



सीएसआईआर - केंद्रीय खनन एवं ईंधन अनुसंधान संस्थान  
CSIR - Central Institute of Mining and Fuel Research

(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद् (Council of Scientific & Industrial Research))

(अंतर्गत वैज्ञानिक तथा औद्योगिक अनुसंधान विभाग, विज्ञान और प्रौद्योगिकी मंत्रालय, भारत सरकार)

(Under the Department of Scientific & Industrial Research, Ministry of Science & Technology, Govt)

बरवा रोड, धनबाद - 826015, झारखंड, भारत / Barwa Road, Dhanbad - 826015, Jharkhand, India

(आई एस ओ 9001 प्रमाणित संस्थान / ISO 9001 Certified Institute)

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परीक्षण एवं मूल्यांकन रिपोर्ट सं.

Test & Assessment Report No. IN/CIMFR/TR23/R/ 1130

दिनांक/Dated: 28 July, 2023

यूएलआर सं./ULR No.: TC2300000232F

टीसी कोड सं./TC CODE NO. FES/70(E)/23-24

सेवा में/To,

मेसेर्स औमा इंडिया प्राइवेट लिमिटेड/M/S. AUMA INDIA PRIVATE LIMITED

३८ए एवं ३९-बी, फेस-ii, पीनया इंडस्ट्रियल एरिया/38-A & 39-B, PHASE-II, PEENYA INDUSTRIAL AREA,  
बैंगलोर-५६०५८/BANGALORE - 560 058

**विषय/Subject:** Type Examination Certificate along with test assessment report Flameproof Enclosure for Compact Actuator (With Integral Starter), in SG grade Iron & cast aluminium Alloy LM-6 construction designated by Model No.: SACEx100, Motor Frame 112, as per IS/IEC 60079-1:2014 for use in Gas Group: IIB, EPL Gb & Db atmosphere.

- (परीक्षण रिपोर्ट/Test Report)

आपका संदर्भ आवेदन सं./ Your Ref. Appl. No.: AIL/HQ/R&D//10/22-23 R0

दिनांक/Dated: 20/06/2023

प्रिय महोदय/Dear Sir,

आग्रह है कि कृपया आपके द्वारा भेजे गए उपरोक्त दस्तावेज़ के परीक्षण मूल्यांकन रिपोर्ट के साथ संलग्न किया गया इसका टाइप परीक्षा प्रमाण-पत्र भी प्राप्त करें। Please find the enclosed Type Examination Certificate along with test assessment report of the above document submitted by you.

इस संस्थान को सुरक्षा की दृष्टि से आवश्यकता होने पर किसी भी समय उक्त 'परीक्षण रिपोर्ट' की समीक्षा, संशोधन करने या उसे वापस लेने का अधिकार प्राप्त है। This Institute reserves the right to review, amend or withdraw this 'Test Report' at any time, if considered necessary in the interest of safety.

इस परीक्षण कार्य के लिए लागू जी. एस.टी. सहित रु. 30,149/- के शुल्क को आपके द्वारा किए गए अग्रिम जमा के साथ समायोजित किया गया है। Charges of Rs. 30,149/- (Rupees Thirty Thousand One Hundred Forty Nine Only) including applicable GST involved towards the testing have been adjusted against the advance deposit made by you.

कृपया प्राप्ति सूचना भेजें। Kindly acknowledge receipt.

सधन्यवाद/Thanking you.

भवदीय/Yours faithfully,

जितेंद्र कुमार सिंह

27/07/2023

(J. K. SINGH)

HOS, TESTING CELL

संलग्न/Encl:

1. परीक्षण मूल्यांकन रिपोर्ट/Test & assessment report in Triplicate
2. टाइप परीक्षा प्रमाण-पत्र/Type examination certificate

प्रति/Copy to:

1. प्रमुख, ज्वाला-सह एवं उपस्कर सुरक्षा/Head, Flameproof & equipment Safety
2. बिल अनुभाग/Bill section

HQ : Dhanbad - ☎ :+91-326-2296023,2296006 (O) 📠 :+91-326-2296025 EPABX : +91-326-2296012/6013/6027/6028

E-mail : director@cimfr.nic.in/drpk Singh@cimfr.nic.in Digwadih Campus : ☎ +91-326-2381111

Research Centres : Bilaspur : ☎ +91-775-2271450, Nagpur : Unit - I - ☎ +91-712-2510604, Unit - II - ☎ 2510390

Ranchi : ☎ +91-651-2461392, Roorkee : ☎ +91-1332-275998

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ज्वालासह एवं उपकरण सुरक्षा / FLAMEPROOF & EQUIPMENT SAFETY

## परीक्षण रिपोर्ट / TEST REPORT

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FORMAT NO.: (CIMFR: DQM: FLP02: F-01:REV-01)  
(Flameproof & Equipment Safety)

ULR No.: TC23000000232F

Code No.: FES/70(E)/23-24

Test & Assessment Report No.: IN/CIMFR/TR23/R/ 1130

Dated: 28 July, 2023

Application Ref. No.: AIL/HQ/R&D//10/22-23 R0

Dated: 20/06/2023

1. Applicant : M/S. AUMA INDIA PRIVATE LIMITED  
38-A & 39-B, PHASE-II, PEENYA INDUSTRIAL AREA,  
BANGALORE - 560 058
2. Manufacturer : M/S. AUMA INDIA PRIVATE LIMITED  
38-A & 39-B, PHASE-II, PEENYA INDUSTRIAL AREA,  
BANGALORE - 560 058
3. Equipment : Flameproof Enclosure for Compact Actuator (With Integral Stater)
4. Designated by : Model No.: SACEX100, Motor Frame 112.
5. Type of Protection : Ex db for Gas Group: IIB, EPL Gb & Db.
6. Electrical ratings : rated at 7.5KW, 2pole, 415V, 3Phse, 50Hz.
7. Temperature Class : T4 (Project Report No. CNP/4224/2015-2016)
8. Degree of Ingress Protection : IP-68 (CPRI Test Report No. 149EATDIP03S0064 Dated: 16/09/2003).
9. Material of Construction : SG grade Iron & cast aluminium Alloy LM-6 construction.
10. Description of the equipment : Flameproof Enclosure for Compact Actuator (With Integral Stater)

Description	Volume in (cc.)		Min. Wall Thickness (mm)	Nos. & Size of Bolts/Fasteners
	Gross	Net		
Actuator Enclosure	36000	25000	Ref. Drg.	Ref. Drawing.
Terminal Enclosure	5020	4725		Ref. Drawing.

Note: For further details refer drawings.

B.

Sl. No.	Glass details on cover	Max no. of aperture on cover	
01	Size = 100x28.5mm, Type = Toughened Type Flat Glass, Make: Premier, Thickness = 8 mm thick, Cemented Path = 12.5mm, Sealing Material = Araldite	Actuator enclosure	Push Buttons 03 Nos. & Rotary switch 1 no.
02.	Size = Ø90mm, Type = Toughened Type Flat Glass, Make: Premier, Thickness = 10 mm thick, Cemented Path = 19mm, Sealing Material = Araldite	Switch compartment cover	.....

11. Nature of Flameproof Joint: Type of joints and gaps (Flange joint, Threaded joint, Spigot joint & Cylindrical joint for Gas Gr. IIB).

Sl. No.	Location of flamepath	Type of Joint	Min. length of flamepath (in mm)		Max. gap/dia clearance (in mm)	
			R e q	S p e c	R e q	S p e c
1.	SC cover - Actuator Housing (FL-1)	Cylindrical	12.5	13	0.15	0.15
2.	Actuator Housing - Motor mounting Flange. (FL-2)	Cylindrical	12.5	13	0.15	0.15
3.	Motor Flange - Motor Housing ((FL-3)	Cylindrical	12.5	16	0.15	0.15
4.	Motor Flange - Motor Mounting Flange (FL-4)	Flange	12.5	14	0.15	0.125
5.	Actuator Housing - External bearing retainer (FL-5)	Cylindrical	12.5	14	0.15	0.15
6.	Compact Housing - Cover (FL-6)	Cylindrical	12.5	24	0.15	0.15

*[Handwritten Signature]*



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Sl. No.	Part Name	Material	Length	Width	Thickness	Remarks
7.	Cover - Bush (FL-7)	Cylindrical	12.5	16	0.15	Press fitted
8.	Semi pact Housing - Compact Housing (FL-8)	Cylindrical	12.5	25	0.15	0.15
9.	Semi pact Housing - KLK Cover (FL-9)	Flange	12.5	13	0.15	0.125
10.	Semi pact Housing - Cover (FL-10)	Cylindrical	12.5	24	0.15	0.15
11.	Actuator Housing - Semi pact Housing (FL-12)	Flange	12.5	13	0.15	0.125
12.	Base Plate - Threaded Bush (FL-13)	Cylindrical	12.5	18	0.15	0.15
13.	KLK Cover - Base Plate (FL-14)	Cylindrical	12.5	12.5	0.15	0.15
14.	KLK Cover - TC cover (FL-15)	Cylindrical	12.5	13	0.15	0.15
15.	Actuator Housing - Hand wheel Adaptor (FL-17)	Cylindrical	12.5	14	0.15	0.15
16.	Cover - Switch Extension Shaft (FL-18)	Cylindrical	12.5	13	0.15	0.15
17.	Bush - Push Button Plunger (FL-19)	Cylindrical	12.5	12.5	0.15	0.15
18.	Actuator Housing - Declutch lever (FL-20)	Cylindrical	12.5	16	0.15	0.15
19.	Actuator Housing - Bearing Flange (FL-21)	Cylindrical	12.5	14	0.15	0.15
20.	Bearing Flange - Hallow drive Shaft (FL-22)	Cylindrical	12.5	15	0.15	0.15

Max. No. & size of cable entries: 3 nos. of sizes M32x1.5 pitch and 2 nos. of sizes M25x1.5 pitch are provided on the terminal enclosure body maintaining 20mm axial threaded length, no. of engaged thread 12 nos. for attachment of certified and approved double compression type cable glands.

12. Name and Warning Inscription: The name-cum-warning inscription plate and rating plate made of Brass/M.S/SS is permanently fixed on the cover of enclosure by hammer driven rivets leaving min. 3mm material thickness below the rivets. The warning inscription shall read as "SWITCH OFF MAINS BEFORE OPENING THE COVER ENSURE TIGHTNING OF ALL THE EXTERNAL FASTNERS".

13. Drawings: The unit is designed and constructed as flameproof accordance with the following drawing conforming to the requirements of IS/IEC 60079-0: 2017 and IS/IEC 60079-1: 2014 and IS/IEC 60529-2001 (Reaffirmed 2014).

Sl. No.	Drg. No.	Title	Rev.	Sheet	Date
1.	ISACEx100-6224	Application drawing (compact actuator unit for IIA & IIB) (Integral Starter - EPAC).	R5	1 of 2	16/06/2023
2.	ISACEx100-6224	Application drawing (compact actuator unit for IIA & IIB) (Integral Starter - EPAC).	R5	2 of 2	16/06/2023

13. Any other relevant information:

- 1) As per Clause 4.3 Note - 3 of IS/IEC 60079-0:2017 the equipment marked IIB is suitable for application requiring IIA equipment. As per Clause 4.4 Note of IS/IEC 60079-0:2017 the equipment marked IIIC is suitable for application requiring IIIA /IIIB equipment.
- 2) The material of construction of the enclosure may be MS/SS/CI/Brass instead of cast Aluminum alloy LM-6 construction as per the specification given the drawing.
- 3) The above equipment has been tested and certified by CIMFR vide test report no.: CIMFR/TC/P/462 Dated 29/07/2011 and Supplementary report no. CIMFR/TC/S/1566 Dated: 04/03/2013 as per IS/IEC 60079-1: 2007.
- 4) Equal and equivalent medium class fit NPT threads of medium class fit conforming to requirements of ANSI/ASME B1.20.1 may be used instead of metric threads conforming to ISO 965-1 & 965-3 as per Clause No. 5.3 & 13 of IS/IEC 60079-1:2014.



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ज्वालासह एवं उपकरण सुरक्षा / FLAMEPROOF & EQUIPMENT SAFETY

## परीक्षण रिपोर्ट / TEST REPORT

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- 5) The motor Frame size-90, 1.1KW may be attached with FLP compact Actuator (with integral stator) gross volume of motor -- 33275cc and net volume-24080cc other than the prototype Frame size-112.
- 6) Permissible variation Terminal Compartment enclosure with Plug & Socket Connector

Description	Volume (in cc)	
	Gross	Net
Terminal Compartment Enclosure (with plug & socket connector)	2925	2605

Sr. No.	Location of flamepath	Type of joint	Min. length of flamepath (in mm)		Max. gap (in mm) OR Min. No. of threads engaged and pitch size (in mm)	
			Req.	Spec.	Req.	Spec.
Terminal Compartment enclosure with Plug & Socket Connector						
01.	Between Semi pact housing & plug housing.	Flange	12.5	13	0.15	0.125
02.	Between plug in housing & terminal cover (plug & socket).	Cylindrical	12.5	28	0.15	0.15
03.	Between plug in housing & base plate (plug & socket).	Cylindrical	12.5	13	0.15	0.15
05.	Between plug in housing base plate (plug & socket).	Flange	l=8, L<25	l=8, L=19	0.15	0.125

Note: For further details refer drawings.

- 7) The above equipment may also be used in Dust group IIIC, EPL Db & Dc area as per IS/IEC 60079-31: 2013.

#### 14. Declaration by the Applicant/Manufacturer:

(i) As to standards with which the equipment complies in respect of:

- a) Electrical equipment for Potentially Explosive atmosphere – General requirements: IS/IEC 60079-0: 2017
- b) As to flameproof protection IS/IEC 60079-1: 2014
- c) Ingress protection as per IS/IEC 60529: 2001(Reaffirmed 2014)
- d) Dust ignition protection by enclosure 't' IS/IEC60079-31:2013

(ii) Composition of the cast aluminum alloy declared by the manufacturer: Composition of cast aluminum alloy purported to be forming the material of construction of the enclosure has been declared by the manufacturer in the drawing having not more than 7.5% in total of Magnesium Titanium and Zirconium.

*However no sample of the alloy was drawn from the prototype enclosure for verifying its chemical composition declared by the manufacturer.*

15. Documents/Samples Submitted: (i) Application form (2) Drawings

Note: CIMFR has however not revalidation the compliance of the equipment to any standard other than the above standards.

#### SCOPE OF THE TEST CERTIFICATE

The Revalidation Certificate issued by CIMFR certifies that the equipment has been found to comply with the definition of Flameproof-Weatherproof equipment contained in the relevant Standard specifications as per drawings submitted. They do not vouch for the quality of the equipment in any other respect.

*This Institute reserves the right to review, amend or withdraw this Test Report at any time if considered necessary in the interest of safety.*



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REPORT OF TEST

Result #A: Tests as per IS/IEC 60079-0: 2017:

Type Tests			
Clause	Tests	Remarks	Results (Complies, P- Pass, NA-Not Applicable, F-Fail) References
1	Scope		Complies
2	Normative references		Complies
3	Terms and definitions		Complies
4	Equipment grouping	Gas Group: IIB, EPL Gb & Db	Complies
5	Temperature		
5.1.1	Ambient Temperatures	- 20 °C to +40 °C Amb.	Complies
6	Requirements for all electrical equipment		Complies
6.6	Electromagnetic and ultrasonic energy radiating equipment.		NA
7	Non-metallic enclosures and non-metallic parts of enclosures		NA
7.1.2.4	Material used for cementing / Sealing	(Araldite) sealing compound COT - 40°C to 80°C	
7.2	Thermal Endurance		Refer Clause No. 26.8 & 26.9
8	Metallic Enclosure and metallic part of Enclosure	SG grade Iron & cast aluminium Alloy LM-6 construction	Complies
9	Fasteners		Complies
10	Interlocking devices		NA
11	Bushings		NA
12	Reserved for future use		NA
13	Ex components		NA
14	Connection facilities		Complies
15	Connection facilities for earthing and bonding conductors		Complies
16	Entries into enclosures		Complies
17	Supplementary requirements for rotating machines		NA
18	Supplementary requirements for switchgear		NA
19	Reserved for future use		NA
20	Supplementary requirements for plugs and socket outlets and connectors		NA
21	Supplementary requirements for luminaries		NA
22	Supplementary requirements for cap lights and hand lights		NA
23	Equipment incorporating cells and batteries		NA
24	Documentation		Complies
25	Compliance of prototype or sample with documents		Complies
26	Type tests		Complies
26.3	Tests in explosive test mixtures		
26.3	Tests for Flameproof (Ex 'd') protection	Verification for Compliance to Ex 'd' requirements as per IS/IEC 60079-1: 2014	Complies
26.4	Test of enclosures		
26.4.2	Resistance to Impact		Complies
26.4.3/ 26.4.4	Drop test	(not a handheld equipment or portable device) NA	



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**परीक्षण रिपोर्ट / TEST REPORT**

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26.4.5	Degree of protection (IP) by Enclosures		
26.4.5	Test of IP of equipment	IP-68 (CPRI Test Report No. 149EATDIP03S0064 Dated: 16/09/2003)	Complies
26.5	Thermal tests		
26.5.1	Temperature measurement	T4 (Project Report No. CNP/4224/2015-2016)	Complies
26.5.2	Thermal shock test		Complies
26.6	Torque test for bushings		NA
26.7	Non- metallic enclosures or non-metallic parts of enclosures		
26.8	Thermal endurance to heat	Tested sealing compound Araldite colour pole yellow COT - 40°C to 80°C	
26.9	Thermal endurance to cold		
26.10	Resistance to light		NA
26.11	Resistance to chemical agents for Group I Equipment	-----	NA
26.12	Earth continuity test in non-metallic enclosure		NA
26.13	Surface resistance test of parts of enclosures of Non metallic materials	-----	NA
26.14	Measurement of capacitance		NA
26.15	Verification of ratings of ventilating fans		NA
26.16	Alternative qualification of elastomeric sealing O-rings		NA
27	Routine tests	Manufacturer's responsibility: Compliance to prototype of the product and physical measurement of gap and flamepath and overpressure test at the pressure 10kg/cm <sup>2</sup> in earlier Test Report for every sample.	
28	Manufacturer's responsibility	Conformity of the equipment to the applicable standards	Complies
29	Marking	(Ex db IIB T4 Gb) (Ex tb IIIC T135°C Db)	
30	Instructions	Instruction related to use, installation, maintenance, adjustment to be provided by the manufacturer along with the equipment.	

Result #B: Tests in explosive mixtures: Tests for type of protection Ex 'd' as per IS/IEC 60079-1:2014.

Type Tests			
Cl. No.	Description and relevant tests	Remarks	Results (Complies,P- Pass,NA-Not Applicable, F-Fail) References
1	Scope		Complies
2	Normative references		Complies
3	Terms and definitions		Complies
4	Level of protection (Equipment Protection Level, EPL)	Gas Group IIB, EPL Gb & Db	Complies
5	Flameproof joints	Threaded, Flange & Cylindrical joints	Complies
6	Sealed joints		
6.1	Cemented joints		Complies
6.1.2	Mechanical strength		Complies
7	Operating rods		NA
8	Supplementary requirements for shafts and bearings		NA
9	Light transmitting parts		NA
10	Breathing and draining devices which form part of a flameproof enclosure		NA



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Code No.: FES/70(E)/23-24

11	Fasteners and openings		Complies
12	Materials	SG grade Iron & cast aluminium Alloy LM-6 construction	Complies
13	Entries for flameproof enclosures		Complies
14	Verification and tests		Complies
15	Type Tests		
15.1	General		Complies
15.2	Tests of ability of the enclosure to withstand pressure		
15.2.1	General		Complies
15.2.2	Determination of Explosion Pressure (Reference Pressure)		Complies
15.2.3	Overpressure Test		Complies
15.3	Test for non-transmission of an internal ignition		
15.3.1	General		Complies
15.3.2	Electrical equipment of Groups IIA/IIB		Complies
15.3.3	Electrical equipment of Group IIC		NA
15.4	Tests of flameproof enclosures with breathing and draining devices		
15.4.1	General		NA
16	Routine tests	To be conducted by the manufacturer as per earlier test report 10kg/cm <sup>2</sup> for every sample.	
17	Switchgear for Group I		NA
18	Lamp holders and lamp caps		NA
19	Non-metallic enclosures and non-metallic parts of enclosures		
19.1	General		NA
19.2	Resistance to tracking and creepage distances on internal surfaces of the enclosure walls		NA
19.3	Requirements for type test		NA
19.4	Test of erosion by flame		NA
20	Marking	(Ex db IIB T4 Gb) (Ex tb IIIC T135 <sup>0</sup> C Db)	
20.2	Caution and warning markings	"SWITCH OFF MAINS BEFORE OPENING THE COVER ENSURE TIGHTNING OF ALL THE EXTERNAL FASTNERS"	
21	Instruction	The manufacturer shall supply instruction manual of the equipment complying IS/IEC 60079-0:2017.	

**CONCLUSION:** The Flameproof Enclosure for Compact Actuator (With Integral Starter), in SG grade Iron & cast aluminium Alloy LM-6 construction designated by Model No.: SACEX100, Motor Frame 112 meets the requirement for flameproofness as per IS/IEC 60079-1:2014, dust ignition protection as per IS/IEC 60079-31:2013 and IS/IEC 60079-0:2017 and is deemed to be suitable for use in Gas Group : IIB, EPL Gb & Db atmosphere.

Reported By

*M. K. Vishwakarma*  
27/07/2023

Checked & Approved By

*A. P. Singh*  
27/7/23

(M. K. VISHWAKARMA)

Sr. Technical Officer (1)

Dated: 27<sup>th</sup> July, 2023

Flameproof & Equipment Safety

CSIR - Central Institute of Mining & Fuel Research

Barwa Road, DHANBAD - 826 015, (JHARKHAND), INDIA

(A. P. SINGH)

Principal Scientist & HOS