DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía,
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29 507 456

Test report No:

NIE: 78236RSE.001

Test report

Empty enclosures for low-voltage switchgear and controlgear assemblies - General requirements

(*) Identification of item tested	ACQUA, ACQUAPLUS
(*) Trademark	FAMATEL
(*) Model and /or type reference	3902-T, 3904 3904-T, 3908 3908-T, 3912 3912-T, 3918, 3918-T,3926, 3926-T, 3942, 3942-T, 39018, 39036, 39054, 39072
(*) Features	IP65
Manufacturer	FABRICACION MATERIAL ELECTRICO S.A. AV. EL PLA, 11 P.I. EL PLA 08185 LLICA DE VALL BARCELONA SPAIN
Test method requested, standard	UNE-EN 62208:2012 EN 62208:2011 IEC 62208:2011 POSE000_ 26 (General procedure of Safety Lab)
Summary	See appendix A
Approved by (name / position & signature)	Rafael González Lab. ES Manager
Date of issue	2024-05-24
Report template No	FSE571_03 + FSE047_14 (*) “Data provided by the client”

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Competences and guarantees

DEKRA Testing and Certification S.A.U is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U has a calibration and maintenance program for its measurement equipment.

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The results presented in this Test Report apply only to the particular item under test established in this document.

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Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Testing and Certification internal document PODT000.

The uncertainty of the results, where appropriate, are available on request of the client, which applies for the tests.

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested", “Features”

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: Bercabox

Sample M/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
78236/046		3504		2024-01-30
78236/044		3508		2024-01-30
78236/040		3512		2024-01-30
78236/034		3518		2024-01-30
78236/009		3524		2024-01-30
78236/005		3536		2024-01-30
78236/014		3604		2024-01-30
78236/012		3608		2024-01-30
78236/030		3612		2024-01-30
78236/037		3618		2024-01-30
78236/027		3624		2024-01-30
78236/024		3636		2024-01-30
78236/072		3704		2024-01-30
78236/077		3708		2024-01-30
78236/057		3712		2024-01-30
78236/108		3718		2024-01-30
78236/105		3724		2024-01-30
78236/020		3736		2024-01-30
78236/095		3808		2024-01-30
78236/073		3812		2024-01-30
78236/099		3818		2024-01-30
78236/101		3824		2024-01-30
78236/002		3836		2024-01-30
78236/147		3902-T		2024-01-30
78236/058		3904		2024-01-30
78236/082		3904-T		2024-01-30

78236/062	3908	2024-01-30
78236/144	3908-T	2024-01-30
78236/143	3912	2024-01-30
78236/109	3912-T	2024-01-30
78236/049	3918-T	2024-01-30
78236/069	3926	2024-01-30
78236/018	3926-T	2024-01-30
78236/033	3942	2024-01-30
78236/132	3942-T	2024-01-30
78236/121	3946	2024-01-30
78236/129	39018	2024-01-30
78236/119	39036	2024-01-30
78236/054	39054	2024-01-30
78236/124	39072	2024-01-30
78236/136	39123	2024-01-30
78236/133	39134	2024-01-30
78236/112	39145	2024-01-30
78236/140	39146	2024-01-30
78236/115	39157	2024-01-30
78236/126	39168	2024-01-30
78236/115	39169	2024-01-30
78236/126	39174	2024-01-30

1. Sample M/01 has undergone the test(s) specified in subclau39169se “IP, IK test”.

Test sample description

EMPTY INUSLATING ENCLOSURES FOR ELECTRICAL APPLICATIONS

Rated supply :	-		
Other parameters :	-		
Software version :	-		
Hardware version :	-		
Dimensions in cm (W x H x D) :	See appendix B		
Accessories (not part of the test item) :	Description	Type	Manufacturer
Documents as provided by the applicant :	Description	File name	Issue date

Identification of the client

FABRICACION MATERIAL ELECTRICO S.A.

AV. EL PLA, 11 P.I. EL PLA

08185 LLICA DE VALL

BARCELONA SPAIN

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U. (HQ facilities)
Date (start)	2024-02-07
Date (finish)	2024-05-15

Document history

Report number	Date	Description
78236RSE.001	24/05/24	First release

Environmental conditions

Date	Max. Temp. (ºC)	Min. Temp. (ºC)	Max. Hum. (%)	Min. Hum. (%)	Max. Pressure (mbar)	Min. Pressure (mbar)	Limit
From 2024-02-07 to 2024-05-15	40.3	15.0	78.6	16.6	1028.2	1002.7	---

Remarks and comments

Related to subclause DD.8.2.1 of the IEC 61439-2:2020 protection against mechanical impact (IK code) for assembly enclosure installed in a location with restricted access. The tested sample meets IK08 code regarding to IEC62262. See clause 9.7 of the appendix A.

Related to subclause DD.8.2.2 of the IEC 61439-2:2020 protection against contact with live parts, ingress of solid foreign bodies and water (IP code) for assembly enclosure. The tested sample meets IP65 code regarding to IEC60529. See clause 9.8 of the appendix A.

Personnel

Tests have been performed by:

- Salvador Gómez
- Juan Pardo

Used instruments

Nº de Control / Control Number	Descripción / Description	F. Última Calibración / Last Calibration Date	F. Última Verificación Periódica / Last Periodic Verification Date
01841	Manómetro glicerina Aire-Fluidos / Glycerin manometer 0-1.6 bar Air-Fluid	2022-02-18	2023-09-05
02016	MEDIDOR DE RESISTENCIA DE TIERRA	2023-05-22	---
04207	Escuadra milimetrada / Square 600 x 400 mm	---	---
04551	Cámara de estanqueidad al polvo / Dust chamber IP5X-IP6X	---	---
04560	Cronómetro / Chronometer	2023-07-26	---
09663	Sonda de temperatura, humedad relativa y presión / Temperature, humidity and pressure probe	2024-04-23	---
08352	Caudalímetro / Flow meter 3-25 Nl/min	2022-07-21	---
08659	Bomba de vacío / Vacuum pump	2022-10-24	---
03790	Pieza de golpeo / Impact piece IK08	---	2023-03-20

01163	Boquilla / Nozzle Ø6.3 mm IPX5	---	2024-03-06
09527	Fuente de alimentación / Power supply DC 25/50V- 4/7 A	---	---
04590	Hilo incandescente / Glowing wire	---	2023-05-24
01238	Tabla de pino blanco / White pine wood	---	---
00161	Termómetro / Thermometer	2023-07-26	---
00511	Papel ensayo Hilo incandescente / Glowing wire paper	---	2023-07-26
04560	Cronómetro / Chronometer	2023-07-26	---
08768	Multímetro / Multimeter	2023-06-14	---

Testing verdicts

Not applicable :	N/A
Pass :	P
Fail :	F
Not measured :	N/M

Summary

See appendix A

Particular: Test item vs. test requirements

N/A

Appendix A: Test results according to UNE-EN 62208:2012, EN 62208:2011, IEC 62208:2011

6	INFORMATION TO BE GIVEN REGARDING THE ENCLOSURE		
6.2	Marking		
	The enclosure shall be marked as follows:		
	- Name, trade mark or identification mark of the enclosure manufacturer.		P
	- Type designation or identification number of the enclosure.		P
	The marking shall be durable and easily legible and may be inside the enclosure.		P
	Compliance is checked according to the test of 9.3 and by inspection.		P
	The marking for recycling of plastic parts follows ISO 11469.		P
6.3	Documentation		
6.3.1	General		
	The manufacturer's documentation includes:		
	- relevant constructional and mechanical characteristics		P
	- enclosure classification (see Clause 4)		P
	- instruction necessary for the correct handling, assembling, mounting and service conditions of the enclosure		P
6.3.2	- dimension		P
6.3.3	- mounting arrangements		P
6.3.4	- permissible loads		N/A
6.3.5	- lifting devices, if necessary		N/A
6.3.6	- provisions for protection against electric shock		P
	- applicable service conditions (see Clause 7);		P
	- location and size of protected space		P
	- data of thermal power dissipation capability;		P
	- rated insulation voltage of enclosures constructed of an insulating material		P
	- degree of protection (IK code, see 8.7)		P
	- degree of protection (IP code, see 8.8)		P
	Data for the thermal power dissipation capability		P
7	SERVICE CONDITIONS		
7.1	Manufacturer has specified the locations for which the enclosure is intended		P
7.2	Normal service conditions		
7.2.1	Ambient air temperature		
7.2.1.1	- for indoor locations (max. +40°C, average over 24 h ≤ 35°C; lower limit : -5°C)		P
7.2.1.2	- for outdoor locations (max. +40°C, average over 24 h ≤ 35°C; lower limit : -25°C)		P

7.2.2	Humidity conditions		
7.2.2.1	- for indoor locations (≤ 50% RH at max. +40°C or for example 90% RH at +20°C)		P
7.2.2.2	- for outdoor locations (up to 100% RH at max. +25°C)		P
7.3	Special service conditions, if applicable		N/A
7.4	Conditions during transport and storage, if applicable		P
8	DESIGN AND CONSTRUCTION		
8.1	General		
	The enclosure constructed of materials capable of withstanding the mechanical, electrical and thermal stresses, as specified in clause 9, as well as the effects of humidity which are likely to be encountered in normal use.		P
	Protection against corrosion checked by the test of 9.13		N/A
	For enclosures or parts of enclosures made of insulating materials, thermal stability, resistance to heat, fire and weathering shall be verified according to tests of 9.9 and 9.12		P
8.2	Static loads		
	Compliance of the permissible load that the enclosure and its doors are able to carry is checked according to the test of 9.4		N/A
8.3	Lifting and transport support		
	Where required, enclosures are provided with appropriate lifting devices or transport means (according to the test of 9.5)		N/A
8.4	Access to the interior of the enclosure		
	Doors or removable covers allow adequate access to the protected space. Access may be restricted by the use of a key or tool		P
	Cable gland plates and covers which are removable from the outside require the use of a tool.		P
8.5	Protective circuit		
	Metallic enclosures shall ensure the electric continuity		
	- by conductive structural parts of the enclosure		N/A
	- by separate protective conductor to earth		N/A
	After remove of a removable part protective circuit of the remainder shall not be interrupted		N/A
	For lids, doors, removable covers and the like, the usual metal screwed connections and metal hinges may ensure continuity of the protective circuit provided no electrical equipment is attached to them		N/A
	Where these are intended for mounting electrical equipment, additional means shall be provided to ensure the continuity of the protective circuit.		N/A

	Compliance is checked according to the test of 9.11		N/A
	The enclosure manufacturer shall provide means to facilitate the connection of the external protective conductor by the final assembly manufacturer. The location and the designed I^2t withstand capacity under fault conditions of such means shall be indicated in the enclosures manufacturers' documentation.		N/A
8.6	Dielectric strength		
	Enclosure constructed of an insulating material fulfil the dielectric test of 9.10		P
8.7	Degree of protection (IK-Code)		
	Degree of protection according to IEC 62262		P
	Compliance is checked according to the test of 9.7		P
8.10	Degree of protection (IP-Code)		
	Degree of protection according to IEC 60529		P
	Compliance is checked according to the test of 9.8		P
9	TYPE TESTS		
9.2	General conditions of tests		
	The enclosures under test are mounted and installed as in normal use according to the enclosure manufacturer's instructions		P
	Unless otherwise specified, the tests shall be carried out at an ambient temperature of between +10 °C and +40 °C		P
	Number of samples and order of test per sample according to Table 1	See Table 1	P
9.3	Marking		
	Markings made by moulding, pressing or similar and labels with a laminated plastic covering are not submitted to this test		
	Test: 15 s rubbing with water and then 15 s rubbing with petroleum spirit		P
	After the test markings easily legible		P
9.4	Static loads		
	The enclosure fitted with all its required components to support the permissible load is loaded with a weight of 1,25 times the permissible load as declared by the manufacturer	Enclosure: kg	N/A
	The loads are arranged on the mounting plate or switchgear and controlgear supports and on the door evenly distributed as specified by the enclosure manufacturer		N/A
	Loads retained for 1h in the closed position		N/A
	Enclosure constructed of insulating material and metallic enclosures with parts (hinges, locks, etc.) of insulating material tested at 70°C		N/A
	Closed door opened 5 times through 90°		N/A
	Resting in open position: 1 min.		N/A

	For enclosures constructed of insulating material and metallic enclosures with parts (hinges, locks, etc.) of insulating material, this part of the test may be carried out at ambient temperature external to the heating cabinet			N/A
	After the test enclosure shows no cracks or permanent distortions			N/A
	During the test no deflections which could impair any of its characteristics			N/A
9.5	Lifting			
	Enclosure loaded as in 9.4 with its door closed, lifted with the specified lifting means and in the manner defined by the manufacturer	Enclosure: kg		N/A
	3 times: from standstill position in a vertical plane, returning to standstill position	Not lifting devices		N/A
	From standstill position to a height of ≥ 1m for 30 min, without any movement			N/A
	3 times: from standstill position to a height of ≥ 1m and moved 10 ± 0,5 m horizontally; then set down. One cycle: 1 min ± 5 s at uniform speed			N/A
	After the test enclosure shows no cracks or permanent distortions			N/A
	During the test no deflections which could impair any of its characteristics			N/A
9.6	Axial loads of metal inserts			
	Axial load according to table 2 applied for 10s	Size: M	Load: N	N/A
	After the test:			
	- the insert is in its original position			N/A
	- no sign of movement			N/A
	- no cracks and splits in the material			N/A
9.7	Degree of protection against external mechanical impacts (IK code)			
	- according to IEC 62282 by means of a test hammer suitable for the dimensions of the enclosure, the enclosure is fixed on a rigid support as for normal use			P
	The impact energy shall be applied:	IK 08 / Impact Energy = 5 J		P
	- 3 times to each exposed surfaces in normal use whose largest dimensions is not above 1m			P
	- 5 times to each exposed surfaces in normal use whose largest dimensions is greater than 1m			N/A
	Impacts applied with even distributed over the faces of the enclosure			P
	After the test:			
	- enclosure continue to provide the IP code and dielectric strength			P
	- removable covers are removed and reinstalled			P
	- doors opened and closed			P
9.8	Degree of protection (IP-Code)			

9.8.1	Degree of protection against access to hazardous parts and against the ingress of solid foreign objects indicated by first characteristic numeral		
9.8.1.1	Protection against access to hazardous parts		
	Subclauses 12.1 and 12.2 of IEC 60529 apply	IP 65	P
	Access probe shall not enter the protected space		P
9.8.1.2	Degree of protection against the ingress of solid foreign objects		
	For enclosures IP2X, IP3X, IP4X, 13.2 and 13.3 of IEC 60529 apply.		N/A
	For IP 5X enclosures, 13.4, category 2 (without vacuum pump) and 13.5 (without vacuum pump) of IEC 60529 apply. Ingress of talcum powder into protected space is verified as described		N/A
	For enclosures IP6X, 13.6 of IEC 60529 apply. No talcum powder shall be observable inside the enclosure at the end of the test		P
9.8.2	Degree of protection against ingress of water as indicated by the second characteristic numeral		
	Test according to clauses 14.1 and 14.2 of IEC 60529		P
	After the test, water has not ingressed into the protected space		P
9.8.3	Degree of protection against hazardous parts as indicated by additional letter.		
	Test according to clause 15 of IEC 60529		N/A
	The access probe does not touch the surface of the protected space.		N/A
9.9	Properties of insulating materials		
9.9.1	Thermal stability		
	Test according to IEC 60068-2-2 Test Bb, temperature 70°C, with natural air circulation, for a duration of 168 h		P
	After the treatment:		
	Enclosures are kept at ambient temperature and relative humidity between 45% and 55% for 4 days (96h)		P
	- enclosure shows no crack without additional magnifications		P
	- material became not sticky or greasy		P
	The forefinger wrapped in a dry piece of rough close is pressed with a force of 5N against the enclosure.		P
	No traces of the cloth remain to the enclosure and the material of the enclosure doesn't stick to the cloth.		P
9.9.2	Resistance to normal heat		
	The suitability of the insulating materials to resist effects of heat shall be verified either by reference to the insulation temperature index (determined e.g. by the methods of IEC 60216 series), or by compliance to IEC 60085		P

9.9.3	Resistance to abnormal heat and to fire		
	Test in accordance with the principles of IEC 60695-2-10 and the details of IEC 60695-2-11.		P
	Tested as described in clause 4 of IEC 60695-2-11		P
	Apparatus used as described in clause 5 of IEC 60695-2-11		P
	Preconditioning of the samples:		
	Storage at 15-35°C / RH 35-45 % for 24h		P
	Thermocouple of test apparatus calibrated in accordance with clause 6 of IEC 60695-2-10		P
	During test:		
	- clause 8 of IEC 60695-2-10 followed		P
	- clause 10 of IEC 60695-2-11 followed		P
	Temperature of the tip of the glow wire:		
	- for parts retaining current-carrying parts in position: 960 ± 15°C		N/A
	Time at which sample ignited:	t_i = s	
	Time when sample extinguished:	t_e = …..s	
	- for parts intended to be installed in hollow Walls: 850 ± 15°C		N/A
	Time at which sample ignited:	t_i = s	
	Time when sample extinguished:	t_e = …..s	
	All other parts: 650 ± 15°C		P
	Time at which sample ignited:	t_i = 0 s	
	Time when sample extinguished:	t_e = 0 s	
	No visible flame, no sustained glowing or flames and glowing extinguish within (30 ±1)s	No flame	P
	No burning of the tissue paper, no scorching of the pinewood board		P
9.10	Verification of dielectric strength		
9.10.1	General		
	This test applies to enclosures where insulating material is used, even in combination with non-insulating materials		
9.10.2	Preconditioning		
	Enclosures are placed in a humidity cabinet (relative humidity between 91% and 95%) and an air temperature of (40±2)°C for 2 days (48h)		P
9.10.3	Enclosures without metal elements inside the protective space		
	An r.m.s voltage according to 10.9.4 of IEC 61439-1 is applied for 1 min between 2 metal foils, one in contact with the external surface and the other inside the enclosure at the limit of the protected space		P
	Applied voltage:	U = 3700 V	P

9.10.4	Enclosure having metal elements in the protected space		
	All internal metallic parts are connected to a bar, a voltage according to 10.9.4 of IEC 61439-1 is applied for 1 min. between a metal foil in contact with the external surface and the bar.		P
	Applied voltage:	U = 3700 V	P
9.10.5	Results to be obtained		
	- samples show no damage impairing their further use		P
	- no flashover or breakdown occurs during the test		P
9.11	Continuity of the productive circuit		
	Exposed conductive parts of the enclosure connected to the protective circuit		P
	Resistance not exceeding 0,1 Ω	Measured: 0.005 Ω	P
9.12	Resistance to ultra-violet (UV) radiation		N/A
	This test applies only to enclosures and external parts of enclosures intended to be installed outdoors and which are constructed of insulating materials or metals that are entirely coated by synthetic material. Representative samples of such parts shall be subjected to the following test		N/A
	UV test according to ISO 4892-2 method A, cycle 1 with a total test period of 500 h		N/A
	For enclosures constructed of insulating materials compliance is checked by verification		N/A
	- flexural strength (according to ISO 178) of insulating materials have 70% min. retention		N/A
	- charpy impact (according to ISO / EN ISO 179) of insulating materials have 70% min. retention		N/A
	After the test samples are subjected to the glow wire test of 9.9.3		N/A
	For compliance, enclosures constructed of metals entirely coated by synthetic material, the adherence of the insulating material shall have a minimum retention of category 3 according to ISO 2409 (a cross-cut area greater than 15 %, but not greater than 35 % is affected)		N/A
	Samples show no cracks or deterioration		N/A
9.13	Resistance to corrosion		
9.13.1	General		
	Metallic enclosures and external metallic parts of insulating and combined enclosures are tested to verify that they ensure protection against corrosion	See external report	N/M
	In all cases hinges, locks and fastenings have to be tested		N/M
9.13.2	Test procedure		
9.13.2.1	Severity test A		
	This test is applicable to:		
	- metallic indoor enclosures		N/M

	- external metallic parts of indoor enclosures		N/M
	- internal metallic parts of indoor and outdoor enclosures upon which intended mechanical operation may depend		N/M
	The test consists of:		
	- 6 cycles of 24 h each to damp heat cycling test according to IEC 60068-2-30 (Test Db) at (40 ± 3) ºC and relative humidity of 95 %		N/M
	- 2 cycles of 24 h each to salt mist test according to IEC 60068-2-11; (Test Ka: Salt mist), at a temperature of (35 ± 2) ºC		N/M
9.13.2.2	Severity test B		
	This test is applicable to:		
	- metallic outdoor enclosures		N/M
	- external metallic parts of outdoor enclosures		N/M
	The test comprises two identical 12 day periods		
	Each 12 day period comprises:		
	- 5 cycles of 24 h each to damp heat cycling test according to IEC 60068-2-30 (Test Db) at (40 ± 3) ºC and relative humidity of 95 %		N/M
	- 7 cycles of 24 h each to salt mist test according to IEC 60068-2-11; (Test Ka: Salt mist), at a temperature of (35 ± 2) ºC		N/M
9.13.3	Results to be obtained		
	After the test, the enclosure or samples shall be washed in running tap water for 5 min, rinsed in distilled or demineralized water then shaken or subjected to air blast to remove water droplets. The specimen under test shall then be stored under normal service conditions for 2 h		N/M
	Compliance is checked by visual inspection to determine that:		
	- there is no evidence of iron oxide, cracking or other deterioration more than that allowed by ISO 4628-3 for a degree of rusting Ri1		N/M
	- the mechanical integrity is not impaired		N/M
	- seals are not damaged		N/M
	- doors, hinges, locks, and fastenings work without abnormal effort		N/M
9.14	Thermal power dissipation capability		
	The thermal power dissipation data provided by the manufacturer (see 6.3.1) is determined by following test:		
	- either in accordance with 10.10.4.2.2 of IEC 61439-1:2011		P
	- or by a calculation method, e.g. according to IEC/TR 60890		P

Table 1 Number of samples to be tested and order of test per sample

Subclause:	Test	Sample 1 Order / verdict	Sample 2 Order / verdict	Sample 3 Order / verdict	Representative sample (see 9.12) Verdict
9.4	Static loads	1 / P			
9.5	Lifting	2 / P			
9.6	Axial loads of metal inserts	3 / P			
9.7	Degree of protection against external mechanical impacts (IK code)	4 / P			
9.8	Degree of protection against access to hazardous parts and against ingress of solid objects and/or water (IP code)	5 / P			
9.9.1	Thermal stability		1 / P		
9.9.2	Resistance to heat		2 / P		
9.9.3	Resistance to abnormal heat and fire		3 / P		
9.10	Dielectric strength	6 / P			
9.11	Continuity of the protective circuit	7 / P		3 / P	
9.12	Resistance to ultra-violet (UV) radiation				[a] / N/M
9.13	Resistance to corrosion			2 / N/M	
9.14	Thermal power dissipation capability			1 [b] / P	
9.3	Marking	8 / P			

[a] Tests carried out on representative sample only
[b] Only appliance if verified by test