed outdoors, in order to increase the resistance of powders to UV rays.

In specific conditions, also very polluting and corrosive environments must be considered, where the painting cycle and powder paints do not ensure suitable corrosion resistance. For these problems, stainless steel offers an ideal solution, better than any other material. ETA technical staff is available to identify suitable technical solutions for specific needs.



SHORTCIRCUIT

The cabinet shall be manufactured to withstand heat and dynamic stress up to the established short circuit values. The resistance to short circuit needs not be tested in the following conditions:

Icc or Icw does not exceed 10 kA, or the cabinet is protected by a current limiting device, such that the peak is not higher than 17 kA. For higher values, verification is compulsory. For partially type-tested equipment (ANS), the test can be replaced by calculations, referring to a proven system. ETA has submitted the ARETA cabinet to short circuit and protection system verification tests. The calculation procedure that applies in compliance with IEC 17-52 is included in our QuadroPlan.

The following information guides the customer through the design of partially type-tested (ANS) cabinets without repeating the tests.

TECHNICAL DETAILS OF THE TEST

VERIFICATION OF SHORT CIRCUIT RESISTANCE FOR THE MAIN CIRCUITS	LABORATORY CESI
VERIFICATION OF PROTECTIVE CIRCUIT EFFICIENCY: VERIFICATION OF THE EFFECTIVE CONNECTION BETWEEN THE EQUIPMENT MASSES AND THE PROTECTIVE CIRCUIT, AND VERIFICATION OF THE SHORT CIRCUIT RESISTANCE OF THE PROTECTIVE CIRCUIT	
NOMINAL SPECIFICATIONS:	ARETA CABINET
OPERATING VOLTAGE	400V
INSULATION VOLTAGE	660V
FREQUENCY	50Hz
NOMINAL CURRENT OF THE MAIN BUSBAR SYSTEM (SEE NOTE BELOW)	3500A
NOMINAL CURRENT OF THE TERMINAL BUSBAR SYSTEM (SEE NOTE BELOW)	
VERIFICATION OF SHORT CIRCUIT RESISTANCE FOR THE MAIN CIRCUITS: ADMISSIBLE SHORT-LASTING CURRENT (ICW) ADMISSIBLE PEAK CURRENT (IPK) FOR ENTRY CIRCUIT, MAIN BUSBARS AND TERMINAL BUSBARS.	80kA FOR 1 SEC 176 kA
VERIFICATION OF PROTECTION CIRCUIT EFFICIENCY: VERIFICATION OF EFFECTIVE CONNECTION BETWEEN THE EQUIPMENT MASSES AND PROTECTIVE CIRCUIT VERIFICATION OF PROTECTIVE CIRCUIT EFFICIENCY: VERIFICATION OF SHORT CIRCUIT RESISTANCE OF THE PROTECTIVE CIRCUIT ADMISSIBLE SHORT-LASTING CURRENT (ICW) ADMISSIBLE PEAK CURRENT (IPK) OF THE PROTECTIVE CIRCUIT	R=0.98 mΩ 48kA FOR 1 SEC 101 kA

NOTE: The IEC 17-52 standard prescribes that parameter changes, such as clearances, busbar material, busbar section and busbar configuration, demonstrated by the calculation according to IEC 865 (IEC EN 60865-1, classification IEC 11-26), are admissible provided the following conditions are complied with.

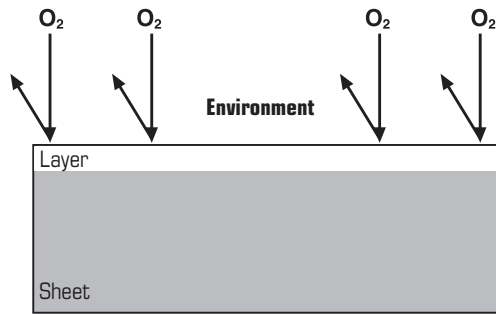
- Short circuit current can be changed only with lower values as compared to test values
- It is not allowed to change the support material or shape. However, other supports can be used that have passed the type test. It is allowed to increase the busbar section, hence their capacity, as compared to the tested system.

We remind you that, in case the busbar nominal current exceeds 3150 A, the temperature-rise calculation procedure according to standard IEC 17-43 cannot be applied; a test shall be carried out by the cabinet manufacturer, instead.



STAINLESS STEEL

For INDOOR and OUTDOOR applications (food, chemical and petrochemical industries) requiring a high degree of hygiene and/or resistance to chemical and environmental agents, ETA recommends its AISI 304L and AISI 316L stainless steel products. Stainless steel materials are alloys of iron, chrome and carbon, enriched with other elements such as nickel, molybdenum, silicon, titanium etc. Their peculiarity is the high resistance to corrosive attacks from weather agents. Stainless steel materials are alloys of iron, chrome and carbon, enriched with other elements such as nickel, molybdenum, silicon, titanium etc. This layer, very stable and tough, avoids the direct contact between the surrounding atmosphere and the steel; unlike common protection coatings (zinc-plating, painting etc.), it has the capacity to restore itself after accidental breaks, making the material intrinsically resistant to corrosion. There are different degrees of non-oxidizing, or in other words, a nobility scale determined by a different chemical composition. The steel selected by ETA is austenitic AISI 304L and 316L.



CLASSIFICATION AND FEATURES

	ANSI (USA)	AISI304L	AISI316L
DEFINITIONS	EU	1.4306	1.4404
	UNI	X2 CrNi 1811	X2 CrNiMo 1712
	C MAX	0.03	0.03
CHEMICAL COMPOSITION	Mn	2	2
	Si MAX	1	1
	S MAX	0.030	0.030
	P MAX	0.045	0.045
	Cr	18 - 20	16 - 18.5
	Ni	8 - 12	11 - 14
	Mo	-	2 - 2.5

APPLICATIONS

AISI 304L	IT IS THE MOST COMMON TYPE, FOR SEVERAL APPLICATIONS IN MANY INDUSTRIES: FOOD, CHEMICAL, WINE, DAIRY PRODUCTS, CANNING, CUTLERY, TOOLS, BURNERS, HOUSEHOLD ITEMS, HOSPITAL EQUIPMENT, SURGERY, PLANTS, AUTOMOTIVE, CONSTRUCTIONS ETC. (BETTER PERFORMANCE THAN 304 DUE TO LOWER CARBON CONTENT AND HIGHER NICKEL CONTENT)
AISI 316L	THIS IS RECOMMENDED IN HARSH WORKING CONDITIONS, SUCH AS MARINE ENVIRONMENTS, ACIDS OR EQUIPMENT CONSTANTLY IN CONTACT WITH WATER, SURGERY AND DENTAL SURGERY IMPLEMENTS, PROTHESIS, AUTOMOTIVE, TEXTILE, PAPER, TANNING ETC.

CHARACTERISTICS

INSENSITIVITY TO LOW TEMPERATURES	OPERATING SAFETY EVEN AT TEMPERATURES MUCH BELOW ZERO, THANKS TO THE PRESERVATION OF HIGH RESISTANCE AND PLASTICITY.
HIGH FIRE RESISTANCE	STAINLESS STEEL PRESERVES ITS MECHANICAL PROPERTIES THREE TIMES LONGER THAN STANDARD STEEL. THEREFORE IT ALLOWS TO AVOID OTHER TREATMENTS (PAINTS, COATINGS ETC.)
HIGHER MECHANICAL RESISTANCE	RESISTANCE TO REPEATED STRESS (FATIGUE) AND HIGHER PLASTICITY. WITH THESE PROPERTIES, IT IS RECOMMENDED FOR USE IN SEISMIC AREAS.
HIGHER HYGIENE	NO SPECIAL MAINTENANCE IS REQUIRED BESIDES CLEANING
STURDINESS	STIFFER STRUCTURE OF STEEL
UV RAY RESISTANCE	LOW DETERIORATION DUE TO EXPOSURE TO UV RAYS
GROUNDING	THEY CAN BE FULLY GROUNDED
ELECTROMAGNETIC WAVE SCREENING	THEY HAVE A-MAGNETIC PROPERTIES (NO PROBLEM TO BE ADAPTED TO HOSPITALS, RADIO AND TV STATIONS, BANKS ETC. FOR THE ABSENCE OF HARMFUL OR UNWANTED ELECTROMAGNETIC FIELDS).
CHEM. RESISTANCE	SEE TABLE

CHEMICAL RESISTANCE OF STEEL

	STEEL	
	304L	316L
ACETYLENE (COMMERCIAL)		
VINEGAR		
VINEGAR FUMES		
ACETONE 100% AT 100°C		
ACETIC ACID UP TO 20%		
BORIC ACID 5%		
BUTYRIC ACID 5%		
CYANHYDRIC ACID 100%		
CITRIC ACID 5%		
HYDROCHLORIC ACID (ALL CONCENTRATIONS)		
CHROMIC ACID 5%		
HYDROFLUORIC ACID (ALL CONCENTRATIONS)		
PHOSPHORIC ACID 5%		
LACTIC ACID 5%		
LINOLEIC ACID 100% UP TO 100°C		
MALIC ACID 10-40% UP TO 50°C		
MURIATIC ACID (COMMERCIAL)		
NITRIC ACID UP TO 10% AT 80°C		
OLEIC ACID 100%		
OXALIC ACID 5%		
PICRIC ACID (ALL CONCENTRATIONS)		
HUMID HYDROGEN SULPHIDE 100% (SAME SOLUTION)		
HOT SULPHURIC ACID 5%		
FUMING SULPHURIC ACID (OLEUM) 50°C		
SULPHURIC ACID 100%		
STEARIC ACID 100% UP TO 100°C		
TARTARIC ACID 10% UP TO 100°C		
SOFT WATER		
HYDROGEN PEROXIDE 10-30%		
WHITE SPIRIT		
ETHYL ALCOHOL		
METHYL ALCOHOL 100%		
MOLTEN ALUMINIUM		
AMMONIUM 100% (DRY)		
ACETIC ANHYDRIDE 100%		
CARBON DIOXIDE 100% (DRY)		
SULPHUR DIOXIDE 90%		
ANILINE 100%		
TANNING BATHS		
CHROMING BATHS		
PHOTO FIXING BATHS		
PHOTO DEVELOPING BATHS		
PETROL		
HOT AND COLD BENZOLE		
SODIUM HYDROGEN CARBONATE (ALL CONCENTRATIONS)		
BEER		
SODIUM HYDROGEN SULPHATE 15% AT 85°C		
CARBON DISULPHIDE 100%		
HOT BORAX 5%		
BUTANE		
HOT COFFEE		
SATURATED LIQUID BLEACH		
CAMPHOR		
SODIUM CARBONATE 10% UP TO 65°C		
HOT AND COLD SODIUM CITRATE		
CHLOROFORM 100%		
AMMONIUM CHLORIDE 1%		
FERRIC CHLORIDE 5-50%		
FEROUS CHLORIDE 10-20%		
MAGNESIUM CHLORIDE UP TO 20%		
MERCURY CHLORIDE 10%		
NICKEL CHLORIDE 10-30%		
POTASSIUM CHLORIDE 1-5%		
5% SODIUM CHLORIDE (UNSTIRRED)		

- Presence of corrosion
- Absence of corrosion
- Possibility of corrosion
- Data not available

CHEMICAL RESISTANCE OF STEEL

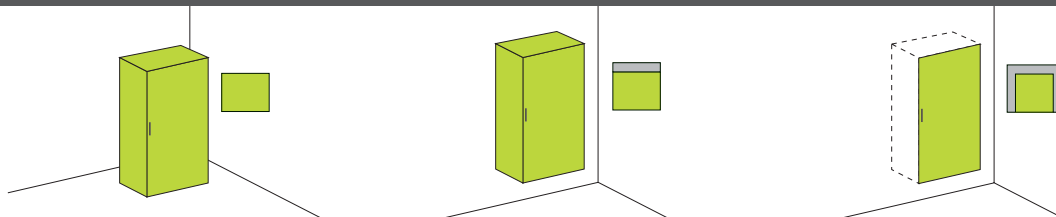
	STEEL	
	304L	316L
ZINC CHLORIDE 10%		
ZINC CHLORIDE 100% AT BOILING TEMPERATURE		
COKE (PURE SYRUP)		
ETHER 100%		
FORMALDEHYDE 100%		
AMMONIUM PHOSPHATE 10%		
SODIUM PHOSPHATE AT ANY CONCENTRATION		
PHURPHUROL 100% AT BOILING TEMPERATURE		
HUMID CHLORINE GAS		
COKE OVEN GAS		
GELATINE		
GLYCERIN AT ALL CONCENTRATIONS		
ETHYL GLYCOL 100%		
GLUCOSE		
SHELLAC		
AMMONIUM HYDROXIDE UP TO 40%		
CALCIUM HYDROXIDE UP TO 10% AT 100°C		
MAGNESIUM HYDROXIDE 10% AT 100°C		
POTASSIUM HYDROXIDE UP TO 50%		
SODIUM HYDROXIDE UP TO 20%		
CALCIUM HYPOCHLORITE 100%		
SODIUM HYPOCHLORITE 100%		
MILK (FRESH OR ACID)		
YEAST		
MAYONNAISE		
MOLASSES		
MUSTARD		
AMMONIUM NITRIDE 10-50%		
SODIUM NITRATE 10-40%		
HOT AND COLD MINERAL OILS		
HOT AND COLD VEGETAL OILS		
HOT AND COLD PARAFFIN		
SODIUM PERBORATE 10% UP TO 100°C		
HYDROGEN PEROXIDE 10%		
SODIUM PEROXIDE 10% UP TO 100°C		
MOLTEN LEAD		
PROPANE		
SOAP		
SUGAR SYRUP AT ALL CONCENTRATIONS		
WHEY		
SODIUM SILICATE 100% UP TO 100°C		
ALUMINIUM SULPHATE 10%		
AMMONIUM SULPHATE		
FERRIC SULPHATE 10%		
FERRIC SULPHATE 10-40%		
MAGNESIUM SULPHATE 10-40%		
NICKEL SULPHATE 30%		
POTASSIUM SULPHATE 10% UP TO 100°C		
COPPER SULPHATE 10%		
SODIUM SULPHATE 10%		
ZINC SULPHATE 10%		
SODIUM SULPHIDE 10%		
CONCENTRATED ORANGE JUICE		
CONCENTRATED LEMON JUICE		
CARBON TETRACHLORIDE 10%		
SODIUM THIOSULPHATE 10-60% UP TO 100°C		
TOLUENE		
TRICHLOROETHYLENE 100% UP TO 100°C		
PAINTS		
WINE		
WHISKEY		
MOLTEN ZINC		
MOLTEN SULPHUR		

CABINET HEATING

A cabinet behaves exactly like any enclosed heated environment. Due to the Joule effect, the equipment installed inside the cabinet, through which current flows, heat up. Temperature inside the cabinet increases until it establishes at a T_i value that differs from external temperature T_e . IEC EN 60439-1 sets temperature-rise limits that shall not be exceeded in certain areas of the cabinet.

For type-tested equipment, a verification shall be carried out always. For partially type-tested (ANS) equipment, the test can be replaced by calculations, without referring to a tested prototype. An applicable calculation procedure is given in IEC 17-43. The QuadroPlan software allows to calculate the power dissipated through surfaces, as described on page 6. The following tables refer to sheet metal heat dissipation.

BOXES HEAT DISSIPATION



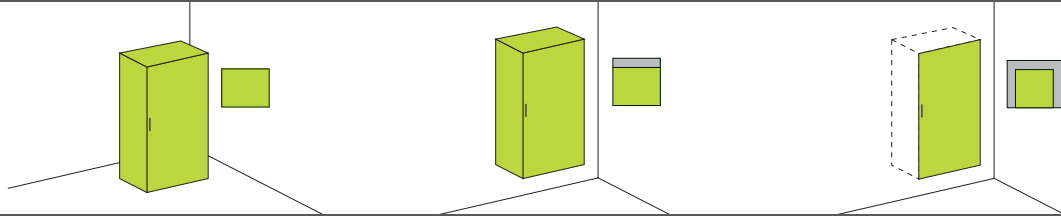
BOX WITH ALL SIDES FREE

BOX LEANING TO WALL

ENCLOSED BOX

BOX DIMENSIONS			ΔT [°C] POWER DISSIPATION [W]								ΔT [°C] POWER DISSIPATION [W]								ΔT [°C] POWER DISSIPATION [W]							
W	H	D	5	10	15	20	25	30	35	5	10	15	20	25	30	35	5	10	15	20	25	30	35			
200	300	150	3	6	10	15	19	24	30	2	6	9	13	17	22	26	2	4	7	10	13	16	19			
300	300	150	4	8	14	20	26	33	40	3	8	13	18	24	30	36	2	6	9	13	17	22	26			
300	400	150	4	10	17	25	33	41	50	4	9	15	22	29	36	44	3	7	12	17	22	28	33			
300	500	150	5	12	19	27	36	45	55	4	10	17	24	31	39	48	3	8	13	19	24	31	37			
400	300	150	4	10	17	24	32	40	49	4	9	15	22	29	37	44	3	7	11	16	21	27	33			
400	500	150	6	15	25	36	47	59	71	5	13	21	31	40	51	62	4	11	17	25	33	41	50			
300	400	200	5	12	19	27	36	45	55	4	11	17	25	33	41	50	3	8	13	18	24	31	37			
300	500	200	6	14	22	32	42	53	64	5	12	21	29	39	49	59	4	9	14	21	27	34	41			
400	300	200	5	12	21	30	39	49	59	5	11	18	26	35	44	53	4	8	14	20	26	33	40			
400	400	200	6	15	24	35	46	58	70	5	13	22	31	41	51	62	4	10	17	24	32	40	48			
400	500	200	7	17	28	40	53	67	81	6	15	25	35	47	59	71	5	12	19	28	37	46	56			
400	600	200	8	19	32	45	60	75	91	7	17	28	40	53	66	80	6	13	22	31	42	52	63			
500	500	200	9	20	34	48	64	80	97	8	18	30	42	56	70	85	6	14	23	33	44	55	67			
500	700	200	11	25	42	60	79	99	120	9	22	36	52	68	86	104	7	18	29	42	56	70	84			
600	400	200	9	21	34	49	65	82	99	8	18	30	43	57	72	87	6	14	24	34	45	57	69			
600	600	200	11	27	44	63	83	105	127	10	23	38	54	72	90	109	8	19	31	44	59	73	89			
600	800	200	11	25	41	59	78	98	118	12	28	46	66	87	110	133	10	23	38	54	72	90	109			
400	500	250	8	19	31	44	58	73	88	7	17	27	39	52	65	79	5	13	21	30	40	50	61			
400	600	250	9	21	35	51	67	84	101	8	19	31	45	59	74	90	6	14	23	33	44	55	67			
500	700	250	12	28	46	66	87	109	132	10	25	41	58	77	96	117	8	19	31	45	59	74	90			
600	800	250	12	29	48	68	90	113	137	13	30	50	72	95	119	145	10	24	41	58	77	96	116			
600	1000	250	14	33	55	78	103	129	157	12	29	48	69	91	115	139	12	29	48	68	90	113	137			
600	400	300	11	25	42	59	79	99	119	10	23	38	54	71	89	108	7	17	28	39	52	65	79			
600	600	300	13	31	51	73	97	121	147	12	28	46	65	86	108	131	9	21	35	50	66	83	101			
600	800	300	14	32	53	76	101	127	153	12	28	47	67	88	111	134	11	26	43	62	81	102	124			
600	1000	300	16	38	62	89	118	148	179	14	33	54	78	103	129	156	11	25	42	60	79	99	120			
600	1200	300	19	45	74	105	139	175	212	16	38	62	89	118	148	179	12	29	49	69	92	115	139			
800	800	300	18	42	70	100	132	166	201	15	37	61	87	115	144	174	12	29	48	69	91	114	138			
800	1000	300	22	51	85	122	161	202	244	19	44	73	105	139	174	211	14	34	57	81	107	135	163			
800	1200	300	26	61	101	145	192	240	291	22	52	86	122	161	203	245	17	39	65	93	123	154	187			
400	600	400	11	26	44	63	83	104	126	10	25	41	58	77	97	117	7	17	29	41	55	68	83			
600	600	400	13	31	52	74	98	122	148	12	29	47	68	89	112	136	10	24	39	56	75	94	113			
600	800	400	16	39	64	92	121	152	184	15	35	58	83	109	137	166	12	29	48	68	90	113	137			
600	1000	400	20	47	78	111	147	184	223	17	41	68	98	129	162	196	13	30	50	71	94	117	142			
800	800	400	22	52	86	122	161	203	245	19	45	75	107	141	177	215	14	33	55	79	104	130	158			
800	1000	400	27	64	106	151	199	250	303	23	55	91	130	171	215	261	17	39	65	94	123	155	188			
800	600	300	14	33	54	77	102	128	155	13	31	51	73	96	121	146	12	28	46	65	86	108	131			
1000	800	200	19	44	73	105	138	173	210	15	36	60	86	114	143	173	13	31	51	73	97	122	147			
1000	800	300	23	55	91	130	172	215	261	20	47	78	111	146	184	222	15	36	60	86	113	142	172			
1000	1000	300	29	68	112	160	211	265	321	24	57	95	135	179	224	271	19	46	76	109	143	180	218			
1000	1200	300	33	79	130	187	246	309	374	28	66	110	157	208	261	316	22	52	86	123	162	203	246			
1200	1200	300	40	95	158	225	297	373	452	34	81	135	193	255	319	387	28	67	111	158	209	262	318			

COMPACT ENCLOSURES HEAT DISSIPATION



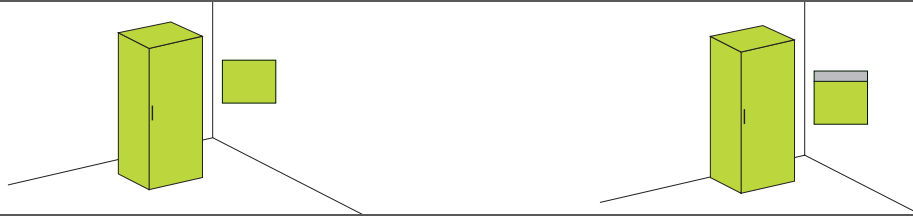
ENCLOSURE WITH ALL SIDES FREE

ENCLOSURE LEANING TO WALL

ENCLOSED ENCLOSURE

COMP. ENCL. DIMENSIONS			ΔT [°C]								ΔT [°C]								ΔT [°C]												
			POWER DISSIPATION [W]								POWER DISSIPATION [W]								POWER DISSIPATION [W]												
W	H	D	5	10	15	20	25	30	35	5	10	15	20	25	30	35	5	10	15	20	25	30	35	5	10	15	20	25	30	35	
600	1200	400	24	56	93	134	176	221	268	20	48	80	114	150	189	228	17	40	66	94	124	156	189								
600	1400	300	22	52	86	123	162	204	247	18	44	72	103	136	171	207	16	37	61	87	115	145	175								
600	1400	400	27	63	105	150	198	248	301	20	46	77	109	144	181	219	15	36	60	86	113	142	172								
800	1200	400	32	75	124	178	234	294	356	27	65	107	154	203	255	308	20	47	78	112	148	185	224								
800	1400	300	30	70	116	166	219	275	333	25	60	99	141	186	233	283	19	46	76	108	143	179	217								
800	1400	400	35	84	139	199	262	329	398	31	74	122	175	231	290	351	23	54	90	128	169	213	257								
1000	1200	400	39	93	154	220	291	365	442	34	82	135	193	255	320	387	26	62	102	146	192	241	292								
1000	1400	300	37	88	146	209	276	347	420	32	77	127	181	239	300	364	26	61	102	145	192	241	292								
1000	1400	400	43	102	168	241	318	399	483	38	91	150	215	283	355	431	33	78	129	184	243	305	369								
1200	1200	400	45	107	177	254	335	420	509	41	96	159	228	301	378	458	32	76	126	180	238	298	361								
1200	1400	300	43	102	170	242	320	401	486	39	92	152	217	287	360	436	32	77	127	182	241	302	366								
1200	1400	400	48	113	188	269	355	445	539	45	106	176	252	332	417	505	37	87	144	205	271	340	412								

CABINETS HEAT DISSIPATION

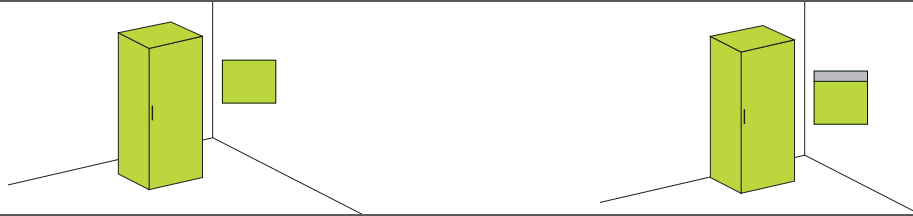


CABINET WITH ALL SIDES FREE

CABINET WITH COVER ON BACK

CABINET DIMENSIONS			CABINET WITH ALL SIDES FREE							CABINET WITH COVER ON BACK						
			Δ T [°C]							Δ T [°C]						
W	H	D	POWER DISSIPATION [W]							POWER DISSIPATION [W]						
			5	10	15	20	25	30	35	5	10	15	20	25	30	35
400	1600	400	18	44	72	103	136	171	207	18	43	72	103	136	170	206
400	1600	500	25	60	99	141	187	234	284	23	55	91	130	172	215	261
400	1600	600	30	71	117	167	221	277	335	28	66	109	155	205	257	312
400	1800	400	21	50	83	119	157	198	239	21	50	83	119	157	197	239
400	1800	500	28	66	109	156	206	258	313	26	61	101	144	191	239	290
400	1800	600	33	77	128	182	241	302	366	30	72	119	171	226	283	343
400	1800	800	41	96	159	227	300	376	456	40	94	156	222	294	368	446
400	2000	400	26	63	104	148	196	246	297	24	56	93	133	176	220	267
400	2000	500	31	72	120	172	227	284	344	28	67	110	158	208	261	316
400	2000	600	35	83	138	197	260	326	395	33	79	130	186	246	308	373
400	2000	800	42	99	164	234	309	388	470	41	97	161	231	305	382	463
400	2200	500	33	79	131	187	247	310	376	31	74	122	175	231	290	351
400	2200	600	37	87	143	205	270	339	411	35	83	138	197	261	327	396
400	2200	800	44	103	171	244	323	405	490	43	101	168	240	317	398	482
600	1400	400	27	63	105	150	198	248	301	24	56	93	132	175	219	265
600	1400	500	32	75	124	177	234	294	356	29	68	112	160	212	266	322
600	1600	400	30	71	117	167	221	277	335	26	62	103	147	194	244	295
600	1600	500	35	83	137	195	258	324	392	31	74	123	176	233	292	354
600	1600	600	40	95	157	224	296	371	450	37	87	144	207	273	342	414
600	1800	400	33	78	129	184	243	305	369	29	69	114	163	216	271	328
600	1800	500	38	90	149	213	281	352	427	34	82	135	193	255	320	388
600	1800	600	41	98	162	232	307	385	466	40	95	157	224	296	371	450
600	1800	800	50	117	194	278	367	460	557	48	113	187	267	353	443	536
600	2000	400	35	82	137	195	258	323	392	32	75	124	178	235	295	357
600	2000	500	39	93	153	219	289	363	440	37	88	146	208	275	345	418
600	2000	600	43	102	169	241	318	399	484	41	98	162	232	306	384	465
600	2000	800	51	122	201	288	380	477	578	50	118	195	279	368	462	560
600	2000	1000	58	138	228	327	431	541	655	57	135	224	320	422	530	642
600	2200	500	40	96	158	227	299	375	454	39	91	151	216	286	358	434
600	2200	600	45	107	177	254	335	420	509	43	101	167	239	315	395	479
600	2200	800	53	125	208	297	392	492	596	51	121	201	287	379	475	575
800	1400	400	35	84	139	199	262	329	398	29	68	113	162	213	268	324
800	1400	500	40	96	158	226	299	374	454	37	87	144	206	272	341	414
800	1600	400	38	91	151	216	285	357	433	34	81	134	192	254	318	385
800	1600	500	43	102	169	241	318	399	484	40	94	156	224	295	370	448
800	1600	600	47	111	184	263	348	436	528	45	107	176	252	333	418	506
800	1800	400	41	96	159	227	300	376	456	37	87	145	207	273	342	415
800	1800	500	45	106	175	250	330	414	501	42	100	166	237	313	393	476
800	1800	600	50	117	194	278	367	460	557	46	110	182	261	344	432	523
800	1800	800	57	136	224	321	424	531	644	56	131	218	311	411	516	625
800	2000	400	42	100	165	237	312	392	474	39	93	154	220	291	365	442
800	2000	500	47	111	183	262	346	434	525	44	104	172	245	324	406	492
800	2000	600	52	122	202	289	382	479	580	48	114	189	271	357	448	543
800	2000	800	59	140	232	332	439	550	667	57	135	224	321	423	531	643
800	2000	1000	68	160	265	379	500	628	761	65	154	254	364	480	602	730
800	2200	500	49	115	191	273	360	452	547	45	108	178	255	336	422	511
800	2200	600	53	125	208	297	392	492	596	50	120	198	283	374	469	568
800	2200	800	62	146	241	345	456	572	693	59	140	231	330	436	547	663
1000	1600	400	45	106	175	251	331	415	503	42	98	163	233	307	386	467
1000	1600	500	50	118	195	278	367	461	558	37	89	147	210	277	347	421
1000	1600	600	54	129	213	305	402	505	612	50	120	198	283	374	469	568
1000	1800	400	47	111	183	262	346	434	525	43	103	170	243	320	402	487
1000	1800	500	52	124	205	294	388	486	589	48	114	190	271	358	449	544
1000	1800	600	56	133	220	315	416	522	632	53	127	210	300	396	496	601
1000	1800	800	64	152	252	360	475	596	722	62	146	241	345	456	571	692
1000	2000	400	49	117	194	277	366	459	556	45	106	176	251	332	416	504
1000	2000	500	54	128	211	302	399	500	606	51	120	198	284	374	470	569
1000	2000	600	58	138	229	327	432	542	656	56	132	218	312	412	517	626
1000	2000	800	68	160	265	379	500	628	761	64	151	251	359	474	594	720
1000	2200	500	56	132	218	312	411	516	625	52	124	205	293	387	485	588
1000	2200	600	61	143	238	340	448	562	681	57	135	224	320	423	530	642
1000	2200	800	71	169	280	401	529	663	803	66	157	259	371	490	614	744
1200	1400	400	48	114	189	270	356	447	541	45	106	176	251	332	416	504

CABINETS HEAT DISSIPATION

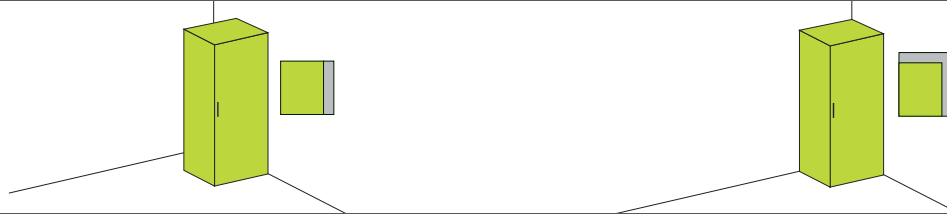


CABINET WITH ALL SIDES FREE

CABINET WITH COVER ON BACK

CABINET DIMENSIONS			CABINET WITH ALL SIDES FREE							CABINET WITH COVER ON BACK						
			ΔT [°C]							ΔT [°C]						
W	H	D	POWER DISSIPATION [W]							POWER DISSIPATION [W]						
			5	10	15	20	25	30	35	5	10	15	20	25	30	35
1200	1400	500	53	125	207	296	390	489	593	49	116	192	274	362	454	550
1200	1600	400	51	121	201	287	379	476	576	47	111	184	263	347	436	528
1200	1600	500	56	133	220	315	415	521	631	52	122	202	290	382	479	581
1200	1600	600	60	142	234	335	443	555	673	57	135	223	319	421	529	640
1200	1800	400	54	127	210	301	397	498	603	49	116	192	274	362	454	550
1200	1800	500	58	138	228	326	430	539	653	55	130	215	308	407	510	618
1200	1800	600	63	148	245	351	463	581	704	59	140	232	332	438	550	666
1200	1800	800	72	169	280	401	529	664	805	67	160	264	378	499	626	758
1200	2000	400	55	131	217	310	409	513	622	52	122	202	289	381	479	580
1200	2000	500	61	144	239	341	450	565	684	57	135	224	320	422	529	641
1200	2000	600	66	156	258	369	487	612	741	61	145	240	343	453	568	688
1200	2000	800	77	182	301	430	567	712	862	71	168	278	397	524	658	797
1200	2000	1000	90	213	352	503	664	833	1009	82	194	321	460	607	761	922
1200	2200	500	63	150	248	355	469	588	713	58	138	228	326	430	540	654
1200	2200	600	70	165	273	390	515	646	782	64	151	249	357	471	590	715
1200	2200	800	83	196	324	463	612	767	930	75	178	294	421	555	697	844
1400	2000	400	62	146	242	347	458	574	696	56	134	222	317	418	525	636
1400	2000	500	68	161	266	380	502	630	763	62	147	243	347	458	575	696
1400	2000	600	74	175	290	415	548	687	833	68	160	265	379	500	628	760
1400	2000	800	88	208	344	492	649	814	987	79	186	308	441	582	730	885
1400	2000	1000	103	245	405	580	765	960	1163	92	218	360	515	680	853	1034
1600	1400	400	59	140	232	332	438	550	666	50	118	195	279	369	463	560
1600	1400	500	67	158	262	375	495	621	752	57	136	225	321	424	532	645
1600	1400	600	74	176	292	418	551	692	838	66	156	258	369	487	611	740
1600	1400	700	81	193	319	456	602	755	915	73	172	285	407	538	675	817
1600	2000	400	75	179	296	423	558	700	848	65	155	256	367	484	607	735
1600	2000	500	82	194	320	458	605	759	919	74	175	290	415	547	687	832
1600	2000	600	88	209	346	495	654	820	994	83	196	325	464	613	769	931
1600	2000	800	93	219	363	520	686	861	1042	94	223	370	529	698	875	1060
1800	1000	400	52	122	202	290	382	479	581	43	102	168	240	317	398	482

CABINETS HEAT DISSIPATION

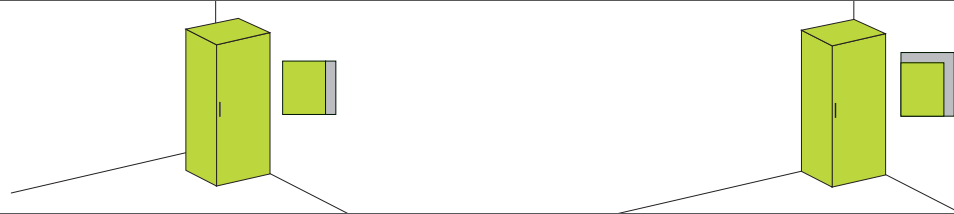


CABINET WITH COVER ON ONE SIDE

CABINET WITH COVER ON BACK AND ONE SIDE

CABINET DIMENSIONS			CABINET WITH COVER ON ONE SIDE							CABINET WITH COVER ON BACK AND ONE SIDE						
			Δ T [°C]							Δ T [°C]						
W	H	D	POWER DISSIPATION [W]							POWER DISSIPATION [W]						
			5	10	15	20	25	30	35	5	10	15	20	25	30	35
400	1600	400	18	43	71	102	135	169	205	16	38	63	91	119	150	182
400	1600	500	22	53	87	125	165	206	250	20	47	77	110	146	183	221
400	1600	600	26	61	101	145	191	239	290	24	57	94	134	177	222	269
400	1800	400	21	50	83	118	156	196	237	18	43	71	102	135	169	205
400	1800	500	24	58	96	137	181	227	275	22	53	88	126	166	208	252
400	1800	600	29	68	112	160	212	266	322	26	62	103	147	194	244	295
400	1800	800	36	86	142	203	268	336	407	35	82	136	195	257	322	391
400	2000	400	24	56	93	132	175	219	266	21	50	82	117	155	194	235
400	2000	500	27	64	106	152	201	252	305	24	58	96	137	180	226	274
400	2000	600	31	74	122	175	231	289	350	29	68	113	162	213	267	324
400	2000	800	39	91	151	216	285	358	434	37	88	145	207	274	343	416
400	2200	500	30	71	117	167	221	277	336	27	65	107	153	202	253	307
400	2200	600	33	79	131	187	247	310	375	31	74	122	174	230	289	350
400	2200	800	40	94	156	223	294	369	447	39	93	153	219	289	363	440
600	1400	400	25	58	97	138	182	229	277	21	50	83	118	156	196	238
600	1400	500	29	68	113	162	214	268	325	26	61	100	143	189	237	287
600	1600	400	27	65	108	154	203	255	309	24	57	94	134	177	222	269
600	1600	500	32	75	125	178	235	295	357	28	67	111	159	210	263	318
600	1600	600	36	86	143	205	270	339	410	33	79	130	186	246	309	374
600	1800	400	30	71	118	169	223	280	340	26	62	103	147	194	244	295
600	1800	500	35	83	137	195	258	324	392	31	74	123	176	232	291	352
600	1800	600	39	93	154	220	290	364	441	36	85	141	202	266	334	405
600	1800	800	46	108	180	257	339	425	515	45	106	175	250	330	414	502
600	2000	400	33	77	128	183	241	303	367	29	68	113	162	213	267	324
600	2000	500	38	90	149	213	281	352	426	34	81	133	191	252	316	382
600	2000	600	41	96	159	228	300	377	456	39	91	151	217	286	359	434
600	2000	800	48	113	187	268	354	444	538	46	109	180	257	339	426	516
600	2000	1000	55	129	214	306	404	507	614	54	127	210	301	397	498	603
600	2200	500	38	91	150	215	284	356	431	36	85	141	201	266	334	404
600	2200	600	42	100	165	236	312	392	474	40	95	157	224	296	371	450
600	2200	800	50	117	194	278	367	460	558	47	112	186	266	351	440	533
800	1400	400	33	79	130	186	245	308	373	29	68	112	160	212	266	322
800	1400	500	38	90	150	214	283	355	429	34	80	132	189	250	313	380
800	1600	400	36	86	143	205	270	339	410	32	75	124	178	235	294	357
800	1600	500	41	98	163	232	307	385	466	37	88	146	209	276	347	420
800	1600	600	40	96	158	226	299	375	454	42	100	165	237	312	392	475
800	1800	400	39	93	154	220	291	365	442	35	82	136	195	257	322	391
800	1800	500	43	101	168	240	317	397	481	40	95	157	224	295	371	449
800	1800	600	47	111	183	262	346	434	526	45	106	175	250	330	414	502
800	1800	800	55	130	215	308	407	510	618	52	123	203	291	384	481	583
800	2000	400	40	96	158	227	299	375	455	37	88	145	207	274	343	416
800	2000	500	44	105	174	249	328	412	499	42	99	165	235	311	390	472
800	2000	600	49	116	191	274	361	453	549	46	109	180	257	339	426	516
800	2000	800	57	134	222	318	419	526	637	55	129	214	306	404	507	614
800	2000	1000	63	150	248	354	468	587	711	61	145	241	345	455	570	691
800	2200	500	47	110	182	261	344	432	523	43	102	169	241	318	400	484
800	2200	600	51	120	199	284	375	471	570	47	112	186	266	351	440	533
800	2200	800	58	138	228	326	430	540	654	56	132	219	313	414	519	629
1000	1600	400	44	104	172	245	324	406	492	40	94	156	223	294	368	446
1000	1600	500	48	113	188	269	354	445	539	45	106	176	252	333	418	506
1000	1600	600	52	123	204	292	386	484	586	49	115	191	273	361	452	548
1000	1800	400	45	107	178	254	335	421	510	43	101	167	238	315	395	478
1000	1800	500	50	119	198	283	373	468	567	47	110	183	261	345	433	524
1000	1800	600	55	130	215	307	406	509	617	51	121	201	287	379	475	575
1000	1800	800	63	149	247	353	466	585	708	60	141	233	334	441	553	670
1000	2000	400	47	112	186	266	352	441	534	43	103	170	244	322	404	489
1000	2000	500	52	124	206	294	388	487	590	48	115	190	272	359	450	545
1000	2000	600	57	134	222	317	419	525	636	53	126	209	299	395	496	600
1000	2000	800	64	152	251	359	474	595	721	61	145	241	345	455	570	691
1000	2200	500	54	127	210	301	397	498	604	50	119	197	282	372	467	566
1000	2200	600	58	138	228	326	430	540	654	55	131	216	310	409	513	621
1000	2200	800	67	159	263	376	497	623	755	63	150	248	355	469	588	712
1200	1400	400	47	112	185	265	350	439	532	43	103	170	243	321	402	487

CABINETS HEAT DISSIPATION



CABINET WITH COVER ON ONE SIDE

CABINET WITH COVER ON BACK AND ONE SIDE

CABINET DIMENSIONS			CABINET WITH COVER ON ONE SIDE							CABINET WITH COVER ON BACK AND ONE SIDE						
			ΔT [°C]							ΔT [°C]						
W	H	D	POWER DISSIPATION [W]							POWER DISSIPATION [W]						
			5	10	15	20	25	30	35	5	10	15	20	25	30	35
1200	1400	500	51	122	202	288	380	477	578	48	114	189	271	357	448	543
1200	1600	400	50	118	196	280	369	463	561	46	109	181	259	342	428	519
1200	1600	500	55	131	216	309	408	512	620	50	119	197	282	373	468	567
1200	1600	600	59	139	229	328	433	543	658	55	130	215	307	406	509	617
1200	1800	400	53	125	208	297	392	492	595	48	113	188	269	355	445	539
1200	1800	500	57	135	223	319	421	528	640	53	126	209	298	394	494	598
1200	1800	600	61	144	239	341	451	565	685	58	138	228	326	431	540	654
1200	1800	800	69	163	270	386	509	639	774	65	155	256	366	483	606	734
1200	2000	400	54	128	212	303	399	501	607	50	118	196	280	370	464	562
1200	2000	500	61	145	240	343	453	568	688	56	132	219	313	414	519	629
1200	2000	600	64	150	249	356	470	590	714	60	141	234	335	442	555	672
1200	2000	800	73	172	285	407	537	674	817	68	161	266	381	502	630	763
1200	2000	1000	82	195	323	462	610	765	927	77	181	300	429	567	711	861
1200	2200	500	61	144	239	342	451	566	685	57	134	222	318	419	526	637
1200	2200	600	66	157	261	373	492	617	748	61	145	241	344	455	570	691
1200	2200	800	77	182	302	432	570	715	866	71	168	277	397	524	657	796
1400	2000	400	61	144	238	340	449	563	682	56	132	219	313	414	519	629
1400	2000	500	66	156	259	370	489	613	743	61	144	239	342	452	567	686
1400	2000	600	72	169	280	401	529	664	805	66	155	257	368	486	609	738
1400	2000	800	82	195	323	462	610	765	926	75	178	294	421	555	696	843
1400	2000	1000	95	224	372	532	702	880	1066	86	203	336	480	633	795	963
1600	1400	400	54	129	213	304	402	504	611	44	105	173	248	327	410	496
1600	1400	500	61	145	240	343	453	568	688	52	123	203	290	383	481	582
1600	1400	600	67	159	264	377	498	625	757	58	136	226	323	426	535	648
1600	1400	700	73	173	287	410	541	679	822	64	151	250	357	472	592	717
1600	2000	400	70	167	276	395	521	654	792	59	141	233	333	440	552	669
1600	2000	500	77	183	303	434	573	719	870	66	157	260	372	491	616	746
1600	2000	600	83	197	327	467	617	774	937	74	175	290	415	548	687	833
1600	2000	800	93	221	366	523	690	866	1049	87	207	342	490	646	811	982
1800	1000	400	48	113	186	267	352	441	535	40	94	156	223	294	368	446