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KARANDIKAR LABORATORIES PVT. LTD. BOISAR

Format: F#07 b.1 Rev 10

TYPE TEST REPORT

IS/IEC 60529:2001 (RA 2019)

Degrees of Protection Provided by Enclosures (IP Code)



Report No. : KLPL/BTG/25/01-122

ULR No. : TC411025000000135F

Discipline : Electrical Discipline

Group/Category : Environmental Test Facility

Sub-category : Ingress protection test

Date of issue : 17.05.2025

No. of pages : 06 PAGES + Annexure

Compiled by (+ signature)..... : Bhavesh Rawate

Designation: Testing Engineer

Approved by (+ signature)..... : Javed Shaikh

Designation: Dy.Laboratory Manager

Item Received On : 31.01.2025 in Good Condition

Test Completion Date : 06.02.2025

Client

Name : M/S. Metalmech Engineering
: Plot No. 4246, Road E, Dared Phase-3, G.I.D.C.,
Jamnagar, Gujarat - 361004.

Test Specification

Standard : IS/IEC 60529:2001 (RA 2019)

Specified IP-Code : IP66

Equipment Under Test

Type of Test Object : MM AXL Series of Aluminium Enclosures,
Size: Ref. Page No.02 of This Report

Model : AXL Series

Serial No.. : NA

Manufacturer : M/s. Metalmech Engineering

Annexure :-

Drawing No. : MM-AXL-WE, Rev. No.00, Dated: 03.07.2024, (No. of Pages 02).

NOTE : 1) This refers only to the particular item(s) submitted for testing.

2) If necessary, this report shall be reproduced ONLY in full.



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Possible test case verdicts:

Test case does not apply to the test object : N (Not Applicable)

Test object does meet the requirement..... : P (Pass)

Test item does not meet the requirement : F (Fail)

Test case has not been checked : -----

General remarks:

"(See remark #)" refers to a remark 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.

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

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

IP6X test conducted at Laboratory (Boisar).

IPX6 test conducted at Laboratory (Boisar).

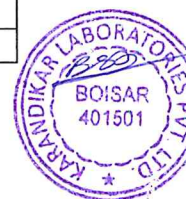
Note: - MAJOR EQUIPMENTS USED

Tests	Required Instruments	Id. No.	Cal Due Date	Used Y/N
5X / 6X	Vacuum Meter	K&A 1108/1-17	07.02.2025	Y
	Rotameter	K&A 1346/23-4	24.12.2025	Y
	DTC with sensor	K&A 581/2-12	21.07.2025	Y
	Timer	K&A 581/1-12	14.07.2025	Y
X6	Nozzle 12.5 mm Dia	K&A 382	16.04.2025	Y
	Rotameter	K&A 1103-17	02.03.2025	Y
	Stop Watch	K&A 1171-18	25.10.2025	Y

AXL Series of Aluminium Enclosures

Sr.No.	Dimension L X W X H in mm	Model Number
1	45 X 50 X 30	MM AXL B 01
2	64 X 58 X 34	MM AXL B 02
3	64 X 98 X 34	MM AXL B 03
4	80 X 75 X 57	MM AXL B 04
5	80 X 125 X 57	MM AXL B 05
6	80 X 175 X 57	MM AXL B 06
7	80 X 250 X 57	MM AXL B 07
8	100 X 100 X 81	MM AXL B 08
9	120 X 122 X 81	MM AXL B 09

Sr.No.	Dimension L X W X H in mm	Model Number
10	120 X 122 X 91	MM AXL B 10
11	140 X 140 X 91	MM AXL B 11
12	160 X 160 X 91	MM AXL B 12
13	180 X 180 X 101	MM AXL B 13
14	120 X 220 X 81	MM AXL B 14
15	120 X 220 X 91	MM AXL B 15
16	160 X 260 X 91	MM AXL B 16
17	230 X 400 X 181	MM AXL B 17



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Date: 17.05.2025

IS/IEC 60529:2001 (RA 2019)

Clause	Requirement - Test	Result- Remark	Verdict
10	Marking.	--	N
11	General requirement for tests.		
11.1	Tests should be carried out under the standard atmospheric conditions described in IEC 60068-1	Followed	P
11.2	Test samples shall be in a clean and new condition.	Sample found clean	P
	The relevant product standard shall specify details such as: The number of samples to be tested;	One	P
	-conditions for mounting, assembling and positioning of the samples;	Vertical	P
	-the pre-conditioning, if any, which is to be used;	--	N
	-whether to be tested energized or not;	--	N
	-whether to be tested with its parts in motion or not;	Non-Operational	P
11.5	Empty enclosures		
	If the enclosure is tested without equipment inside, the manufacturer shall ensure that after the electrical equipment is enclosed the enclosure meets the declared degree of Protection of the final product.	Empty enclosures	P

12	Tests for protection against access to hazardous parts indicated by the first characteristic numeral.				
First, characteristic Numeral.	Test means (Access probes)	Test force	Test Conditions Refer IS/IEC 60529:2001 (RA 2019)	--	
0	No test required	-	-	--	N
1	The access probe, sphere of 50 mm ϕ shall not fully penetrate and adequate clearance shall be kept.	50N $\pm 10\%$	Cl.12.2	--	N
2	The jointed test finger may penetrate up to 80 mm length but adequate clearance shall be kept.	30N $\pm 10\%$	Cl.12.2	--	N
3	The access probe, sphere of 2.5 mm ϕ shall not penetrate and adequate clearance shall be kept.	3N $\pm 10\%$	Cl.12.2	--	N
4	The access probe of 1.0 mm ϕ shall not penetrate and adequate clearance shall be kept.	1N $\pm 10\%$	Cl.12.2	--	N
5	Test conditions for IP 5X: Same As Above	1N $\pm 10\%$	Cl.12.2	--	N
6	Test conditions for IP 6X: Same As Above	1N $\pm 10\%$	Cl.12.2	--	N

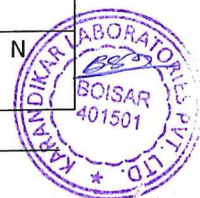
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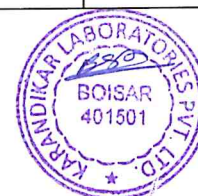
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Date: 17.05.2025

IS/IEC 60529:2001 (RA 2019)					
Clause	Requirement – Test			Result-Remark	Verdict
13	Tests for protection against solid foreign objects indicated by the First characteristic numeral.				
First, characteristic Numeral.	Test means (object probes and dust chamber)	Test force	Test Conditions Refer IS/IEC 60529:2001 (RA 2019)	--	
0	No test required	-	-	--	N
1	Rigid sphere without handle or guard 50 mm diameter.	50N ±10%	Cl.13.2	--	N
2	Rigid sphere without or guard 12.5 mm diameter.	30N ±10%	Cl.13.2	--	N
3	Rigid steel rod 2.5mm diameter with edges free from burrs	3N± 10%	Cl.13.2	--	N
4	Rigid steel wire 1, mm diameter with edges free from burrs.	1N± 10%	Cl.13.2	--	N
5	Dust chamber, Enclosure with under pressure	NA	Cl.13.4+13.5	--	N
6	Dust chamber, The enclosure is maintained below the Surrounding atmospheric pressure by a vacuum pump.	NA	Cl.13.4+13.6	For 8 Hrs, As extraction rate is less than 40 volumes per hour and max depression of 20 mbar.	P
13.6.2	Acceptance conditions for the first characteristic numeral 6X. The protection is satisfactory if no deposit of dust is observable inside the UUT at the end of test.			No ingress of dust found inside the UUT.	P



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IS/IEC 60529:2001 (RA 2019)				
Clause	Requirement – Test		Result-Remark	Verdict
14	Tests for protection against water indicated by the second characteristic numeral.			
Second, characteristic Numeral.	Test means	Test Conditions Refer IS/IEC 60529:2001 (RA 2019)	--	
0	No test required	Cl.14.2.0	--	N
1	Drip box, Enclosure on turntable	Cl.14.2.1	--	N
2	Drip box, Enclosure in 4 fixed positions of 15 ° tilt	Cl.14.2.2	--	N
3	oscillating tube or spray nozzle, 60° from vertical	Cl.14.2.3	--	N
4	oscillating tube or spray nozzle, 180° from vertical	Cl.14.2.4	--	N
5	6.3-mm nozzle, tested with a spraying nozzle, distance 2.5 m to 3 m, water flow rate 12.5 l/min ±5%	Cl.14.2.5	--	N
6	12.5-mm nozzle, tested with a spraying nozzle, distance 2.5 m to 3 m, water flow rate 100 l/min	Cl.14.2.6	12.5 mm nozzle, Flow rate 95 to 105 lit/min, 2.5 – 3 m distance, 3 min duration.	P
7	Immersion tank, Temporary immersion	Cl.14.2.7	--	N
8	Immersion tank, Continuous immersion subject to agreement. Water temperature does not differ from that of equipment by more than 5K.	Cl.14.2.8	--	N
-	Acceptance conditions for IPX6: The protection is satisfactory if no water has accumulated near the insulation, cable end or entered cables or interferes with the correct operation of the equipment.	Cl.14.3	No ingress of water observed inside the UUT.	P

SUMMARY OF INGRESS PROTECTION TESTS ACCORDING TO IS/IEC 60529:2001(RA 2019)

Conclusion of the IP66 test: PASS.

The results of the tests were in compliance with the requirements in the standard IS/IEC 60529:2001 (RA 2019)

UUT=Unit Under Test

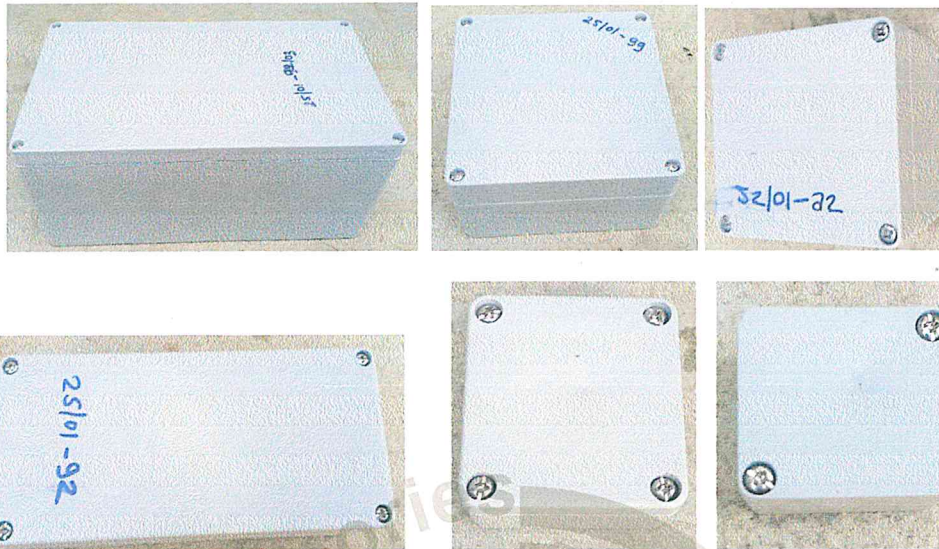
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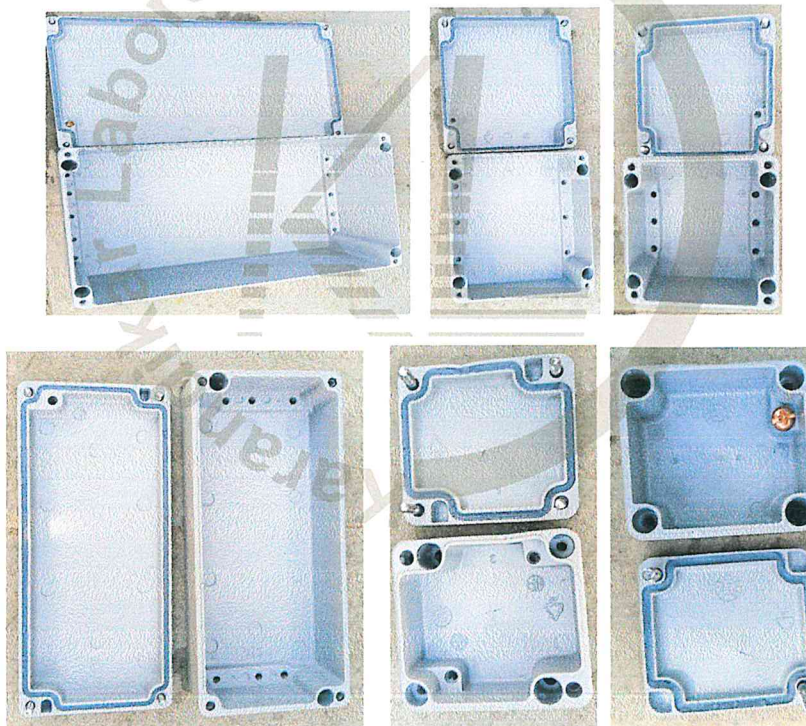
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Picture 1: MM AXL Series of Aluminium Enclosures, Pl. Ref. Page No.02 of This Report



Picture2 : No ingress of dust & water observed



END OF REPORT

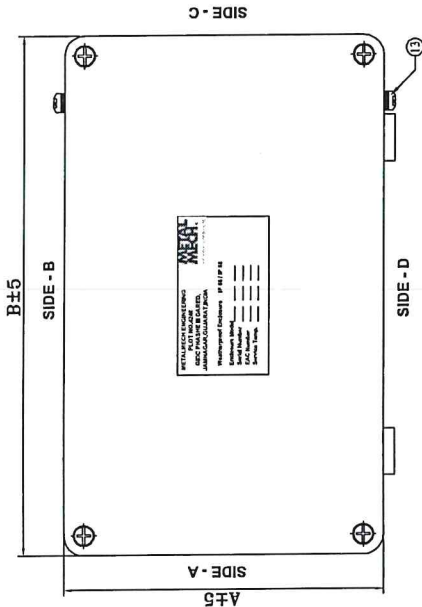
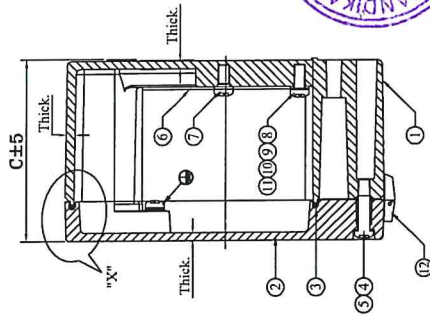


Table - B (Bill of material)

Sl. No.	DESCRIPTION	MOC	QTY.	REMARK
1	Base	Aluminum Alloy as per En AC - A9112 (FEB) / Bin 1706	01	
2	Lid	Aluminum Alloy as per En AC - A9112 (FEB) / Bin 1706	01	
3	Lid Gasket	Silicone, Color: Black/Red	01	
4	Lid Fixing Screw	Stainless Steel SS304/A2	As Actual	M4-M6
5	Spring Washer (Item 4)	Spring Steel / SS 304	As Actual	M4-M6
6	Mounting Plate	Sheet steel/SS 316/SS 316L	01	Optional
7	Mounting Plate Fixing Screw	Stainless Steel SS304/SS316	04	Optional
8	Internal Earthing	Copper Coated Steel Screws	02	M4-M6
9	Spring Washer	Spring Steel / SS 304	02	
10	Plain Washer	Stainless Steel SS304/SS316	02	
11	TabStar Washer	Stainless Steel SS304/SS316	02	Optional
12	Hinge Arrangement with Gasket, Spring Washer, Plain Washer & TabStar Washer	Polyamid / Stainless Steel	On Request	Optional
13	External Earthing with Gasket, Spring Washer, Plain Washer & TabStar Washer	Copper Coated Steel Screws	02 Nos.	Optional

EXPLANATION OF TYPE No.
M A X L B 0 4 0 0 0 0
Metalmech Heavy Duty Aluminum Enclosure BBox
Enclosure size 04 = 80 x 75 x 57 05 = 80 x 125 x 57 06 = 80 x 175 x 57 07 = 80 x 225 x 57 08 = 100 x 100 x 81 09 = 120 x 122 x 81 10 = 120 x 122 x 91 11 = 140 x 140 x 91 12 = 140 x 140 x 101 13 = 180 x 180 x 101 14 = 120 x 220 x 81 15 = 120 x 220 x 91 16 = 160 x 260 x 91 17 = 230 x 400 x 181
0000 = Natural Finish (Uncoated) 7001 = Ral 7001 Silver Grey 9005 = Ral 9005 Black

Report No: KLPL18TQ125101-122

Notes: THESE ALUMINIUM ENCLOSURES HAVE PASSED BELOW TESTS:

1. SALT SPRAY TEST: 1000 HOURS AS PER IS 9000 PART XI.
2. IMPACT TEST: 7 JOULES (IS/IEC 60079-4, IEC 60079-4)
3. IP TEST: IP 66 AND IP 68 (1.5 METERS, 2 HOURS) AS PER IS/IEC 60529:2001.

Table - A (Dimensions chart)

Models	Sizes	Dimensions			Wall Thickness		Mountings		Screw for Lid		
		A ±3	B ±3	C ±5	Base	Lid	D ±3	E ±3	Bolt	Size	Nos.
MM AXL B 04	80 x 75 x 57	80	75	57	3 Min.	2.5 Min.	52	63	M4x2 Nos.	M4x20L	4 Nos.
MM AXL B 05	80 x 125 x 57	80	125	57	3 Min.	2.5 Min.	52	113	M4x2 Nos.	M4x20L	4 Nos.
MM AXL B 06	80 x 175 x 57	80	175	57	3 Min.	2.5 Min.	52	163	M4x2 Nos.	M4x20L	4 Nos.
MM AXL B 07	80 x 250 x 57	80	250	57	3 Min.	2.5 Min.	52	238	M4x2 Nos.	M4x20L	4 Nos.
MM AXL B 08	100 x 100 x 81	100	100	81	3 Min.	3 Min.	66	86	M4x4 Nos.	M4x24L	4 Nos.
MM AXL B 09	120 x 122 x 81	120	122	81	4 Min.	4 Min.	82	106	M6x4 Nos.	M6x25L	4 Nos.
MM AXL B 10	120 x 122 x 91	120	122	91	4 Min.	4 Min.	82	106	M6x4 Nos.	M6x25L	4 Nos.
MM AXL B 11	140 x 140 x 91	140	140	91	4 Min.	4 Min.	93	120	M6x4 Nos.	M6x35L	4 Nos.
MM AXL B 12	160 x 160 x 91	160	160	91	4 Min.	4 Min.	110	140	M6x4 Nos.	M6x25L	4 Nos.
MM AXL B 13	180 x 180 x 101	180	180	101	4 Min.	4 Min.	130	160	M6x4 Nos.	M6x35L	4 Nos.
MM AXL B 14	120 x 220 x 81	120	220	81	4 Min.	4 Min.	82	204	M6x4 Nos.	M6x25L	4 Nos.
MM AXL B 15	120 x 220 x 91	120	220	91	4 Min.	4 Min.	82	204	M6x4 Nos.	M6x35L	4 Nos.
MM AXL B 16	160 x 260 x 91	160	260	91	4 Min.	4 Min.	110	240	M6x4 Nos.	M6x35L	4 Nos.
MM AXL B 17	230 x 400 x 181	230	400	181	4.2 Min.	4.2 Min.	180	380	M6x4 Nos.	M6x28L	4 Nos.

NAME	SIGN	DATE
JMS		01/07/24
SHS		03/07/24
JHV		03/07/24

TITLE	SCHEDULE DRAWING OF EMPTY ALUMINIUM ENCLOSURE
DWG. NO.	MM-AXL - VE
REV.	R0



METALMECH ENGINEERING

PLOT NO.4246

GIDC PHASHE III DARED,

JAMNAGAR, GUJARAT, INDIA

PRODUCTION ANGLE

SHEET 1 OF 2

SCALE: 1

