Final Report On Environmental (IP Classification) Performance For

Amber Panels and Enclosures

On

Wall Mounted Panel Range

(500mm x 500mm x 100mm) to (2000mm x 2000mm x 600mm)

Report No. TRA-034983-33-00A

20 March 2017

EXR006 1.0

TEST REPORT
IEC 60529 / EN 60529
Degrees of protection provided by enclosures (IP code)

Report Reference No.....:	TRA–034983-33-00A
Tested by (name + signature) .....:	A Traverse
Reviewed by (name + signature) .....:	A Neild
Date of issue.....:	2017-03-20
Testing Laboratory.....:	Element Skelmersdale
Address .....:	Unit 1, Pendle Place, Skelmersdale, West Lancashire, WN8 9PN
Applicant's name.....:	Amber Panels and Enclosures
Address .....:	Sidings Road, Lowmoor Business Park, Kirby in Ashfield, Nottingham, NG17 7JZ, United Kingdom
Test specification:	
Standard.....:	EN 60529 : 1992 + A2:2013
Test procedure .....:	XF60529
Non-standard test method……..:	N/A
Test Report Form No.....:	RF383 is07

Use of this Element Ex Test Report:
This report format is for Element purposes only.

Test item description .....:	Wall Mounted Panel 1150mm x 1200mm x 200mm
Trade Mark .....:	AMBER PANELS
Manufacturer .....:	Amber Panels and Enclosures
Model and/or Type reference .....:	Wall Mounted Panel Range (500mm x 500mm x 100mm) to (2000mm x 2000mm x 600mm)
Rating(s).....:	N/A

Test Sample:

Test item particulars:	
- Classification of installation and use ..... :	indoor
- Supply connection ..... :	Permanent connection
- Test classification ..... :	Ingress of dust by first characteristic numeral (tests of clause 13) Ingress of water by second characteristic numeral (tests of clause 14)
- Target IP code ..... :	IP54
Possible test case verdicts:	
- test case does not apply to the test object ..... :	N/A
- test object does meet the requirement ..... :	Pass
- test object does not meet the requirement ..... :	Fail
Testing ..... :	
Date of receipt of test item..... :	2017-03-13
Date(s) of performance of tests..... :	IPX4: 2017-03-15 IP5X: 2016-03-16 to 17

General remarks:

The tests results presented in this report relate only to the object tested.

This report shall not be reproduced except in full without the written approval of the testing laboratory.

"(see Attachment #)" refers to additional information appended to the report.

"(see appended table)" refers to a table appended to the report.

Throughout this report a point is used as the decimal separator.

Throughout this report the date format yyyy-mm-dd is used.

Photographs of the equipment under test are contained in the Attachments appended within this report.

The equipment tested complied with the requirements of test standard for the purpose of classifying the equipment to the target IP code specified above.

General product information:

The Amber Panels wall mounted panel range consists of enclosures of varying size from (500mm x 500mm x 100mm) to (2000mm x 2000mm x 600mm). The equipment are identical in design and are scaled up or down depending on size requirements.

The panels consist of 5 bays (1 large central bay and two smaller stacked bays to either side). Sealing is provided by a 10mm close cell foam rubber seal (Ref AT321 SABA21) and locking devices. Equipment is manufactured from 2mm or 2.5mm mild or stainless steel.

IEC 60529			
Clause	Requirement – Test	Result – Remark	Verdict
12	**TESTS FOR PROTECTION AGAINST ACCESS TO HAZARDOUS PARTS INDICATED BY THE FIRST CHARACTERISTIC NUMERAL**		**N/A**
12.3	**Acceptance conditions**		
12.3.1	**For low-voltage equipment (rated voltages not exceeding 1000 V a.c. and 1500 V d.c.)**		**N/A**
	The access probe shall not touch hazardous live parts.	N/A	N/A
	If adequate clearance is verified by a signal circuit between the probe and hazardous parts, the lamp shall not light.	N/A	N/A
12.3.2	**For high-voltage equipment (rated voltages exceeding 1000 V a.c. and 1500 V d.c.)**		**N/A**
	When the access probe is placed in the most unfavourable position(s), the equipment shall be capable of withstanding the dielectric tests as specified in the relevant product standard applicable to the equipment.	N/A	N/A
	Verification may be made either by dielectric test or by inspection of the specified clearance dimension in air which would ensure that the tests would be satisfactory under the most unfavourable electric field configuration (see IEC 71-2).	N/A	N/A
	In the case where an enclosure includes sections at different voltage levels the appropriate acceptance conditions for adequate clearance shall be applied for each section.	N/A	N/A
12.3.3	**For equipment with hazardous mechanical parts**		N/A
	The access probe shall not touch hazardous mechanical parts.	N/A	N/A
	If adequate clearance is verified by a signal circuit between the probe and hazardous parts, the lamp shall not light.	N/A	N/A

13	**TESTS FOR PROTECTION AGAINST SOLID FOREIGN OBJECTS INDICATED BY THE FIRST CHARACTERISTIC NUMERAL**		**Pass**
13.3	**Acceptance conditions for first characteristic numerals 1, 2, 3, 4**		**N/A**
	The protection is satisfactory if the full diameter of the probe specified in Table VII does not pass through any opening.	N/A	N/A

13.4	**Dust test for first characteristic numerals 5 and 6**	**Pass**

	Category 1: Enclosures where the normal working cycle of the equipment causes reductions in air pressure within the enclosure below that of the surrounding air, e.g., due to thermal cycling effects.	The enclosure contains a printed circuit boards which will generate thermal cycling. The enclosure is therefore classified as category 1.	N/A
	Category 2: Enclosures where no pressure difference relative to the surrounding air is present	N/A	N/A
	Category 1 enclosures:		**Pass**
	The enclosure under test is supported inside the test chamber and the pressure inside the enclosure is maintained below the surrounding atmospheric pressure by a vacuum pump.	The enclosure was connected to a vacuum pump to maintain a pressure lower than the surrounding atmosphere.	Pass
	The suction connection shall be made to a hole specially provided for this test.	The vacuum was connected via a specially drilled hole.	Pass
	If not otherwise specified in the relevant product standard, this hole shall be in the vicinity of the vulnerable parts.	Position of the vacuum entrance was deemed suitable. Holes were made between internal volumes.	Pass
	If it is impracticable to make a special hole, the suction connection shall be made to the cable inlet hole.	Connection was made via a specially drilled 6mm hole	Pass
	If there are other holes (e.g., more cable inlet holes or drain-holes) these shall be treated as intended for normal use on site.	No other holes present.	Pass
	The object of the test is to draw into the enclosure, by means of depression, a volume of air 80 times the volume of the sample enclosure tested without exceeding the extraction rate of 60 volumes per hour. .	The extraction rate did not exceed 60 volumes per hour.	Pass
	In no event shall the depression exceed 2 kPa (20 mbar) on the manometer shown in Fig. 2.	Max recorded depression was 17.3mbar at end of test.	Pass
	If an extraction rate of 40 to 60 volumes per Hour is obtained the duration of the test is 2 h.	An 8 hour test was required. Flow rate was 4.12LPM (< 10 volumes per hour)	Pass
	If, with a maximum depression of 2 kPa (20 mbar), the extraction rate is less than 40 volumes per hour, the test is continued until 80 volumes have been drawn through, or a period of 8 h has elapsed.	A depression of 12.9mbar was applied to the enclosure. The test was conducted for 8 hours. Depression at the end of the test was recorded at 17.3mbar.	Pass
	Category 2 enclosures:		**N/A**
	The enclosure under test is supported in its normal operating position inside the test chamber, but is not connected to a vacuum pump.	Cat 1 enclosure.	N/A
	Any drain-hole normally open shall be left open for the duration of the test.	N/A	N/A

	The test shall be continued for a period of 8 h.	N/A	N/A
	Category 1 and category 2 enclosures:		**N/A**
	If it is impracticable to test the complete enclosure in the test chamber, one of the following procedures shall be applied:	Complete enclosure tested.	N/A
	testing of individually enclosed sections of the enclosure;.	N/A	N/A
	testing of representative parts of the enclosure, comprising components such as doors, ventilation openings, joints, shaft seals, etc., in position during test;	N/A	N/A
	testing of a smaller enclosure having the same full-scale design details.	N/A	N/A
	In the last two cases, the volume of air to be drawn through the enclosure under test shall be the same as for the whole enclosure in full scale	N/A	N/A
13.5.2	**Acceptance conditions for first characteristic numeral 5**		**Pass**
	The protection is satisfactory if, on inspection, talcum powder has not accumulated in a quantity or location such that, as with any other kind of dust, it could interfere with the correct operation of the equipment or impair safety.	No dust was seen to have accumulated in any way that could interfere with the correct operation of the equipment	Pass
	Except for special cases to be clearly specified in the relevant product standard, no dust shall deposit where it could lead to tracking along the creepage distances.	No dust was seen to accumulate at any point which could cause tracking	Pass
13.6.2	**Acceptance conditions for first characteristic numeral 6**		**N/A**
	The protection is satisfactory if no deposit of dust is observable inside the enclosure at the end of the test.	IP5X test.	N/A

14	**TESTS FOR PROTECTION AGAINST WATER INDICATED BY THE SECOND CHARACTERISTIC NUMERAL**		**Pass**
14.2	**Test conditions**		——
	The tests are conducted with fresh water.	Test conducted with fresh water	Pass
	During the tests for IPX1 to IPX6 the water temperature should not differ by more than 5 K from the temperature of the specimen under test.	Water temperature: +9.2°C Sample Temperature: +12.9°C	Pass
	If the water temperature is more than 5 K below the temperature of the specimen a pressure balance shall be provided for the enclosure.	The water temperature was within 5°K	Pass
	For IPX7 details of the water temperature are given in 14.2.7.	N/A	N/A
14.2.1	**Test for second characteristic numeral 1 with the drip box**		**N/A**

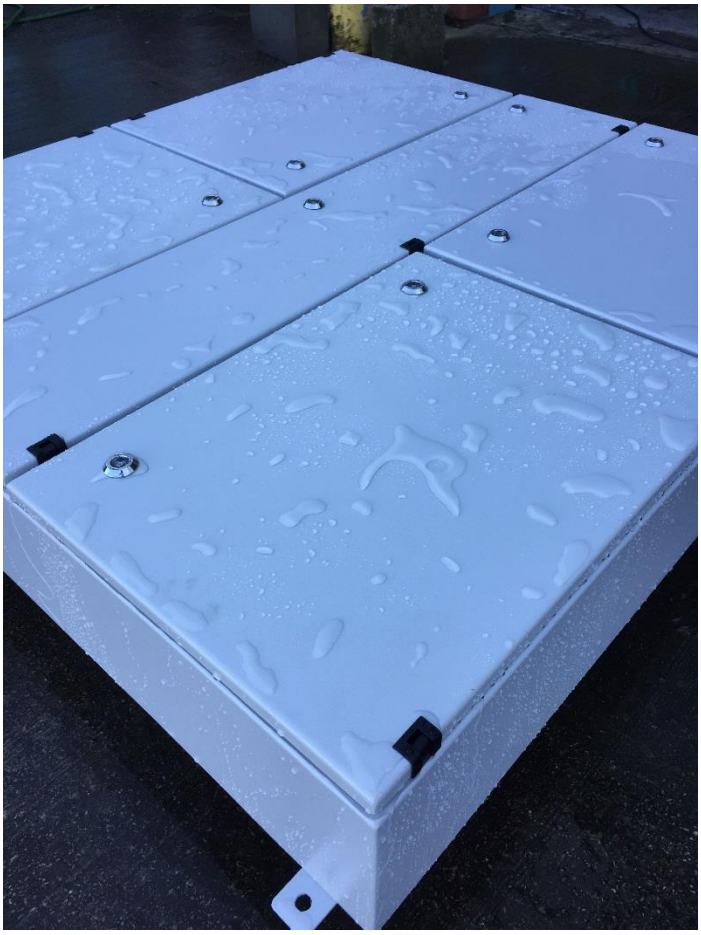
14.2.2	**Test for second characteristic numeral 2 with the drip box**		**N/A**
14.2.3	**Test for second characteristic numeral 3 with oscillating tube or spray nozzle**		**N/A**
	a) Conditions when using the test device as in Fig. 4 (oscillating tube)	IPX4 test.	N/A
	b) Conditions when using the test device as in Fig. 5 (spray nozzle)	N/A	N/A
14.2.4	**Test for second characteristic numeral 4 with oscillating tube or spray nozzle**		**Pass**
	a) Conditions when using the test device as in Fig. 4 (oscillating tube)	N/A	N/A
	b) Conditions when using the test device as in Fig. 5 (spray nozzle)	Test conducted using spray nozzle and in accordance with the parameters detailed in this clause.	Pass
14.2.5	**Test for second characteristic numeral 5 with the 6,3 mm nozzle**		**N/A**
	The test conditions to be observed are: internal diameter of the nozzle: 6.3mm delivery rate :12.5LPM ± 5% test duration 1 min per square metre min test duration 3 mins distance 2.5 to 3 m.	IPX4 test.	N/A
14.2.6	**Test for second characteristic numeral 6 with the 12,5 mm nozzle**		**N/A**
	The test conditions to be observed are: internal diameter of the nozzle: 12.5mm delivery rate :100LPM ± 5% test duration 1 min per square metre min test duration 3 mins distance 2.5 to 3 m.	IPX4 test.	N/A
14.2.7	**Test for second characteristic numeral 7: temporary immersion between 0,15 and 1 m**		**N/A**
	a) the lowest point of enclosures with a height less than 850 mm is located 1000 mm below the surface of the water;	IPX4 test.	N/A
	b) the highest point of enclosures with a height equal to or greater than 850 mm is located 150 mm below the surface of the water;	N/A	N/A
	c) the duration of the test is 30 min;	N/A	N/A
	d) the water temperature does not differ from that of the equipment by more than 5 K.	N/A	N/A
14.2.8	**Test for second characteristic numeral 8: continuous immersion subject to agreement**		**N/A**

	Unless there is a relevant product standard, the test conditions are subject to agreement between manufacturer and user, but they shall be more severe than those prescribed in 14.2.7. They shall also take account of the condition that the enclosure will be continuously immersed in actual use.	IPX4 test.	N/A
14.3	**Acceptance conditions**		——
	In general, if any water has entered, it shall not:		——
	be sufficient to interfere with the correct operation of the equipment or impair safety;	There was no water ingress upon completion of the tests.	Pass
	deposit on insulation parts where it could lead to tracking along the creepage distances;	There was no water deposited on any insulated parts.	Pass
	reach live parts or windings not designed to operate when wet;	There was no water ingress upon completion of the tests.	Pass
	accumulate near the cable end or enter the cable if any.	There was no water ingress upon completion of the tests.	Pass
	If the enclosure is provided with drain-holes, it should be proved by inspection that any water which enters does not accumulate and that it drains away without doing any harm to the equipment.	No drain holes.	N/A
	For enclosures without drain-holes, the relevant product standard shall specify the acceptance conditions if water can accumulate to reach live parts	There was no water ingress upon completion of the tests.	Pass

15	**TESTS FOR PROTECTION AGAINST ACCESS TO HAZARDOUS PARTS INDICATED BY THE ADDITIONAL LETTER**		**N/A**
15.3	**Acceptance conditions**		——
	The protection is satisfactory if adequate clearance is kept between the access probe and hazardous parts.	N/A	N/A
	In the case of the test for the additional letter B, the jointed test finger may penetrate to its 80mm length, but the stop face (Ø 50 x20 mm)shall not pass through the opening.	N/A	N/A
	Starting from the straight position, both joints of the test finger shall be successively bent through an angle of up to 90° with respect to the axis of the adjoining section of the finger and shall be placed in every possible position.	N/A	N/A
	In case of the tests for the additional letters C and D, the access probe may penetrate to itsfull length, but the stop face shall not fully penetrate through the opening.	N/A	N/A

ZA	**ANNEX ZA (NORMATIVE) Other International Publications quoted in this standard with the references of the relevant European Publications**		——
	When the International Publication has been modified by CENELEC common modifications, indicated by (mod), the relevant EN/HD applies.	(EN 60529)	Noted

ATTACHMENT 1 – PHOTOGRAPHS IPX4



ATTACHMENT 1 – PHOTOGRAPHS IP5X

TEST EQUIPMENT USED

Clause	Measurement/ testing	Testing/measuring equipment/ material used	Reference number	Calibration due date
14.2.4	IPX4	Timer	TRL S 401	2017-06-14
14.2.4	IPX4	Flow Meter	TRL S 259	2017-06-06
14.2.4	IPX4	Thermometer	TRL S 039	2017-08-30
14.2.4	IPX4	Spray Nozzle	TRL S 293	2017-04-21
14.2.4	IPX4	1M Rule	TRL S 417	2020-02-17
13.4	IP5X	Timer	TRL S 401	2017-06-14
13.4	IP5X	Mass flow meter	TRL S 430	2017-10-09
13.4	IP5X	Manometer	TRL S 256	2017-05-31
13.4	IP5X	Dust chamber	TRL S 364	No cal req'd