



# 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/ 1012

दिनांक/Dated: 18 July, 2023

यूएलआर सं./ULR No.: TC2300000213F

टीसी कोड सं./TC CODE NO. FES/70(C)/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 iron & cast aluminium Alloy LM-6 construction designated by Model No.: SACEX60, 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//08/22-23 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,

जितेन्द्र कुमार सिंह

17/07/2023

(J. K. SINGH)

HOS, TESTING CELL

संलग्न/Encl:

1. परीक्षण मूल्यांकन रिपोर्ट-तीन प्रतियाँ/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

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# सीएसआईआर- केन्द्रीय खनिज एवं ईंधन अनुसंधान संस्थान CSIR-Central Institute of Mining and Fuel Research



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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.: TC23000000213F

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

Test & Assessment Report No.: IN/CIMFR/TR23/R/ 1012

Dated: 18 July, 2023

Application Ref. No.: AIL/HQ/R&D//08/22-23 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.: SACEX60.
5. Type of Protection : Ex db for Gas Group: IIB, EPL Gb & Db.
6. Electrical ratings : rated at 4KW, 2pole, 415V, 3Phse, 50Hz.
7. Temperature Class : T4 (Project Report No. CNP/4224/2015-2016)
8. Degree of Ingress Protection : IP-68 (Refer test report no. 493EATDIP12S0272 Dated 11/09/2012).
9. Material of Construction : SG 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 *	33125 cc	21920 cc	Ref. Drg.	See ref. drawings.
Terminal Enclosure	5020 cc	4725 cc		

\* Actuator enclosure volume mentioned above is for 5KW motor.

Note: For further details refer drawings.

B.

Glass details	Max no. of aperture on cover
Size: Ref. Drg., Type = Toughened Glass, 10mm thick, (round) and 8mm thick (square), Cemented path = Sealed all round with sealing compound standard, Make = Araldite (COT: -40°C to + 80°C)	3 nos. Push Buttons  1 no. Switch

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

Sr. No.	Location of flamepath	Type of Joint	Min. length of flamepath (in mm)	Max. gap/dia clearance or no. of threads (pitch in mm)
			S p e c .	S p e c .
Flameproof Enclosure for Compact Actuator (With Integral Starter), Model No.: SACEX60				
1.	SC cover - Actuator Housing (FL-1)	Cylindrical	13	0.15
2.	Actuator Housing - Motor mounting Flange. (FL-2)	Cylindrical	13	0.15
3.	Motor Flange - Motor Housing ((FL-3)	Cylindrical	16	0.15
4.	Motor Flange - Motor Mounting Flange (FL-4)	Flange	l = 12 L = 26	0.125
5.	Actuator Housing - External bearing retainer (FL-5)	Cylindrical	15	0.15
6.	Compact Housing - Cover (FL-6)	Cylindrical	24	0.15
7.	Cover - Bush (FL-7)	Cylindrical	16	Press Fit
8.	Semi pact Housing - Compact Housing (FL-8)	Cylindrical	25	0.15



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No.	Description	Material	Quantity	Weight
9.	Semi pact Housing – KLK Cover (FL-9)	Flange	13	0.125
10.	Semi pact Housing – Cover (FL-10)	Cylindrical	24	0.15
11.	KLK Cover – Cable Gland (FL-i1)	Threaded	15	9 (1.5)
12.	Actuator Housing – Semi pact Housing.(FL-12)	Flange	13	0.125
13.	Base Plate – Threaded Bush (FL-13)	Cylindrical	18	0.15
14.	KLK Cover – Base Plate (FL-14)	Cylindrical	12.5	0.15
15.	KLK Cover – TC cover (FL-15)	Cylindrical	13	0.15
16.	KLK Cover – Cable Gland (FL-16)	Threaded	20	12 (1.5)
17.	Actuator Housing – Hand wheel Adaptor (FL-17)	Cylindrical	14	0.15
18.	Cover – Switch Extension Shaft (FL-18)	Cylindrical	13	0.10
19.	Bush – Push Button Plunger (FL-19)	Cylindrical	12.5	0.15
20.	Actuator Housing – Declutch lever (FL-20)	Cylindrical	18	0.15
21.	Actuator Housing – Bearing Flange (FL-21)	Cylindrical	15	0.15
22.	Bearing Flange – Hollow drive Shaft (FL-22)	Cylindrical	16	0.15

Max. No. & size of cable entries: 3 nos. cable entries of M32x1.5 and 2 nos. M25x1.5 are provided in the terminal compartment maintaining minimum 20mm axial thread length for attachment of certified and approved double compression type cable gland.

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 AND ENSURE TIGHTNING OF ALL THE EXTERNAL FASTNERS". For Trade Mark please refer drawing.

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.	Dwg. No.	Title	Rev.	Sheet	Date
1.	ISACEx25-6222	Application drawing (compact actuator unit for IIA & IIB) (Integral Starter – EPAC).	R5	1 of 2 & 2 of 2	16/06/23

14. 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 IIC is suitable for application requiring IIIA /IIB 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/592 Dated 26/08/2011 and Supplementary report no. CIMFR/TC/S/116 Dated: 09/05/2013 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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परीक्षण रिपोर्ट / TEST REPORT

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5) Permissible variation Terminal Compartment enclosure with Plug & Socket Connector

Description	Bolts	Volume (in cc)	
		Gross	Net
Terminal Compartment Enclosure (with plug & socket connector).	Hex head cap screws 4 nos. M10x25 HTS	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 plug in housing and semi part housing.	Flange	12.5	13	0.15	0.125
02.	Between plug in housing and terminal cover.	Cylindrical	25	28	0.20	0.15
03.	Between plug in housing and base plate (plug & socket).	Flange	L = 12.5 I = 8	L = 19 I = 8	0.15	0.125

Note: For further details refer drawings.

**Cable Entries:** 2 nos. M32x1.5 cable entries are provided with axial threaded length 20mm for attachment with appropriate tested and certified flameproof-weatherproof cable glands/stopping plugs.

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

15. Declaration by the Applicant/Manufacturer:

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

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

(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.

16. 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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(Flameproof & Equipment Safety)

ULR No.: TC2300000C213F

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

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 Iron & cast aluminium Alloy LM-6 construction	Complies
9	Fasteners		Complies
10	Interlocking devices		NA
11	Bushings		Complies
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		Complies
24	Documentation		Complies
25	Compliance of prototype or sample with documents		Complies
26	Type tests		
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
26.4.5	Degree of protection (IP) by Enclosures		

*[Handwritten signature]*



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26.4.5	Test of IP of equipment	IP-68 (Refer test report no. 493EATDIP12S0272 Dated 11/09/2012)	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		Complies
26.7	Non-metallic enclosures or non-metallic parts of enclosures		
26.8	Thermal endurance to heat	Tested Araldite sealing compound shall be used 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	Flange, Cylindrical & Threaded joints	Complies
6	Sealed joints		
6.1	Cemented joints	Tested Araldite sealing compound shall be used COT - 40°C to 80°C	Complies
6.1.2	Mechanical strength		Complies
7	Operating rods		Complies
8	Supplementary requirements for shafts and bearings		NA
9	Light transmitting parts		NA

*[Handwritten signature]*



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10	Breathing and draining devices which form part of a flameproof enclosure		NA
11	Fasteners and openings		Complies
12	Materials	SG 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 IIC T135°C Db)	
20.2	Caution and warning markings	"SWITCH OFF MAINS BEFORE OPENING THE COVER AND 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 iron & cast aluminium Alloy LM-6 construction designated by Model No.: SACEx60 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

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17/07/2025

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