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SPEED POST/COURIER SERVICE

No. CIMFR/TC/P/ 4013
ID NO. 65/17

Dated: 17 November, 2017
CODE NO. FLP/01/17-18

To

M/s. Aczet Pvt. Ltd.
E-2, Plot No. 15, WICEL
Opp. Seepz Gate No. 1
Andheri MIDC, Andheri (East)
Mumbai - 400093

Sub: Intrinsic Safety Testing as per IS/IEC 60079-11:2006 of **Intrinsic Safe Load cell, Weight Indicator and Composite Circuit of Electronic Weighing Scales/Weighbridges** for use in Zone 1 & 2 and Gas Group IIBatmosphere.

- Report on (Prototype)

Your Ref. No.: AZT/CMRI/2017/01
Letter Ref. No.: AZT/CMRI/2017/01-B

Date: 30/01/2017 and
Date: 23/05/2017

Dear Sir,

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

Charges of **Rs. 35,305/- (Rupees Thirty five thousand Three hundred & Five)** only including applicable service tax involved towards the testing/issuing the schedule have been adjusted against the advance deposit made by you.

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

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

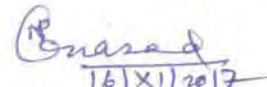
Kindly acknowledge the receipt.

Thanking you.

Encl: As above.

Prototype Test Report in **Triplicate**
Copy to: 1. Head, Flameproof & Equipment Safety
2. Bill Section.

Yours faithfully,


16/11/2017
(G. M. PRASAD)
HEAD
TESTING CELL



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CSIR-Central Institute of Mining and Fuel Research
(Council of Scientific & Industrial Research)

बर्वा रोड, धनबाद-826015, झारखण्ड, भारत
Barwa Road, Dhanbad - 826015, Jharkhand, India

ज्वालासह एवं उपकरण सुरक्षा / FLAMEPROOF & EQUIPMENT SAFETY

परीक्षण प्रमाण पत्र / TEST CERTIFICATE मूल प्रति
[FORM NO.: CIMFR: DOM: FLP02: F-02] ORIGINAL COPY
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TEST & ASSESSMENT REPORT

Proto Report No.: CIMFR/TC/P/ 4013	Dated: 17 November, 2017
Equipment ID NO.: 65/17	Code No.: FLP/01/17-18
Application Ref. No.: AZT/CMRI/2017/01	Date: 30/01/2017

1. Address of Applicant & Manufacturer:

Applicant	Manufacturer
M/s Aczet Pvt. Ltd. E-2, Plot No. 15, WICEL, Opp. Seepz Gate No. 1, Andheri MIDC, Andheri (East), Mumbai - 400093	M/s Aczet Pvt. Ltd. 6/7/8 Sawagat Building, Sagar Plaza Indl. Est., Sativali Road, Vasai (E)- 401208

2. Name of the Apparatus: Intrinsic Safe Load cell, Weight Indicator and Composite Circuit of Electronic Weighing Scales/Weighbridges.

3. Zone and Gas Group: Zone 1 & 2 for Gas Group: IIB

4. Electrical ratings: Input-5V DC/80mA(max) and Output- 20mV/100mA (Max).

5. Temperature Class: T6 at ambient temperature range

6. Degree of Ingress Protection of enclosure: IP-66

7. Material of Construction of enclosure: Tool Steel

8. Drawing: The unit is designed and constructed as intrinsically safe in accordance with the following drawing conforming to the requirements of IS/IEC 60079-0:2011, IS/IEC 60079-11: 2006 and IS/IEC 60529: 2001.

Sl. No.	Drg. No.	Title	Sheet	Date
1.	BK-01	Block Diagram for the Weighbridge/Weigh Scale	1 of 1	25/10/16
2.	BK-02	Composite Ckt of Loadcell Wiring, Zener Barrier & Indicator	1 of 1	25/10/16
3.	PCB-01	PCB Layout	1 of 1	25/10/16

[Signature]



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9. Any other relevant information:

(i). The apparatus marked for IIB is suitable for IIA atmosphere as per Note.2 of Clause No.: 4.2 of IS/IEC 60079-0:2007.

(ii) The certified flameproof enclosure vide certificate No.: CIMFR/TC/SR/H200 dated 26th June, 2012 as per IS/IEC 60079-0:2004 and IS/IEC 60079-1:2007 & IS/IEC 60079-0:2004 has Intrinsic safe zener barriers MTL 7761 ac & 7766 ac.

(iii). The Load cell got marked for IP-66 vide Report No.: KLPL/BTG/17/03-116 by Karandikar Laboratories Pvt. Ltd. Boisar dated 10.04.2017.

10. Declaration by the Applicant/Manufacturer:

As to standards with which the apparatus complies in respect of:

- Electrical apparatus for Potentially Explosive atmosphere – General requirements: IS/IEC 60079-0: 2007.
- As to intrinsically safe protection IS/IEC 60079-11: 2006.

11. Documents/Samples Submitted:

- Application form
- Drawings
- Prototype/test sample

12. 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 intrinsically safe 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.

J. Prasad



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13. Testing and Assessment of Intrinsically safe Apparatus:

(I) Description: The Flameproof Electronic Weighing Scales/Weighbridge comprises digital weight indicator, flameproof enclosure, zener barrier and load cells. The certified flameproof enclosure has zener barrier MTL 761ac/MTL 766ac, junction PCB for 1 to 6 signals coming from load cells. The Load cell is constructed from Tool Steel. The strain gauge based load cell (Passive device). The strain gauges are arranged in bridge form. It operates on +5VDC supply originating from weight indicator and routed through one no. MTL 7766ac Zener barrier present in the FLP enclosure and the load cell produces an electrical output 0-20 mV (max.) is routed through one no. MTL 7761ac Zener Barrier present in the FLP enclosure via four core shield cable to weight indicator.

The circuit of the Load Cell consists of purely resistive strain gauge bridge. The input supply & output signals will be connected to 2 nos. of certified and approved intrinsically safe enerBarrier which is present inside the certified FLP enclosure. There is neither inductor nor capacitor in the load cell circuit present in Hazardous area. The strain gauge based load cells are installed in hazardous area.

(i) Spark Ignition Compliance: In order to comply with 10.1, i.e. spark ignition test, an output of electronic weighing scales/weighbridge comprises digital weight indicator (5V dc/80 mA and 20mV/100mA) were assessed as per 10.1.1. Safety was deduced from the reference curves, figures A.1. to A.6 or tables A.1 and A.2, by the methods described in Annex A. It complies.

(ii) Temperature Class Test: There was no measurable temperature rise in normal working condition for apparatus circuit. The assessment of intrinsically safe circuit optimum power is less than 1.3W. Hence the temperature class of T6 may be acceptable to the circuit with respect to the ambient temperature at 40°C.

(iii) Insulation Test: The insulation between intrinsically safe circuit and the housing withstood test voltage of 500V rms for one min.

(iv) Creepage Distance & Clearance: Creepage distance and clearance between the connection terminals is 3mm and complies with IS/IEC 60079-11:2006. Minimum track clearance on the PCB is 1.0 mm and PCB is provided with two layers of insulating coatings. The Material of PCB is FRA/PTH grade (1.6mm thickness) and having CTI more than or equal to 175.

(v) Impact Test: One kg mass of hardened steel fallen vertically on the surface of the enclosure on the surface to create impact energy for Gas Gr. II apparatus as per clause 26.4.2 of IS/IEC 60079-0:2007. No damage observed after this test.

(vi) Enclosure and IP-Protection Test: The material of construction of the enclosure is Tool steel. The enclosure complies IP 66 as per IS/IEC 60529-2001 vide certificate No.: KLPL/BTG/17/03-116 by Karandikar Laboratories Pvt. Ltd. Boisar dated 10.04.2017.

J. Narsad



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Proto Report No. CIMFR/TC/P/ 4013	Dated: 17 November, 2017
ID NO.: 65/17	CODE NO.: FLP/01/17-18

TEST & ASSESSMENT REPORT

- I. **Date of Test:** 09/11/2017
- II. **Test Equipment Used:** High voltage test, Digital multimeter, Impact & Temperature class test setup.

Result #A: Test & Assessment as per IS/IEC 60079-0:2007:

Clause	Requirement-Test	Result-Remark Verdict (Complies, NA-Not Applicable, Fail)
1	Scope	
2	Normative references	
3	Terms and definitions	
4	Equipment grouping and temperature classification	Gas Group IIB, T6
5	Temperatures ambient	-20 °C to 40 °C
6	Requirements for all electrical equipment	
6.6	Electromagnetic and ultrasonic energy radiating equipment.	NA
7	Non-metallic enclosures and non-metallic parts of enclosures	NA
7.4	Electrostatic charge on external non-metallic materials	NA
8	Enclosure containing light metal	NA
9	Fasteners	NA
10	Interlocking devices	NA
11	Bushings	NA
12	Materials used for cementing	NA
13	Ex components	NA
14	Connection facilities and termination compartments	NA
15	Connection facilities for earthing or bonding conductors	NA
16	Entries into enclosures	NA
17-22	Supplementary requirements for rotating electrical machines, switchgear, fuses, plugs, sockets, outlets and connectors, luminaries and cap lights and hand lights.	NA
23	Equipment's incorporating cells and batteries	NA
24	Documentation	Complies
25	Compliance of prototype or sample with documents	Complies
26	Type tests	
26.3	Tests in explosive test mixtures Verification for compliance to intrinsic safety (Ex 'i') as per IS/IEC 60079-11-2006	Complies
26.4	Test of enclosures	



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26.4.2	Resistance to Impact	Complies	
26.4.3	Drop test	NA	
26.4.5	Test for Degree of protection (IP) by enclosures (Ability to prevent ingress of dust & water as per IS/IEC 60529:2001)	IP 66	Complies
26.5	Thermal tests		
26.5.1	Temperature measurement	Complies	
26.5.2	Thermal shock test – for glass parts	NA	
26.5.3	Small components ignition test	NA	
26.6	Torque test for bushings	NA	
26.7	Test Non- metallic enclosures or non-metallic parts of enclosures		
26.8	Thermal endurance to heat	NA	
26.9	Thermal endurance to cold		
26.10	Resistance to light	NA	
26.11	Resistance to chemical agents for Group I electrical equipment	NA	
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 tests	NA	
26.15	Measurement of Capacitance	NA	
27	Routine tests	Conformity of the apparatus to the applicable standard as per proto type sample of test report.	
28	Manufacturer's responsibility		
29	Marking	Ex 'ia' IIB T6 IP-66	
30	Instructions	Instruction related to use installation, maintenance, adjustment to be provided by the manufacturer along with apparatus.	

J. Masood



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परीक्षण प्रमाण प्रमाणपत्र CERTIFICATE

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Result #B: Test & Assessment as per IEC 60079-11:2006.

Clause	Requirement-Test	Result-Remark Verdict (Complies, NA-Not Applicable, Fail)
1	Scope	
2	Normative references	
3	Terms and definitions	
4	Grouping and classification of intrinsically safe apparatus and associated apparatus	Gas Group IIB& T6
5	Levels of protection and ignition compliance requirements of electrical apparatus	Ex 'ia'
5.5	Spark ignition compliance	Complies
5.6	Thermal ignition compliance	Complies
5.7	Simple apparatus & associated apparatus	Complies
6.	Apparatus construction	
6.1	Enclosures	Complies
6.2	Facilities for connection of external circuits	Complies
6.3	Separation distances of conducting terminal	Complies
6.4	Protection Against Polarity Reversal	NA
6.5	Earth conductors, connections and terminals	NA
6.6	Encapsulation	NA
7	Components on which intrinsic safety depends	
7.1	Rating of components	Complies
7.2	Connectors for internal connections, plug-in cards and components	NA
7.3	Fuses	NA
7.4	Primary and secondary cells and batteries	NA
7.5	Semiconductors	NA
7.6	Failure of components, connections and separations	NA
7.7	Piezo-electric devices	NA
7.8	Electrochemical cells for the detection of gases	NA
8	Infallible components, assemblies & connections on which intrinsic safety depends	
8.1	Mains transformer	NA
8.2	Transformer other than mains transformers	NA
8.3	Infallible winding	NA
8.4	Current-limiting resistors	NA
8.5	Blocking capacitors	NA
8.6.	Shunt safety assemblies	NA
8.7	Wiring, printed circuit board tracks, and connections	Complies
8.8	Galvanically separating components (Isolating components between IS and Non-IS circuits)	Complies

J. P. Mead



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9	Diode safety barriers	Complies
10	Type verifications and type tests	
10.1	Spark ignition test No ignition has occur in any test series at any chosen test point	Complies
10.2	Temperature tests	Complies
10.3	Dielectric strength tests (Insulation test, high voltage test)	Complies
10.5	Test for cells and batteries (Spark Test)	NA
10.6	Mechanical tests (Enclosure)	Complies
10.7	Tests for apparatus containing piezoelectric devices	NA
10.8	Type tests for diode safety barriers & safety shunts	NA
10.9	Cable pull test	NA
10.10	Transformer tests	NA
11	Routine verifications and tests	To be conducted by the manufacturer as per proto test report)
12	Marking	Ex 'ia' IIB T6 IP-66
12.3	Warning markings (As per standard)	Complies
13	Documentation	Complies
Annex A	Testing & Assessment of intrinsically safe circuits (See report section 13)	Complies

CONCLUSION: In view of the above observations, **Intrinsic Safe Load cell, Weight Indicator and Composite Circuit of Electronic Weighing Scales/Weighbridges** is considered to be intrinsically safe for use in Zone 1 & 2 and Gas group IIB atmosphere and belongs to category 'ia' with Temperature Class T6 at 40°C ambient as per IS/IEC 60079-11:2006.

Reported By

(PRASAD BHUKYA)
Scientist

Dated: 16 November, 2017
Flameproof & Equipment Safety
CSIR - Central Institute of Mining & Fuel Research,
Barwa Road, DHANBAD – 826015,
(JHARKHAND) INDIA

Checked & Approved By

(A. K. SINGH)
Head

Flameproof & Equipment Safety