

केन्द्रीय खनन एवं ईंधन अनुसंधान संस्थान

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

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CENTRAL INSTITUTE OF MINING AND FUEL RESEARCH

Formerly : Central Mining Research Institute
(Council of Scientific & Industrial Research)
BARWA ROAD, DHANBAD-826015, JHARKHAND, INDIA

SPEED POST/COURIER SERVICE

No. CIMFR/TC/SR/544

Dated: 8th August, 2012

Equipment ID NO. 146/12

Code No. FLP/277/11-12

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 **Flameproof cum Weatherproof Well Glass Fitting**, in die cast aluminum alloy LM-6 construction designated by **Cat. No. WG/1238** for use in Zone 1 & 2 and Gas Group: IIB atmospheres only.

- Report on (Revalidation)

Your Ref. Appl. No.: **SSPL/2011/REV/WG1238-015**

Dated: 25/08/2011

Dear Sir,

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

Charges of **Rs. 14,108/-** (Rupees **Fourteen thousand One hundred eight 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

फैक्स FAX

Encl: As above.

Revalidation Test Report in **Triplicate**

Copy to: 1. Head, Flame & Explosion Lab.

फोन-निदेशक Director 2. Bill Section

पी.ए.एक्स PAX

Ph.: 0091-326-2296023/2296006

Ph.: 0091-326-229-6027/6028/6029/6003/6004/6005/6008/6010

Ph.: 0091-326-2296025/2296030/2296176/2296033

Website : www.cimfr.nic.in

कार्यालय के दिन : सोमवार से शुक्रवार तक Working days : Monday to Friday



CSIR-CENTRAL INSTITUTE OF MINING AND FUEL RESEARCH

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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/544	Dated:	8 th August, 2012
Equipment. ID NO.	146/12	Code No.	FLP/277/11-12
Application Ref. No.:	SSPL/2011/REV/WG1238-015	Dated:	25/08/2011

- Applicant :** M/S. SUDHIR SWITCHGEARS PVT. LTD.,
305/6, APEEJAY HOUSE,
130, BOMBAY SAMACHAR MARG,
MUMBAI - 400 023
- 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
- Apparatus :** Flameproof cum Weatherproof Well Glass Fitting.
- Designated by :** Cat. No.: WG/1238.
- Gas Group, Zone :** Zone 1 & 2 Gas Group : IIB atmosphere.
- Electrical ratings:** rated 125W/80W HPMV or 200WGLS or 160W MLL or 70/150W Metal Halide or 1x35W/3x26W/65W CFL or 23W induction lamp or 25W Beacon Lamp or 63W LED lamp rated 250V AC/DC max.
- Temperature Class:** i) Ref. report no.: CIMFR/TC/P/H515 Dated: 09/10/2007
ii) Ref. report no.: CIMFR/TC/S/42 Dated: 13/04/2011
- Degree of Ingress Protection:** IP-66 Refer report no.: CIMFR/TC/P/H515, Dt: 09/10/2007
- Material of Construction:** Die cast aluminium Alloy LM-6 construction. Refer drawing for material thickness at different locations of the enclosure.
- Description of the apparatus:** Flameproof cum Weatherproof Well Glass Fitting.

A.

Description	Volume in cc		Min. Wall Thickness	Nos. & Size of Bolts/Fasteners
	Gross	Net		
Main Enclosure	5200 cc	4130 cc	4mm	4 nos. M6x25mmL socket head screw.
Terminal Enclosure	400 cc	350 cc		2 nos. M6x20mmL socket head screw.

Approved

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TEST CERTIFICATE परीक्षण प्रमाण पत्र

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

ID NO.: 146/12

CODE NO. FLP/277/11-12

B.

Glass details	Max no. of aperture on cover
Size = $\varnothing 178 \times 160$ mmH Type = Heat resistant Toughened type 'A' "BOROCIL" glass Thickness = .8mm, Cemented Path = 35mm Sealing material = Litharge + Glycerin or calcium sulphate. COT: -20°C to 300°C	Nil

Note: M.S. wire guard is provided for well glass of mesh size 50x50mm and the glass is supported by a glass backing ring. For further details refer drawings.

11. Nature of Flameproof Joint: Type of joints and gaps Threaded/Spigot joint for Gas Gr. IIB.

Sr. No	Location of flamepath	Type of Joint	Min. length for spigot joint OR Min. Axial threaded Length for threaded joint (in mm)		Max. gap (in mm) OR Min. No. of threads engaged and pitch size (in mm)	
			Req.	Spec.	Req.	Spec.
01.	Between enclosure body & glass cover.	Spigot Joint	12.5	12.5	0.15	0.15
02.	Between enclosure body & terminal cover.	Spigot Joint	12.5	12.5	0.20	0.15

Bushing: Metal bush are molded casting provided in the partition wall between main and terminal enclosure maintaining. Wires pass through the bush are completely sealed with epoxy compound. COT: -20°C to 220°C.

No. & size of cable entries: Two nos. cable entry holes of size M25X1.5P thread with maintaining direct axial length 23mm with 15nos. full threads are engaged for attachment of certified & approved FLP/WP double compression type cable gland.

12. Name plate and warning inscription: The name-cum-warning inscription plate and rating plate made of 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 ENERGIZED".

13. Drawings: 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	Sheet	Rev.	Date
1.	WG/1238	Flameproof - Weatherproof Well Glass Fitting suitable for use in gas group IIA&IIB.	1 of 1	1	10/12/2011

Arvind Kumar Page 2 of 9

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(Flame & Explosion Laboratory)

ID NO.: 146/12

CODE NO. FLP/277/11-12

14. Any other relevant information:

- 1) The above apparatus has already been tested and certified by the CIMFR vide Prototype Test Report No.: CIMFR/TC/P/H515 Dated: 09/10/2007 and Supplementary test report no.: CIMFR/TC/S/42 Dated: 13/04/2011 as per IS: 2148-2004.
- 2) The apparatus under reference has also been tested for weatherproof IP-66 degree of protection as per IS: 12063-1987 (IEC 60529-1989), hence it may be acceptable for weatherproof degree of protection IP-66 as per IS/IEC 60529:2001.
- 3) The apparatus under reference has also been tested for surface temperature rise classification/Impact/Thermal shock 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/Thermal shock since the test procedure for temperature rise/ Impact/Thermal shock testing are same in both the standard.
- 4) As per clause 4.2.1 Note-2 of IS/IEC 60079-0-2004 Apparatus marked IIB is suitable for applications requiring Group IIA or Group IIB apparatus.
- 5) The material of construction of the enclosure may be CI grade FG150/SS instead of cast aluminum 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) As to weatherproof protection IS/IEC 60529:2001

(ii) **Composition of the die cast aluminum alloy LM-6 declared by the manufacturer:**
Composition of die cast aluminum alloy LM-6 purported to be forming the material of construction of the enclosure has been declared by the manufacturer in the drawings having magnesium 0.1%.

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

16. Documents/Sample 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.

Final LMT Page 3 of 9

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CSIR-CIMFR TESTING CELL



TEST CERTIFICATE परीक्षण प्रमाण पत्र

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

Revalidation Report No.: CIMFR/TC/SR/544 **Dated:** 8th August, 2012

Equipment. ID NO. 146/12

Code No. FLP/277/11-12

REPORT OF TEST

Date of Test: 07/03/2012

Test Equipment Used:

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

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

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	Apparatus grouping and temperature classification	Gr. IIB, (For T-Class Ref. test report no.: CIMFR/TC/P/H515 Dated: 09/10/2007 and CIMFR/TC/S/42 Dated: 13/04/2011)	Complies
5	Temperatures	-20°C to 40°C Amb.	Complies
6	Requirements for all electrical apparatus		Complies
7	Non-metallic enclosures and non-metallic parts of enclosures	-----	NA
8	Enclosures containing light metals	Gr. II, Mg. 0.1% for Zone 1 & 2	Complies
9	Fasteners		Complies
10	Interlocking devices	Locking screw	Complies
11	Bushings		Complies
12	Materials used for cementing/sealing	Litharge + Glycerin or 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 and bonding conductors		Complies
16	Entries into enclosures		Complies
17	Supplementary requirements for rotating electrical machines		NA

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

ID NO.: 110/11

CODE NO. FLP/277/11-12

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		Complies
22	Supplementary requirements for cap lights and hand lights		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	(Ref. test report no.: CIMFR/TC/P/H515 Dated: 09/10/2007)	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	IP-66 (Ref. test report no.: CIMFR/TC/P/H515 Dated: 09/10/2007)	Complies
26.5	Thermal tests		
26.5.1	Temperature measurement	(Ref. test report no.: CIMFR/TC/P/H515 Dated: 09/10/2007 and CIMFR/TC/S/42 Dated: 13/04/2011)	Complies
26.5.2	Thermal shock test – for glass parts	(Ref. test report no.: CIMFR/TC/P/H515 Dated: 09/10/2007)	Complies
26.6	Torque Test for bushings		
26.6	Torque test for bushings		NA
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°C to 220°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)

Final

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

ID NO.: 146/12

CODE NO. FLP/277/11-12

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		Ex d IIB IP-66
30	Instructions	Instruction related to use, installation, maintenance, adjustment to be provided by the manufacturer along with the apparatus.	

Amil Kumar *****

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TEST CERTIFICATE प्रमाण पत्र

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 FORMAT NO. (CIMFR: DDM: FLP02: F-01:REV-01)
 (Filing of Explosives Laboratory)

ID NO.: 146/12

CODE NO. FLP/277/11-12

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 Ref. test report no. CIMFR/TC/P/H515 Dated: 09/10/2007 and CIMFR/TC/S/42 Dated: 13/04/2011)	Complies
5	Flameproof joints	Threaded joint, Spigot 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 (No Plastic part)
19.3.2	Flammability		NA (No Plastic part)
20	Marking	The warning inscription shall read as "DO NOT OPEN WHEN ENERGIZED"	

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

ID NO.: 146/12

CODE NO. FLP/277/11-12

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

Gas mixture: Test with 8% Ethylene in air .

No. of tests: 3 nos. test with each 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/1461201	Body	Body	2.96	17.7	No evidence of distress
PPM/1461202	Body	Body	3.2	16.14	-do-
PPM/1461203	Body	Body	2.57	18.78	-do-
Terminal Enclosure					
PPM/1461204	Body	Body	4.84	8.04	No evidence of distress
PPM/1461205	Body	Body	3.07	9.36	-do-
PPM/1461206	Body	Body	4.51	9.41	-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/1461207	8.0 kg/cm ²	No damage or deformation
Terminal Enclosure	OPM/1461208	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. tests with each 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/1461209 to EIT/1461213	IIB	37 % Hydrogen	Five	Pass
Terminal Enclosure	EIT/1461214 to EIT/1461218	IIB	37 % Hydrogen	Five	Pass

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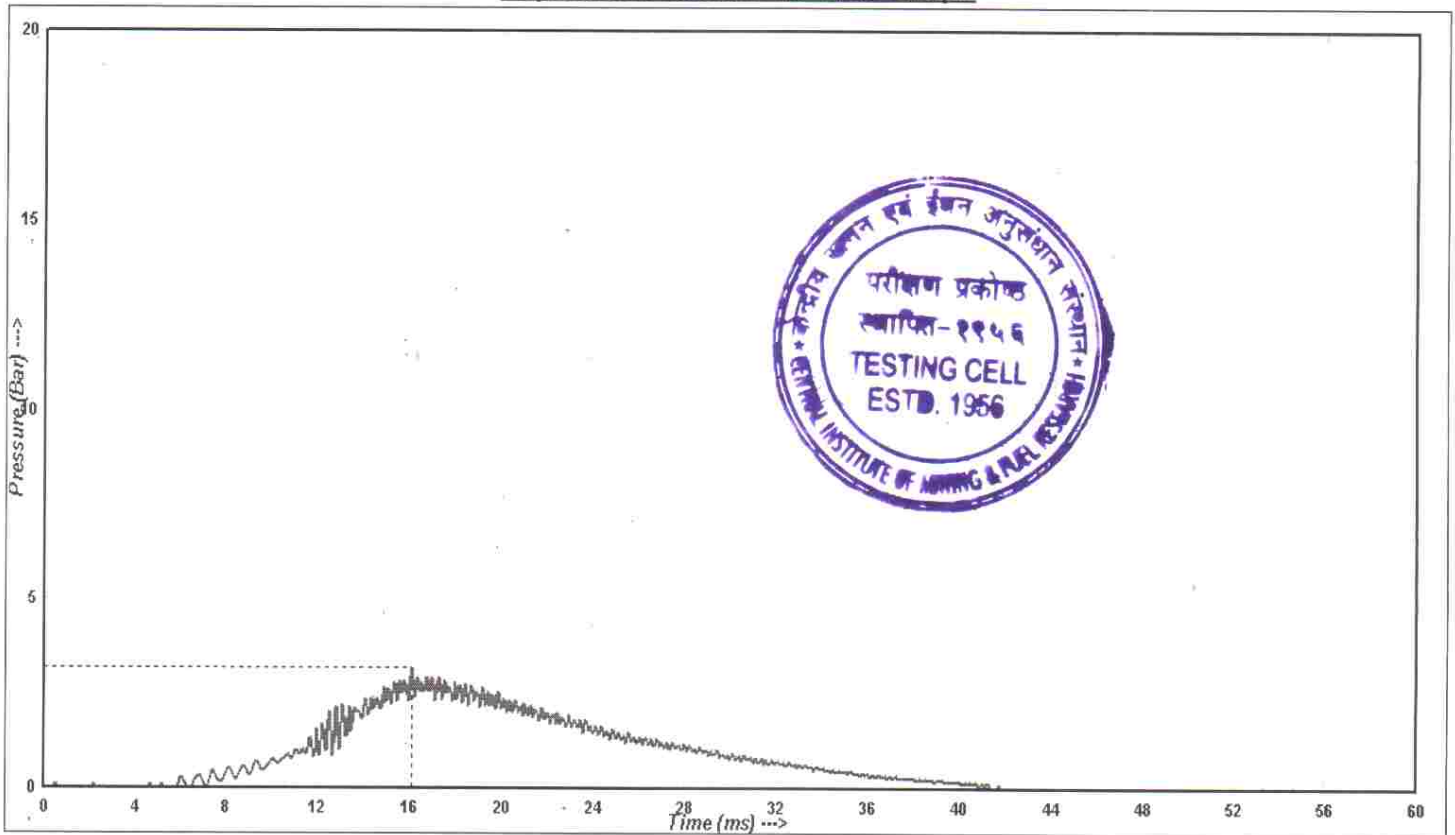


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ID Number: 146/12 Code Number: FLP/277/11
 Test Date: 07/03/2012
 Manufacturer Details: M/S SUDHIR SWITCHGEARS PVT. LTD.
 Manufacturer Address: THANE - 400 604
 Model / Type: NA
 Category No.: CAT. NO.: WG/1238
 Gas: ETHYLENE
 Gas Group: IIB
 Equipment Details: FLP/WP WELL GLASS FITTING SUITABLE
 Enclosure Details: MAIN ENCLOSURE
 Serial / Badge No.: NA
 Peak Pressure: 3.2 Bar at 16.14 ms

Explosion Pressure vs Time Graph



Arvind Kumar
06/03/12
(Testing Officer)

[Signature]
06/03/12
(Discipline Head)

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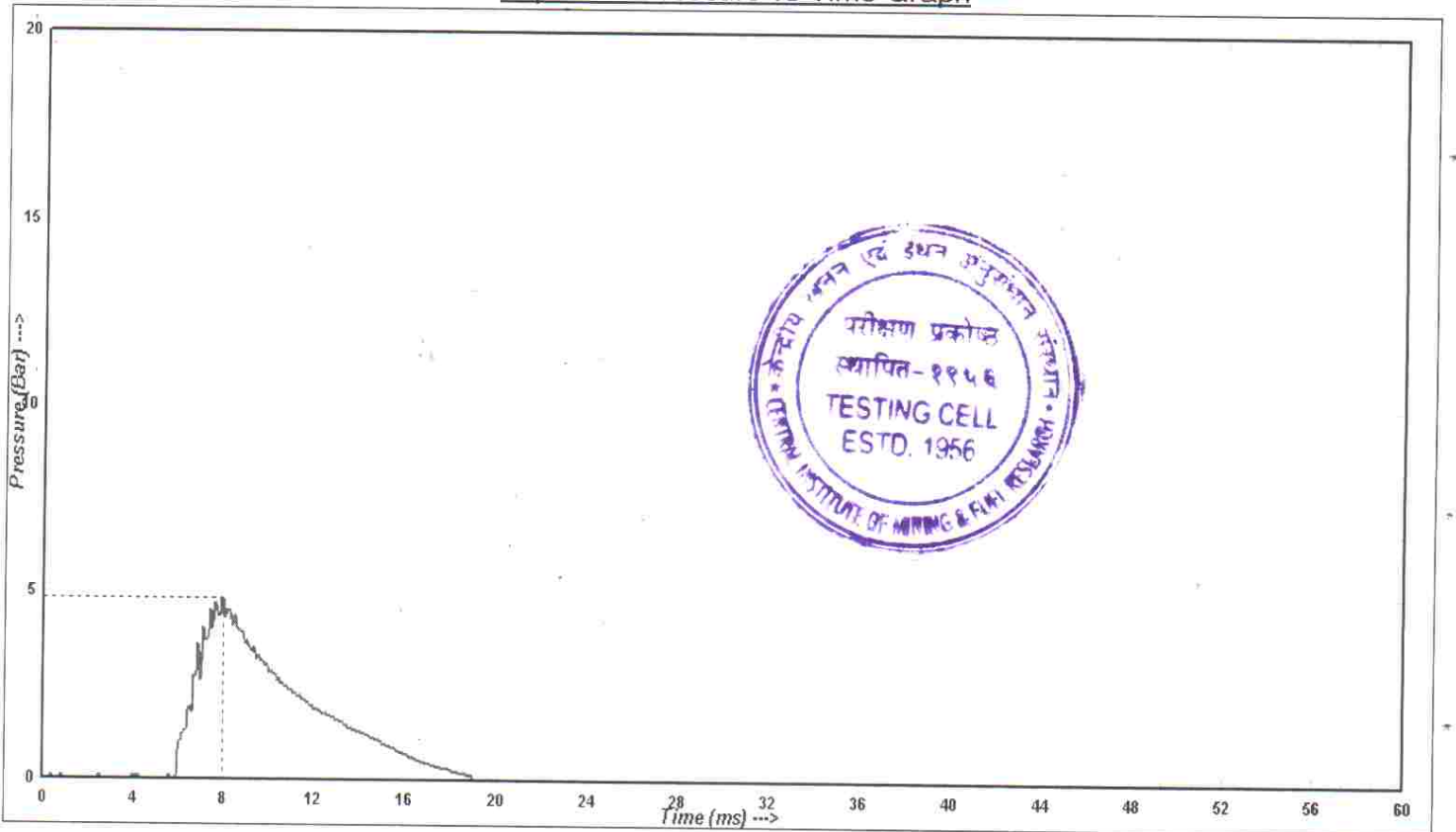


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ID Number: 146/12 Code Number: FLP/277/11
 Test Date: 07/03/2012
 Manufacturer Details: M/S SUDHIR SWITCHGEARS PVT. LTD.
 Manufacturer Address: THANE - 400 604
 Model / Type: NA
 Category No.: CAT. NO.: WG/1238
 Gas: ETHYLENE
 Gas Group: IIB
 Equipment Details: FLP/WP WELL GLASS FITTING SUITABLE
 Enclosure Details: TERMINAL ENCLOSURE
 Serial / Badge No.: NA
 Peak Pressure: 4.84 Bar at 8.04 ms

Explosion Pressure vs Time Graph



A. Anil Kumar
6/8/12
(Testing Officer)

Harish
06/08/12
(Discipline Head)

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(Flame & Explosion Laboratory)

ID NO.: 146/12

CODE NO. FLP/277/11-12

Note: This unit is only Flameproof/Weatherproof when all cable entries have either correctly fitted FLP/WP Blanking Plug or FLP/WP Cable Gland, complete with cable terminated in the proper manner. Cable Glands and Blanking Plugs fitted must be of a type approved for use with this unit.

CONCLUSION: The **Flameproof cum Weatherproof Well Glass Fitting**, in die cast aluminum alloy LM-6 construction designated by **Cat. No.: WG/1238**, 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 Zone 1 & 2 and Gas Group: IIB atmosphere only.

Reported By

Arvind Kumar
6/8/12

(ARVIND KUMAR)
Group III(2)

Dated: 6th August, 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
06/08/12

(A.K. SINGH)
Head of the Department