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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)

TC-4110

Report No. ..... : **KLPL/BTG/25/01-123**

ULR No. .....: TC411025000000136F

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 - 361001.

Test Specification

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

Specified IP-Code .....: **IP68**

Equipment Under Test

Type of Test Object ..... : **MM AXL Series of Aluminium Enclosure,**
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).

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NOTE : 1) This refers only to the particular item(s) submitted for testing.
2) If necessary, this report shall be reproduced ONLY in full.

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).

IPX8 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
X7 /X8	Scale	K&A 430-13	23.12.2025	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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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			--	**P**
11.2	Test samples shall be in a clean and new condition.			--	**P**
	The relevant product standard shall specify details such as: The number of samples to be tested;			--	N
	-conditions for mounting, assembling and positioning of the samples;			--	**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;			--	N
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 Ø shall not fully penetrate and adequate clearance shall be kept.	50N ±10%	Cl.12.2	--	N
2	The jointed test finger may penetrate up to 80 mm length but adequate clearance shall be kept.	30N ±10%	Cl.12.2	--	N
3	The access probe, sphere of 2.5 mm Ø shall not penetrate and adequate clearance shall be kept.	3N± 10%	Cl.12.2	--	N
4	The access probe of 1,0 mm Ø shall not penetrate and adequate clearance shall be kept.	1N± 10%	Cl.12.2	--	N
5	Test conditions for IP 5X: Same As Above	1N± 10%	Cl.12.2	--	N
6	Test conditions for IP 6X: Same As Above	1N± 10%	Cl.12.2	--	N

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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, 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 20mbar.	**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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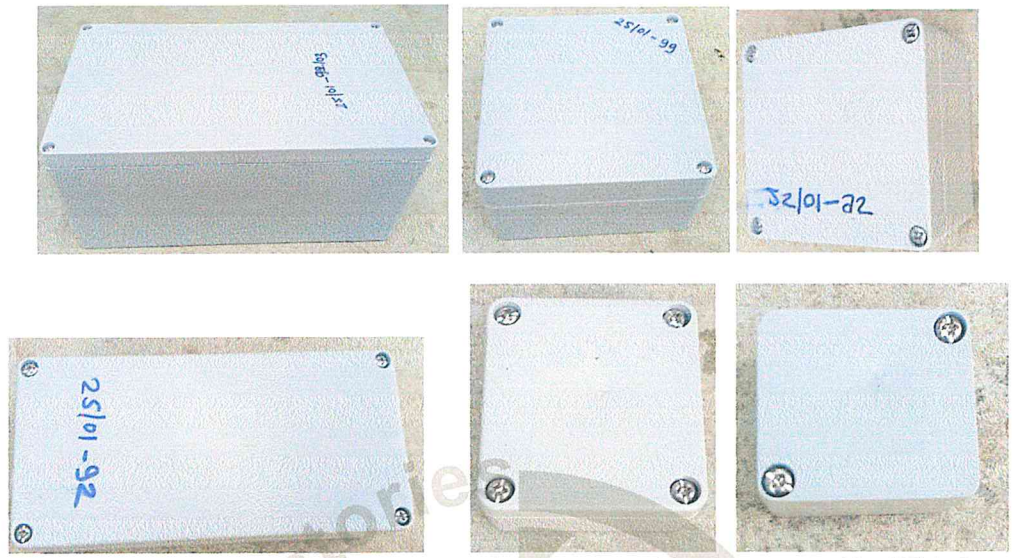
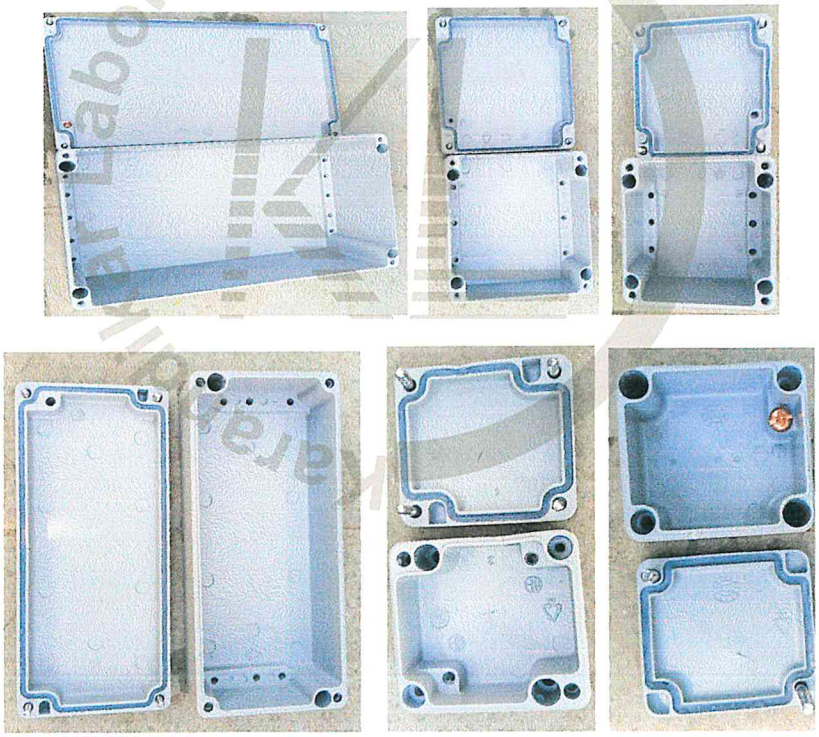
IS/IEC 60529:2001 (RA 2019)				
Clause	**Requirement – Test**		**Result-Remark**	**Verdict**
14	**Tests for protection against water indicated by the second characteristic numeral.**			
Second, characteristic Numeral.	Test means	Test Conditions Refer IS/IEC 60529:2001 (RA 2019)	--	
0	No test required	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	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	--	N
7	Immersion tank,	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. **Test Duration: 2Hrs.**	Cl.14.2.8	The lowest point of UUT is located 1.5 meter below surface of water.	**P**
-	**Acceptance conditions for IPX8:** 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**
-	Tests for protection against access to hazardous parts indicated by the additional letter.	Cl.15	--	N

SUMMARY OF INGRESS PROTECTION TESTS ACCORDING TO IS/IEC 60529:2001 (RA 2019)
Conclusion of the IP68 test: PASS.
The results of the tests were in compliance with the requirements in the standard IS/IEC 60529:2001 RA 2019 (RA 2019)
UUT=Unit Under Test

KARANDIKAR LABORATORIES P. LTD. BOISAR 401501



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



Picture2 : No ingress of dust & water observed

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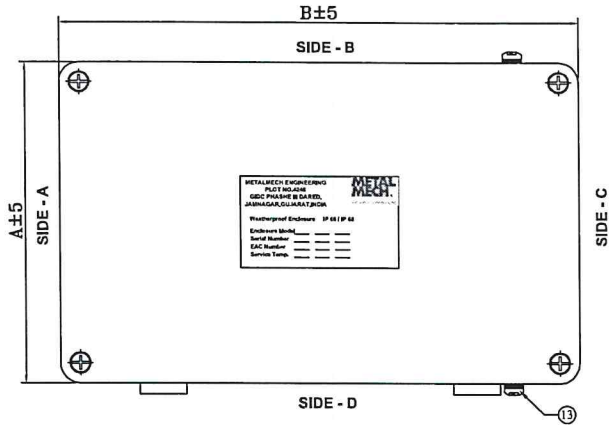
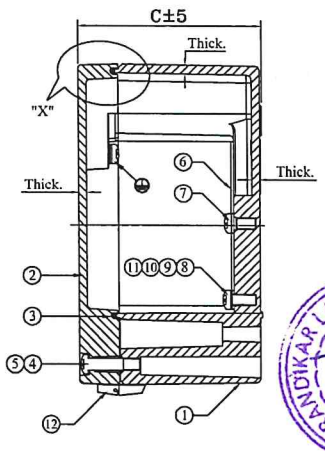
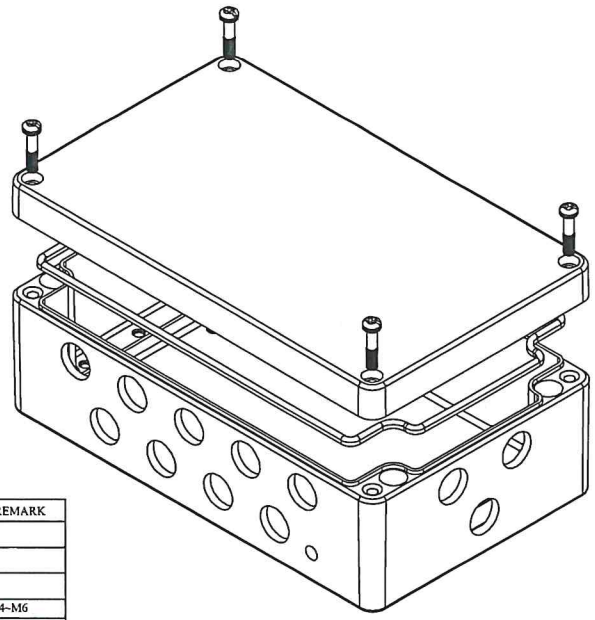
END OF REPORT







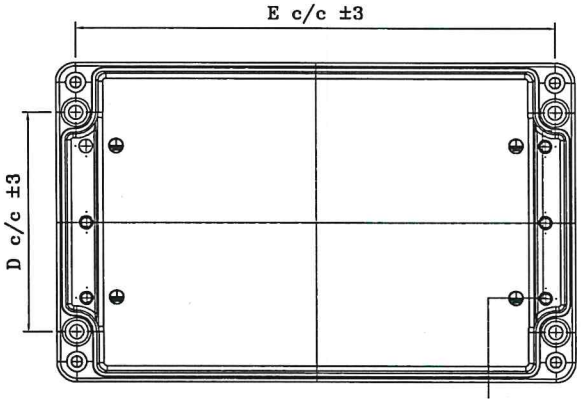


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Table - B (Bill of material)

Sl. No.	DESCRIPTION	MOC	QTY.	REMARK
1	Base	Aluminium Alloy as per En Ac - Aisi 12 (FE) / Din 1706	01	
2	Lid	Aluminium Alloy as per En Ac - Aisi 12 (FE) / Din 1706	01	
3	Lid Gasket	Silicone, Color : Black/Red COT: -60°C to +200°C	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 304/SS 304L /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	Tab/Star Washer	Stainless Steel SS304/SS316	02	
12	Hinge Arrangement with Gasket	Polyamid / Stainless Steel	On Request	Optional
13	External Earthing with Gasket, Spring Washer, Plain Washer, & Tab/Star Washer	Copper Coated Steel Screws	02 Nos. On Request	Optional

EXPLANATION OF TYPE No.

MM	AXL	B	04	0000
Metalmech	Heavy Duty Aluminium Enclosure	BBox	Enclosure size	

Enclosure size
04 = 80 x 75 x 57
05 = 80 x 125 x 57
06 = 80 x 175 x 57
07 = 80 x 250 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 = 160 x 160 x 91
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

Table - A (Dimensions chart)

Models	Sizes	Dimensions A ±3	B ±3	C ±5	Wall Thickness Base	Lid	Mountings D ±3	E ±3	Bolt	Screw for Lid 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.	M6x25L	4 Nos.
MM AXL B 17	230 x 400 x 181	230	400	181	5.2 Min.	4.2 Min.	180	380	M6x4 Nos.	M6x28L	4 Nos.

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 60079-0, IEC 60079-0)
3. IP TEST: IP 66 AND IP 68 (1.5 METERS, 2 HOURS) AS PER IS/IEC 60529:2001.

Report NO: KLPL/BTG/25/01-123

APPROVED SIGN STAMP

NO.	DATE	AMMENDMENT/REVISION

NOTES		NAME	SIGN	DATE
NO MODIFICATION PERMITED WITHOUT REFERENCE TO THE NOTIFIED BODY.	DRAWN	JNS		01/07/24
	CHK.	SHS		03/07/24
DEBURR AND BREAK SHARP EDGES	APP.	JHV		03/07/24

METAL MECH. THE SAFEST CONNECTIONS

METALMECH ENGINEERING
PLOT NO.4246
GIDC PHASHE III DARED,
JAMNAGAR,GUJARAT,INDIA

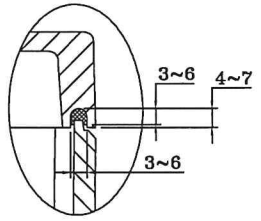
TITLE: SCHEDULE DRAWING OF EMPTY ALUMINIUM ENCLOSURE	DWG NO. MM-AXL-WE	PROJECTION ANGLE	REV. R0
MATERIAL: AS PER NOTES	SCALE:1:1		SHEET 1 OF 2

Annexure

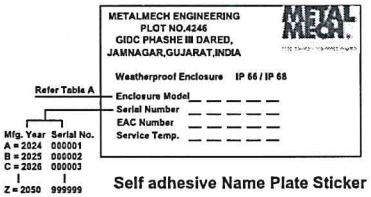
Cable Entry Details : Table - C

Sr. No.	Size of Cable Entries	Maximum Nos. of Cable Entries on each side of enclosure															
		MM AXL B 04		MM AXL B 05		MM AXL B 06		MM AXL B 07		MM AXL B 08		MM AXL B 09		MM AXL B 10		MM AXL B 11	
		Side B/D	Side A/C	Side B/D	Side A/C	Side B/D	Side A/C	Side B/D	Side A/C	Side B/D	Side A/C	Side B/D	Side A/C	Side B/D	Side A/C	Side B/D	Side A/C
01	Max. upto M12 or1/4" NPT	01 No.	02 Nos.	02 Nos.	04 Nos.	02 Nos.	06 Nos.	02 Nos.	09 Nos.	03 Nos.	04 Nos.	04 Nos.	04 Nos.	04 Nos.	04 Nos.	06 Nos.	04 Nos.
02	Max. upto M16 or 3/8" NPT	01 No.	01 No.	01 No.	03 Nos.	01 No.	04 Nos.	01 No.	06 Nos.	02 Nos.	03 Nos.	03 Nos.	02 Nos.	03 Nos.	02 Nos.	04 Nos.	02 Nos.
03	Max. upto M20 or1/2" NPT	01 No.	01 No.	01 No.	02 Nos.	01 No.	03 Nos.	01 No.	05 Nos.	01 No.	02 Nos.	03 Nos.	02 Nos.	03 Nos.	02 Nos.	03 Nos.	02 Nos.
04	Max. upto M25 or 3/4" NPT	-	-	-	-	01 No.	03 Nos.	01 No.	04 Nos.	01 No.	01 No.	02 Nos.	01 No.	02 Nos.	01 No.	02 Nos.	01 No.
05	Max. upto M32 or 1" NPT	-	-	-	-	-	-	-	-	01 No.	01 No.	01 No.	01 No.	01 No.	01 No.	02 Nos.	01 No.
06	Max. upto M40 or 1.1/4" NPT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

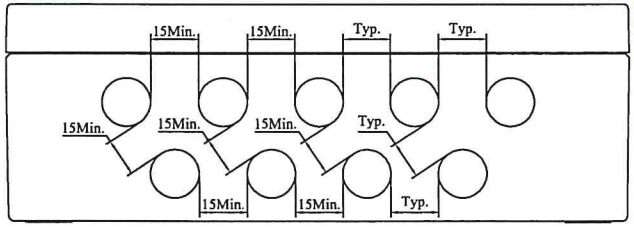
Sr. No.	Size of Cable Entries	Maximum Nos. of Cable Entries on each side of enclosure											
		MM AXL B 12		MM AXL B 13		MM AXL B 14		MM AXL B 15		MM AXL B 16		MM AXL B 17	
		Side B/D	Side A/C	Side B/D	Side A/C	Side B/D	Side A/C	Side B/D	Side A/C	Side B/D	Side A/C	Side B/D	Side A/C
01	Max. upto M12 or1/4" NPT	06 Nos.	05 Nos.	07 Nos.	05 Nos.	07 Nos.	02 Nos.	07 Nos.	02 Nos.	11 Nos.	03 Nos.	40 Nos.	16 Nos.
02	Max. upto M16 or 3/8" NPT	04 Nos.	03 Nos.	07 Nos.	05 Nos.	07 Nos.	02 Nos.	07 Nos.	02 Nos.	11 Nos.	03 Nos.	40 Nos.	16 Nos.
03	Max. upto M20 or1/2" NPT	03 Nos.	02 Nos.	04 Nos.	03 Nos.	05 Nos.	01 No.	05 Nos.	01 No.	06 Nos.	02 Nos.	36 Nos.	16 Nos.
04	Max. upto M25 or 3/4" NPT	02 Nos.	02 Nos.	03 Nos.	02 Nos.	04 Nos.	01 No.	04 Nos.	01 No.	05 Nos.	02 Nos.	21 Nos.	09 Nos.
05	Max. upto M32 or 1" NPT	02 Nos.	01 No.	02 Nos.	02 Nos.	03 Nos.	01 No.	03 Nos.	01 No.	04 Nos.	01 No.	18 Nos.	08 Nos.
06	Max. upto M40 or 1.1/4" NPT	01 No.	01 No.	02 Nos.	01 No.	03 Nos.	-	03 Nos.	-	03 Nos.	01 No.	10 Nos.	04 Nos.
07	Max. upto M50 or 1.1/2" NPT	-	-	-	-	-	-	-	-	-	-	10 Nos.	04 Nos.
08	Max. upto M63 or 2" NPT	-	-	-	-	-	-	-	-	-	-	05 Nos.	02 Nos.
09	Max. upto M75 or 2.1/2" NPT	-	-	-	-	-	-	-	-	-	-	03 No.	01 No.
10	Max. upto M90 or 3" NPT	-	-	-	-	-	-	-	-	-	-	02 Nos.	01 No.
11	Max. upto M100 or 3.1/2" NPT	-	-	-	-	-	-	-	-	-	-	02 Nos.	01 No.



Detail "X"
Tongue & Groove Arrangement



Self adhesive Name Plate Sticker



KARANDIKAR LABORATORIES PVT. LTD.
BOISAR
401501

Report NO: KLPL/BTG/25/01-123

APPROVED SIGN STAMP

NO.	DATE	AMMENDMENT/REVISION

NOTES		NAME	SIGN	DATE
NO MODIFICATION PERMITED WITHOUT REFERENCE TO THE NOTIFIED BODY.	DRAWN	JNS		01/07/24
	CHK.	SHS		03/07/24
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METALMECH ENGINEERING
PLOT NO.4246
GIDC PHASHE III DARED,
JAMNAGAR,GUJARAT,INDIA

TITLE: SCHEDULE DRAWING OF EMPTY ALUMINIUM ENCLOSURE	DWG NO. MM-AXLWE	REV. R0
MATERIAL: AS PER NOTES	SCALE:1:1	SHEET 2 OF 2

Annexure