

सीएसआईआर-केन्द्रीय खनन एवं ईंधन अनुसंधान संस्थान

(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्)
बरवा रोड , धनबाद - 826015 , झारखण्ड, भारत



CSIR-Central Institute of Mining & Fuel Research
(Council of Scientific & Industrial Research)
Barwa Road, Dhanbad - 826015 , Jharkhand , India



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SPEED POST/COURIER SERVICE

No. CIMFR/TC/SR/4586

Dated: 7th December, 2012

Equipment ID NO. 214/12

Code No. FLP/40/12-13

To,
M/S. SUDHIR SWITCHGEARS PVT. LTD.,
305/6, APEEJAY HOUSE,
130, BOMBAY SAMACHAR MARG,
MUMBAI - 400 023

Sub: Flameproof Testing as per IS/IEC 60079-1: 2007 of your **Flameproof enclosure for Bulk Head Fitting with/without internal reflector**, in cast aluminium Alloy LM-6 construction designated by **Cat. No.: BH/124** for use in Zone 1 & 2 and Gas Group: IIB atmosphere only.

- Report on (Revalidation)

Your Ref. Appl. No.: SSPL/2011/REV/BH124-029

Dated: 25/08/2011

Dear Sir,

Please find enclosed the **Test Report (Revalidation)** of the above sample submitted by you.

Charges of **Rs. 12, 225/- (Rupees Twelve thousand two hundred Twenty Five only)** including applicable service charges involved towards the testing /issuing the schedule have been adjusted against the advance deposit made by you.

Kindly arrange to collect the sample within 90 days from the date of receipt of this letter failing which CIMFR would dispose off the sample by public auction without any further NOTICE to you.

Kindly acknowledge receipt.

Thanking you.

Yours faithfully,

(G. M. PRASAD)

HEAD OF THE DEPARTMENT
TESTING CELL

Encl: As above.

Revalidation Test Report in **Triplicate**

Copy to: 1. Head, Flame & Explosion Lab.
2. Bill Section.

EPABX : 0091-326-229-6027/6028/6029

Fax : 0091-326-229-6025 , email : dcmrips@yahoo.co.in

Working Days : Monday to Friday, Website : www.cimfr.nic.in



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CENTRAL INSTITUTE OF MINING AND FUEL RESEARCH

FORMERLY : CENTRAL MINING RESEARCH INSTITUTE
(COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH)

बरवा रोड, धनबाद - 826015 (भारत) - BARWA ROAD, DHANBAD - 826015 (INDIA)

परीक्षण प्रमाण पत्र - TEST CERTIFICATE

FORMAT NO.: (CIMFR: DQM: FLP02: F-01:REV-01)
(Flame & Explosion Laboratory)

Revalidation Report No.: CIMFR/TC/SR/H586	Dated: 7 th December, 2012
Equipment. ID NO. 214/12	Code No.: FLP/40/12-13
Application Ref. No.: SSPL/2011/REV/BH124-029	Dated: 25/08/2011

1. Applicant : M/S. SUDHIR SWITCHGEARS PVT. LTD.,
305/6, APEEJAY HOUSE,
130, BOMBAY SAMACHAR MARG,
MUMBAI - 400 023
2. Manufacturer : M/S. SUDHIR SWITCHGEARS PVT. LTD. (UNIT-1)
"SUDHIR HOUSE", PLOT NO. A-305,
ROAD NO. 32, VIA ROAD NO. 16,
WAGLE INDUSTRIAL ESTATE,
THANE - 400 604
3. Apparatus : Flameproof enclosure for Bulk Head Fitting with/without internal reflector.
4. Designated by : Cat. No.: BH/124
5. Gas Group, Zone : Zone 1 & Zone 2 and Gas Group : IIB atmosphere only.
6. Electrical ratings: rated 80/125W HPMV or 160W MLL or 200W GLS or upto 70W MH or upto 2x26W CFL lamps all at 250V AC max.
7. Temperature Class: Refer test report no.: CIMFR/TC/SR/H1147, Dated: 20/03/2008
8. Degree of Ingress Protection: NA
9. Material of Construction: Cast aluminium Alloy LM-6. Refer drawing for material thickness at different locations of the enclosure.
10. Description of the apparatus Flameproof enclosure for Bulk Head Fitting with/without internal reflector.

A.

Description	Volume in cc		Min. Wall Thickness (mm)	Nos. & Size of Bolts/Fasteners
	Gross	Net		
Main Enclosure	2400 cc	1400 cc	5mm	10 nos. M6x25mm long Allen bolts with spring washer.
Terminal Enclosure	300 cc	250 cc		

Note: For further details refer drawings.

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 (Flame & Explosion Laboratory)

ID NO.: 214/12

CODE NO.: FLP/40/12-13

B.

Glass details	Max no. of aperture on cover
Size = 218x147x8mm thick Type = Heat resistant toughened type 'A' flat glass Thickness = 8mm, Cemented Path = 25mm Sealing Material = Litharge + glycerin with calcium sulphate or epoxy resin COT: -20°C to 300°C	NIL

Note: Glass supported by backing ring. For further details refer drawings.

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

Sr. No	Location of flamepath	Type of joint	Min. length of flamepath/ threaded length (in mm)		Max. gap or minimum no. engaged threaded (in mm)	
			Req.	Spec.	Req.	Spec.
01.	Between enclosure body and cover (Cover common for main & terminal enclosure).	Flange	12.5	12.5	0.15	0.15

BUSHING: Metal bush press fitted into the common hole of main & terminal enclosure maintaining 25mm flamepath. Metal sleeve fitted into the hole of brass bush maintaining 25mm flame path & 0.15mm dia clearance. Wires pass through the bush are completely sealed with epoxy compound.

Max. No. & size of cable entries: 4 nos. cable entries of size M25mm are provided on the body of the terminal enclosure maintaining 13X1.5pitchmm axial threaded length with min 8 full threads are engaged for attachment of approved & certified type double compression type cable glands.

12. Name plate and warning inscription: The name-cum-warning inscription plate and rating plate made of Brass/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 **"DO NOT OPEN WHEN ENERGISED"**.

13. Drawing: The unit is designed and constructed as flameproof and weatherproof in accordance with the following drawing conforming to the requirements of IS/IEC 60079-0: 2004 and IS/IEC 60079-1: 2007.

Sl. No.	Drg. No.	Title	Rev.	Sheet	Date
1.	BH/124	FLAMEPROOF ENCLOSURE FOR BULK HEAD FITTING SUITABLE FOR USE IN GAS GROUP - IIB	2	1 of 1	10/12/2011

Terminal (C/W)



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FORM: (FORM: DQM: FLP02: F-01:REV-01)
(Explosion Laboratory)

ID NO.: 214/12

CODE NO.: FLP/40/12-13

14. Any other relevant information:

- 1) The above apparatus has already been tested and certified by the CIMFR vide Revalidation Test Report No.: CIMFR/TC/SR/H1147, Dated: 20/03/2008 as per IS: 2148-2004.
- 2) The apparatus under reference has also been tested for surface temperature rise classification/impact test/thermal shock test as per IS: 13346-2004 (IEC 60079-0/2000). Hence it may be acceptable as per IS/IEC 60079-0-2004 for temperature class impact test/thermal shock test since the test procedure for temperature rise testing are same in both the standard.
- 3) As per Clause 4.2.1 Note - 2 of IS/IEC 60079-0:2004 the apparatus mark IIB is suitable for application requiring IIA apparatus.
- 4) The material of construction of the enclosure may be of CI FG 150/SS/MS instead of cast aluminium alloy LM-6.

15. Declaration by the Applicant/Manufacturer:

- (i) As to standards with which the apparatus complies in respect of:
 - a) Electrical apparatus for Potentially Explosive atmosphere - General requirements: IS/IEC 60079-0: 2004
 - b) As to flameproof protection IS/IEC 60079-1: 2007
 - c) Ingress protection as per IS/IEC 60529: 2001
- (ii) **Composition of the cast aluminium alloy LM-6 declared by the manufacturer:** Composition of cast aluminum alloy LM-6 purported to be forming the material of construction of the enclosure has been declared in the manufacturer in the drawing having 0.1% magnesium.

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
- ii) Drawings
- iii) Prototype sample

17. Compliance of prototype or sample with documents: The test sample of electrical apparatus submitted for the type tests complies with the manufacturers documents referred above.

Note: CIMFR has however not checked and tested the compliance of the apparatus to any standard other than the above standards.

SCOPE OF THE TEST CERTIFICATE

The Test Certificate issued by CIMFR testifies that the apparatus has been found to comply with the definition of flameproof-weatherproof APPARATUS contained in the relevant Standard specifications. 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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 FORMAT NO. CIMFR/TC/SR/FLP02: F-01: REV-01)
 (Flame & Explosion Laboratory)

 Revalidation Report No. CIMFR/TC/SR/H586 Dated: 7th December, 2012

ID NO.: 214/12

CODE NO.: FLP/40/12-13

REPORT OF TEST

Date of Test: 08/08/2012

Test Equipment Used:

- (i) Computer, Kistler Piezo Electric Transducer and Charge Amplifier for conducting Explosion Pressure Tests.
- (ii) Hydraulic Test Setup

Result #A: Tests as per IS/IEC 60079-0: 2004:

Type Tests		Remarks	Results (Complies, P- Pass, NA-Not Applicable, F-Fail) References
Clause	Tests		
1	Scope		Complies
2	Normative references		Complies
3	Terms and definitions		Complies
4	Apparatus grouping and temperature classification	Gr. IIB For T class refer test report no.: CIMFR/TC/SR/H1147, Dt. 20/3/2008	Complies
5	Temperatures	-20 to 40° Ambient	Complies
6	Requirements for all electrical apparatus		Complies
7	Non-metallic enclosures and non-metallic parts of enclosures		NA
8	Enclosures containing light metals	For Gr. II, Mg 0.1% For Zone 1 & 2	Complies
9	Fasteners		Complies
10	Interlocking devices		NA
11	Bushings		Complies
12	Materials used for cementing/sealing	Litharge+ Glycerin with calcium sulphate COT: -20°C to 300°C	Complies
13	Ex components	-----	NA
14	Connection facilities and terminal compartments		Complies
15	Connection facilities for earthing or bonding conductors		Complies
16	Entries into enclosures		Complies
17	Supplementary requirements for rotating electrical machines		NA



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FORMAT NUMBER: FLP02: F-01:REV-01
(Flame & Explosion Laboratory)

ID NO.: 214/12

CODE NO.: FLP/40/12-13

18	Supplementary requirements for switchgear		NA
19	Supplementary requirements for fuses		NA
20	Supplementary requirements for plugs and sockets		NA
21	Supplementary requirements for luminaries		NA
22	Supplementary requirements for caplights and handlights		NA
23	Apparatus 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 mixtures		
26.3	Tests for Flameproof (Ex 'd') protection	Verification for Compliance to Ex 'd' requirements as per IS/IEC 60079-1: 2007	P/As per Result #B
26.4	Test of enclosures		
26.4.2	Test for resistance to Impact	Refer report CIMFR/TC/SR/H1147, Dt. 20/3/2008	Complies
26.4.3/26.4.4	Drop test	(not a handheld apparatus or portable device)	NA
26.4.5	Tests for the Degree of protection IP		
26.4.5	IP of apparatus		NA
26.5	Thermal tests		
26.5.1	Temperature measurement	Refer report CIMFR/TC/SR/H1147, Dt. 20/3/2008	Complies
26.5.2	Thermal shock test - for glass parts		
26.6	Torque Test for bushings		
26.6	Torque test for bushings	As declared by the manufacturer	Complies
26.7	Tests for non-metallic enclosures or of non-metallic parts of encl.		
26.8	Thermal endurance to heat	Thermal requirements declared by manufacturer for Glass window. COT: -20 to 300°C	Complies
26.9	Thermal endurance to cold		
26.10	Resistance to light	-----	NA
26.11	Resistance to chemical agents for Gr.I	-----	NA (only applicable for Gr. I apparatus)

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 FORMATION OF IMFR (M: FLP02: F-01:REV-01)
 (Flammable Explosions Laboratory)

ID NO.: 214/12

CODE NO.: FLP/40/12-13

26.12	Earth continuity test via non-metallic enclosure		NA
26.13	Surface resistance test of parts of enclosures of Non metallic materials	-----	NA
26.14	Charging test		NA
26.15	Measurement of Capacitance		NA
27	Routine verification and tests	Manufacturer's responsibility: Compliance to prototype of the product and physical measurement of gap and flamepath and hydraulic test at the pressure given in Result#B2 for every sample.	
28	Manufacturer's responsibility	Conformity of the apparatus to the applicable standards	Complies
29	Marking		Exd IIB
30	Instructions	Instruction related to use, installation, maintenance, adjustment to be provided by the manufacturer along with the apparatus	

Cable entry temperature: Max. 40°C ('X' mark shall appear on apparatus if temp. is more than 70°C).

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 FORMAT NO.: BQM: FLP02: F-01:REV-01
 (Flame & Explosion Laboratory)

ID NO.: 214/12

CODE NO.: FLP/40/12-13

Result #B: Tests in explosive mixtures: Tests for type of protection Ex 'd' as per IS/IEC 60079-1:2007.

Type Tests			
Clause 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	Equipment grouping and temperature classification	Gr. IIB for T class refer test report no.: CIMFR/TC/SR/H1147, dt. 20/3/2008	Complies
5	Flameproof joints	Flange, Spigot & Threaded joint.	Complies
6	Cemented joints		Complies
7	Operating rods		NA
8	Supplementary requirements for shaft and bearings		NA
9	Light transmitting parts other than glass		NA
10	Breathing and draining devices which form part of a flameproof enclosure		NA
11	Fasteners, associated holes and blanking elements		Complies
12	Materials and mechanical strength of enclosures- materials inside the enclosures		Complies
13	Entries for flameproof enclosures		Complies
14	Verification and tests		Complies
15.1	Tests of ability of the enclosure to withstand pressure		
15.1.2	Determination of Explosion pressure (Reference Pressure)		P/As per Result #B1
15.1.3	Over Pressure Test		P/As per Result #B2
15.2	Test for non-transmission of Internal ignition		
15.2.1.1	Test for non-transmission of an Internal ignition		P/As per Result #B3
15.3	Reserved for future use		
15.4	Flame proof enclosures with breathing & draining devices		NA
16	Routine tests	To be conducted by the manufacturer as per Result #B2	
17	Switchgear for Group I		NA
18	Lamp holders and lamp caps		NA
19.3	Supplementary requirements for type tests		
19.3.1.3	Flame erosion test		NA
19.3.2	Flammability		NA
20	Marking	The warning inscription shall read as "DO NOT OPEN WHEN ENERGISED"	

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 FORMAT NO.: FLP02: F-01:REV-01
 (Flame & Explosion Laboratory)

ID NO.: 214/12

CODE NO.: FLP/40/12-13

Result # B1: Determination of Explosion pressure (Reference Pressure Test) *:

Gas mixture: Test with 8% Ethylene in air .

No. of tests: 3 nos. test with main & terminal enclosure.

Test Condition: Enclosure fitted with component and clause 15.1.2.1

Type of Test		Gas Group	Gas Mixture % in Air		No. of Tests
Preliminary Test (reference pressure)		IIB	8% Ethylene in air		Three
Test Ref. No.	Ignition	Gauge Position	Max. Pressure in Bar	Time of Pressure rise in millisecond	Remark
Main Enclosure					
PPM/2141201	Body	Body	4.10	12.54	No evidence of distress
PPM/2141202	Body	Body	3.96	13.74	-do-
PPM/2141203	Body	Body	3.38	13.26	-do-
Terminal Enclosure					
PPM/2141204	Body	Body	3.92	7.56	No evidence of distress
PPM/2141205	Body	Body	3.90	7.20	-do-
PPM/2141206	Body	Body	3.86	7.89	-do-

*Results shown for the pressure time curve (enclosed) are the highest recorded value obtained in the test.

Result #B2: Overpressure Test (Static Method): Hydraulic pressure test is conducted as per Cl. 15.1.3.1 of IS/IEC 60079-1: 2007.

Enclosure	Test reference nos.	Over pressure (kg/cm ²) maintained for 1 min.	Remark
Main Enclosure	OPM/2141207	8.0 kg/cm ²	No damage or deformation
Terminal Enclosure	OPM/2141208	8.0 kg/cm ²	No damage or deformation

Result #B3: Test for Non transmission of internal ignition:

Gas Mixture: Test with 37% Hydrogen in air for Gas Gr. IIB

No. of Tests: 5 nos. test with main & terminal enclosure.

Test Condition: Clause 15.2, Table 6 and 15.2.1.1 (No precompression required)

Name of Enclosure	Test Ref. Nos.	Gas Group	Gas Mixture % in Air	No. of Test	Result
Main Enclosure	EIT/2141209 to EIT/2141213	IIB	37 % Hydrogen	Five	Pass
Terminal Enclosure	EIT/2141214 to EIT/2141218	IIB	37 % Hydrogen	Five	Pass

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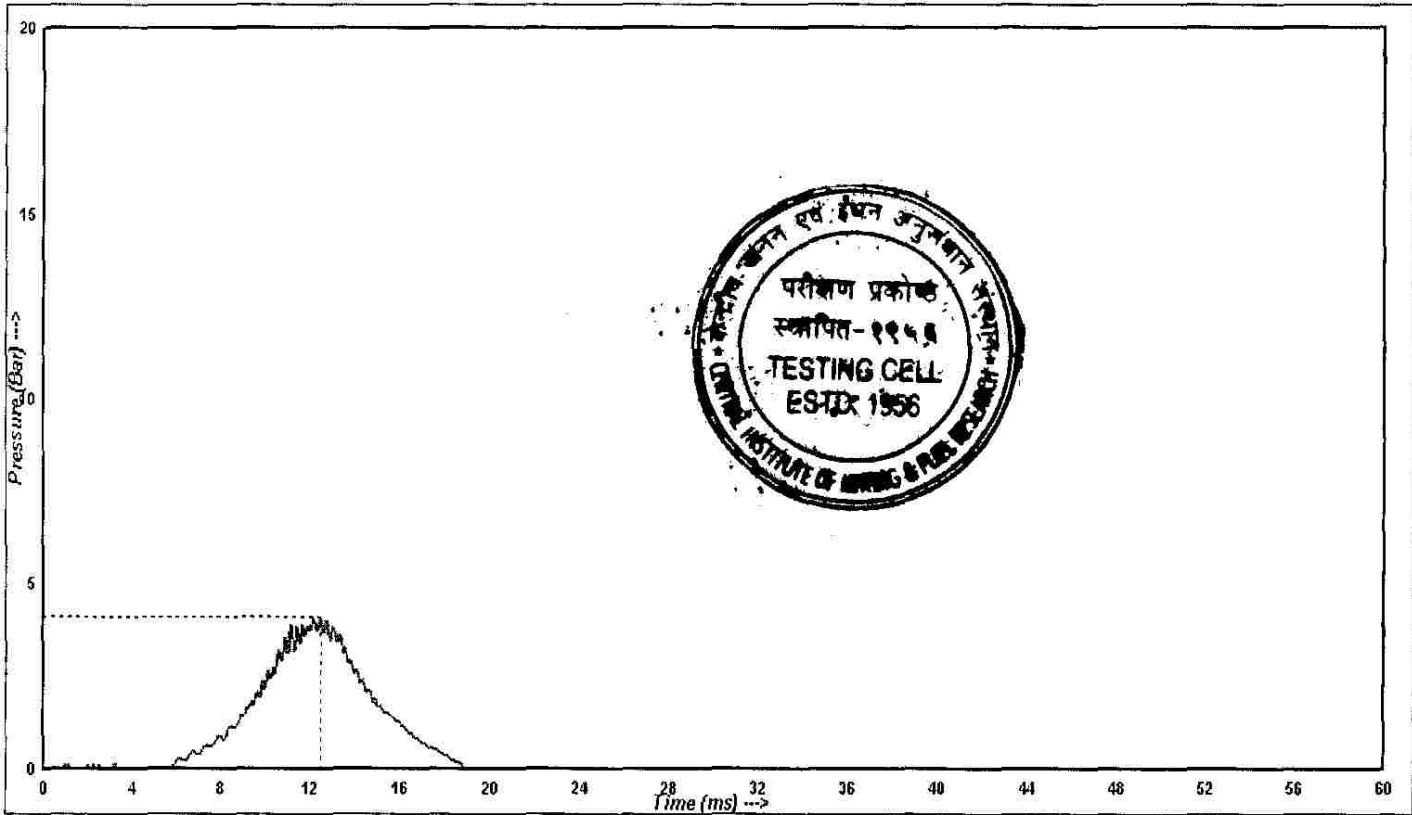


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ID Number: 214/12 Code Number: FLP/40/12
 Test Date: 08/08/2012
 Manufacturer Details: M/S SUDHIR SWITCHGEARS PVT. LTD.
 Manufacturer Address: THANE - 400 604.
 Model / Type: NA
 Category No.: CAT. NO.: BH/124.
 Gas: ETHYLENE
 Gas Group: IIB
 Equipment Details: FLP/WP ENCLOSURE FOR BULK HEAD FITTING
 Enclosure Details: MAIN ENCLOSURE
 Serial / Badge No.: NA
 Peak Pressure: 4.1 Bar at 12.54 ms

Explosion Pressure vs Time Graph



9/08/12
 S/12/12
 (Testing Officer)

(Discipline Head)

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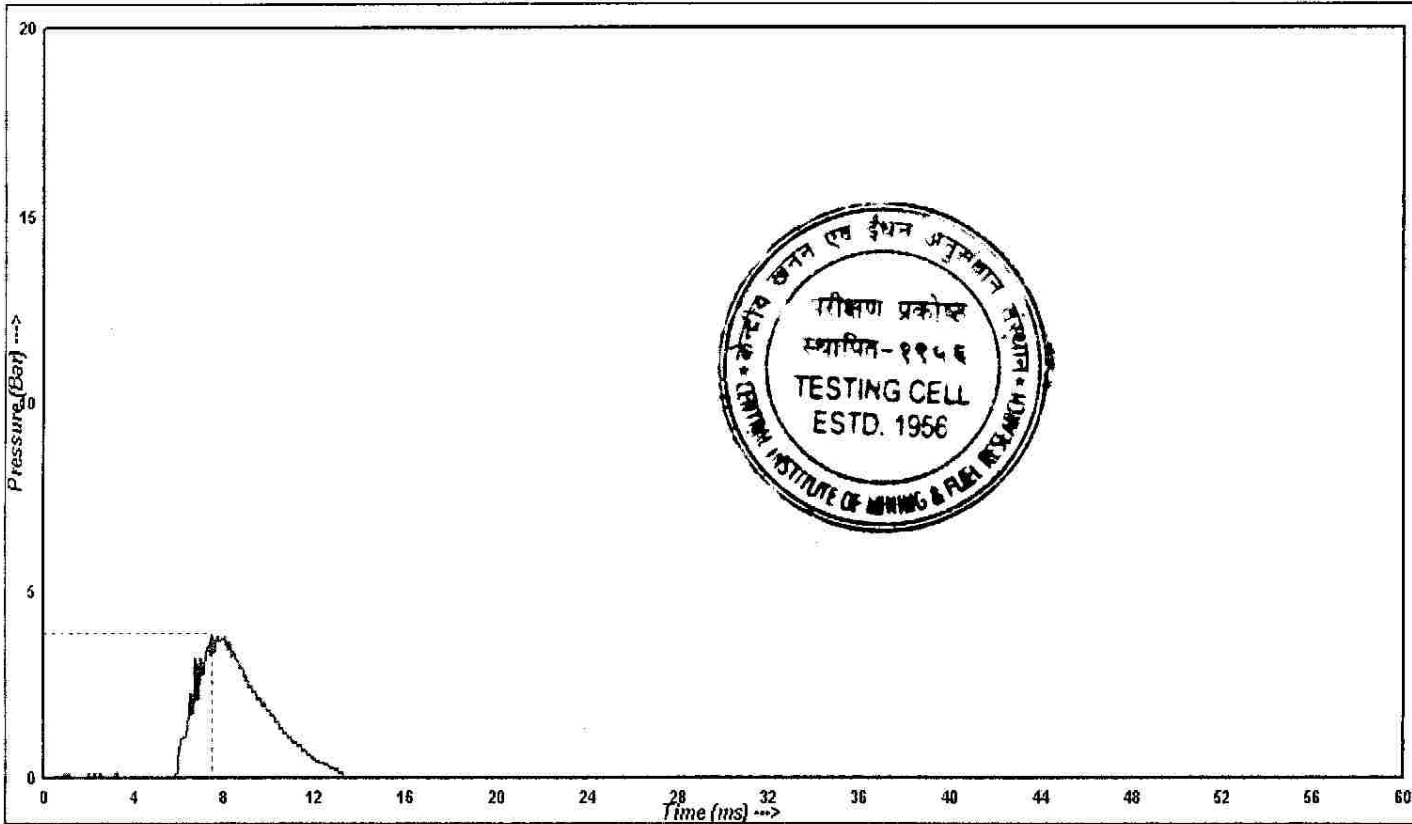
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ID Number	214/12	Code Number	FLP/40/12
Test Date	08/08/2012		
Manufacturer Details	M/S SUDHIR SWITCHGEARS PVT LTD		
Manufacturer Address	THANE - 400 604		
Model / Type	NA		
Category No.	CAT. NO. : BH/124		
Gas	ETHYLENE		
Gas Group	IIB		
Equipment Details	FLP/WP ENCLOSURE FOR BULK HEAD FITTING		
Enclosure Details	TERMINAL ENCLOSURE		
Serial / Badge No.	NA		
Peak Pressure	3.92 Bar at 7.56 ms		

Explosion Pressure vs Time Graph

(Handwritten signature)
(Testing Officer)

(Handwritten signature)
(Discipline Head)

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FORMAT NO. (CSIR-INDIA) M: FLP02: F-01:REV-01
(Flame & Explosion Laboratory)

ID NO.: 214/12

CODE NO.: FLP/40/12-13

CONCLUSION: The **Flameproof enclosure for Bulk Head Fitting with/without internal reflector**, in cast aluminium Alloy LM-6 construction designated by **Cat. No.: BH/124**, meets the test requirements for flameproofness as per IS/IEC 60079-1:2007 & general requirements as per IS/IEC 60079-0:2004. Hence, the above mentioned apparatus may be used in Gas Group: IIB and zone 1 & 2 atmosphere.

Reported By

Arvind Kumar
(ARVIND KUMAR)
Technical Officer

Dated: 5th December, 2012
Flame & Explosion Laboratory
Central Institute of Mining & Fuel Research, (CSIR)
(Erstwhile: Central Mining Research Institute)
Barwa Road, DHANBAD - 826 015,
(JHARKHAND) INDIA

Approved By

A. K. Singh
(A. K. SINGH)
Head of the Department