IECEx TEST REPORT COVER

ExTR Reference Number.....:	CN/CQM/ExTR12.0014/00
ExTR Free Reference Number .....:	CQM/PCEC/ExTR11.0020
Compiled by + signature (ExTL).....:	Qiao Qin
Reviewed by + signature (ExTL)....:	Xu Jianwen
Reviewed by + signature (ExCB) ...:	Yang Jinnan
Approved by + signature (ExCB)....:	Zhang Wei
Date of issue .....:	2012-03-09
Ex Testing Laboratory (ExTL) .....:	Supervision & Test Center of Ex-products of China Petroleum & Chemical Industry
Address .....:	No 85, No. 3 Rd, Dingzigu, Hongqiao District, Tianjin, 300131, P. R. China
Ex Certification Body (ExCB) .....:	China Quality Mark Certification Group Co., Ltd
Address .....:	No.33 Zengguang Road, Haidian District, Beijing P.R. China.
Applicant's name .....:	Dandong Top Electronics Instrument Group Co., Ltd.
Address .....:	No.10 Huanghai Street, Zhenxing District, Dandong City, Liaoning Province, 118000, China
Standards associated with this ExTR package.....:	IEC 60079-0: 2007; IEC 60079-1: 2007; IEC 60079-11: 2006
Clauses considered.....:	All clauses considered
Test procedure .....:	IECEx System
Test Report Form Number .....:	ExTR Cover_4 (released 2010-12)
Test item description .....:	Displacer Level Transducer
Model/type reference.....:	DLT9000
Code (e.g. Ex __ II__ T__).....:	Ex d ⅡC T5(Ta≤80℃)/T6(Ta≤60℃) Gb / Ex ia ⅡC T5(Ta≤80℃) Gb
Rating .....:	Rated voltage: 12V~30VDC
All testing fully performed by ExTL staff at ExTL address above:	Yes.

Instructions for Intended Use of ExTR Cover:

An ExTR Cover is the sole top-level document to associate together all other parts of an IECEx Test Report (ExTR) package. An ExTR package is comprised of an ExTR Cover and one or more associated ExTR documents (which may include Ex Test Reports, ExTR Addendums and ExTR of National Differences). All ExTR package documents are compiled and reviewed by the ExTL. The Issuing ExCB indicates final approval of the overall ExTR package on this ExTR Cover.

Manufacturer's name.....:	Dandong Top Electronics Instrument Group Co.Ltd
Address .....:	No.10 Huanghai Street, Zhenxing District, Dandong City,118000, Liaoning Province, China
Trademark.....:	

Particulars: Test item vs. Test requirements

Classification of installation and use ..... :	stationary
Ingress protection .....:	IP66
Rated ambient temperature range (°C).....:	-40℃≤Ta≤60℃ or -40℃≤Ta≤80℃
Rated service temperature range (°C) for Ex Components .....:	/

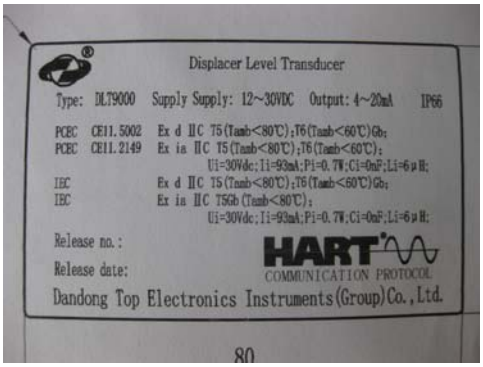
General remarks:

The test results presented in this ExTR package relate only to the item or product tested.

- "(see Attachment #)" refers to additional information appended to the ExTR package.
- "(see appended table)" refers to a table appended to the ExTR package.
- Throughout this ExTR package, a point is used as the decimal separator.
- *Where the term "N/A" appears in any part of an ExTR package, it indicates that the associated issue was considered "Not applicable" to the involved evaluation.*
- *In accordance with IECEx 02, a Receiving ExCB may request a sample of the Ex equipment and copies of the documentation referred to in an ExTR Cover.*

The technical content of this ExTR package shall not be reproduced except in full without the written approval of the Issuing ExCB and ExTL.

Copy of Marking Plate:



Nameplate

Sample

General product information:

1. Series DLT9000 Displacer Level Transducer is protected by type "d" and "ia" separately. The enclosure is comprised of a transmitter enclosure, a power enclosure cap, a display cover and a magnet enclosure. All the metallic parts of enclosure are manufactured from ADC12(aluminium alloy). There are two compartments. One is connection chamber, it contains terminals, another is main chamber, it contains diaphragm and LCD part. The wires through two compartments are encapsulated. The circuit inside the enclosure complies with requirements of type of protection "ia". The sensor of transmitter can detect magnetic field and fulfill the function of apparatus.

In accordance with OD 024, testing not fully performed by ExTL staff at the above ExTL address:

N/A

National differences considered as part of this evaluation, if any:

N/A

"Conditions of Use" for Ex Equipment or "Schedule of Limitations" for Ex Components, if any:

1. Repair of the threaded joints must be made in compliance with the structural specifications provided by the manufacturer. Repairs must not be made on the basis of values specified in table 3 and table 4 of IEC 60079-1:2007.

2. The assembly shall be equipped with IECEx certified cable glands with a compatible mode of protection for the intended use.

Routine tests, if any:

Only protecting tube of the displacer level transducer was subject to the routine overpressure test.Static pressure test is conducted according to Clause 16.1 of IEC 60079-1:2007.

Title:	Drawing No.:	Rev. Level:	Date:
Dispalcer level transducer	DLT9000.0	/	Jan. 16, 2012
Magnetic steel enclosure subassembly	DLT9000.1	/	Jan. 16, 2012
Magnetic steel enclosure	DLT9000.1-1	/	Jan. 16, 2012
Protecting tube	DLT90001.1.1-2	/	Jan. 16, 2012
LCD cover subassembly	DLT9000.3	/	Jan. 16, 2012
LCD cover	DLT9000.3-1	/	Jan. 16, 2012
Sight glass	DLT9000.3-2	/	Jan. 16, 2012
Compression spring	DLT9000.3-3	/	Jan. 16, 2012
Retaining ring	DLT9000.3-4	/	Jan. 16, 2012
Power enclosure cover	DLT9000-5	/	Jan. 16, 2012
Transducer enclosure subassembly	DLT9000.6	/	Jan. 16, 2012
Transducer enclosure	DLT9000.6-1	/	Jan. 16, 2012
Flameproof latch segment	DLT9000-7	/	Jan. 16, 2012
Nameplate	DLT9000-12	/	Jan. 16, 2012
Plug	DLT9000-13	/	Jan. 16, 2012

IECEx TEST REPORT
IEC 60079
Electrical equipment for explosive gas atmospheres
Part 0: General requirements

ExTR Reference Number.....:	
ExTR Free Reference Number.....:	CQM/PCEC/ExTR11.0020
Complied by + signature (ExTL).....:	Qiao Qin Qiao Qin.....
Reviewed by + signature (ExTL).... :	Xu Jianwen Xu Jianwen.....
Date of issue..... :	Feb. 3, 2012
Ex Testing Laboratory (ExTL).....:	Supervision & Test Center of Ex-products of China Petroleum & Chemical Industry
Address..... :	No 85, No. 3 Rd, Dingzigu, Hongqiao District, Tianjin, 300131，P.R. China
Applicant's name..... :	Dandong Top Electronics Instrument Group Co. Ltd
Address..... :	No.10 Huanghai Street, Zhenxing District, Dandong City,118000, Liaoning Province, China
Standard.....:	IEC 60079-0:2007, Fifth edition
Test procedure.....:	IECEx Scheme
Test Report Form No.....:	ExTR60079-0_5A
TRF Originator..... :	Underwriters Laboratories
Master TRF..... :	dated 2007-11

Instructions for Intended Use of Ex Test Report:
This ExTR blank document is to be compiled and reviewed by the ExTL. The ExTR package in which this ExTR is incorporated (comprised of a single ExTR document or multiple ExTR documents) is to be accompanied by a single ExTR Cover Sheet, which is to be approved by the ExCB. ExTR Addendum(s) and/or ExTR Report of National Differences may also supplement this ExTR.

Possible test case verdicts:

- test case does not apply to the test object .....:N / A

- test object does meet the requirement.....:Pass

General remarks:
The tests results presented in this report relate only to the object tested.
This report shall not be reproduced except in full without the written approval of the testing laboratory.

"(see Attachment #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a point is used as the decimal separator.

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
1	SCOPE		
2	NORMATIVE REFERENCES		
3	TERMS AND DEFINITIONS		
4	APPARATUS GROUPING AND TEMPERATURE CLASSIFICATION		
4.1	Group I	Group II equipment.	N / A
4.2	Group II	The DLT9000 Displacer Level Transducer (thereafter transducer) is IIC equipment. Refer to the Temperature measurement for temperature class.	Pass
4.3	Group III	Group II equipment.	N / A
4.4	Equipment for a particular explosive atmosphere	The transducer is not to be used in the particular explosive atmosphere.	N / A
5	TEMPERATURES		
5.1	Environmental influences		Pass
5.1.1	Ambient temperatures	The ambient temperature is -40℃≤Ta≤+60℃ or -40℃≤Ta≤+80℃.	Pass
5.1.2	External source of heating or cooling	There is no internal source of heating or cooling.	N / A
5.2	Service temperature	Use maximum surface temperature instead of service temperature.	Pass
5.3	Maximum surface temperature		Pass
5.3.1	Determination of maximum surface temperature	Refer to Cl. 26.5.1 in test report IEC60079-0.	Pass
5.3.2	Limitation of maximum surface temperature		Pass
5.3.2.1	Group I electrical equipment	Group II equipment.	N / A
5.3.2.2	Group II electrical equipment	Refer to Cl. 26.5.1 in test report IEC60079-0.	Pass
5.3.2.3	Group III electrical equipment		N / A
5.3.2.3.1	Maximum surface temperature determined without a dust layer	Group II equipment	N / A
5.3.2.3.2	Maximum surface temperature with respect to dust layers		N / A

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
5.3.3	Small component temperature for Group I or Group II electrical equipment	Small components are not included.	N / A

6	REQUIREMENTS FOR ALL ELECTRICAL EQUIPMENT		
6.1	General	The transducer complies with the requirements of IEC60079-0:2007, IEC60079-1:2007.	Pass

6.2	Mechanical strength of equipment	The transmitter submitted to the tests in Cl.26.4.	Pass

6.3	Opening times	The temperature class of component inside the enclosure complied with T5/T6. Refer to Cl. 26.5.1 in test report IEC60079-0. And capacitors are not included.	Pass

6.4	Circulating currents	The transducer cannot generate the circulating currents which are caused by stray magnetic fields.	N / A

6.5	Gasket retention	Both power enclosure cover and LCD cover are provided with an O-Sealing ring. The O-sealing rings are fixed in the undercuts.	Pass

6.6	Electromagnetic and ultrasonic energy radiating equipment	The transducer is not an electromagnetic or ultrasonic energy radiating equipment.	N / A
6.6.1	Radio frequency sources		N / A
6.6.2	Lasers or other continuous wave sources		N / A
6.6.3	Ultrasonic sources		N / A

7	NON-METALLIC ENCLOSURES AND NON-METALLIC PARTS OF ENCLOSURES		Pass
7.1	General		Pass
7.1.1	Applicability	The O-seal ring and compound comply with the requirements of this clause.	Pass
7.1.2	Specification of materials	All material data refer to the documents provided by the manufacturer.	Pass
7.1.3	Plastic materials	Plastic materials are not included.	N / A
7.1.4	Elastomeric materials	The material of O-seal ring is S70X silicon rubber. The operating temperature range is -55℃~+200℃.	Pass

7.2	Thermal endurance		Pass
7.2.1	Tests for thermal endurance	Refer to Cl. 26.8 and Cl. 26.9 in this test report for tests for thermal endurance.	Pass

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
7.2.2	Material selection	The service temperature of non-metallic parts are at least 20K lower than the COT of non-metallic parts. The maximum temperature of O-seal ring is 82℃. The maximum temperature of compound and rubber gasket-free adhesive is 86℃. Refer to Cl. 26.5.1 in this test report.	Pass
7.3	Resistance to light	No non-metallic materials expose to light(except glass).	N / A
7.4	Electrostatic charges on external non-metallic materials		Pass
7.4.1	Applicability	The material of enclosure is aluminium alloy. The enclosure is covered with spray coating.	Pass
7.4.2	Avoidance of a build-up of electrostatic charge on Group I or Group II electrical equipment	The thickness of spray coating is less than 0.2mm.	Pass
7.4.3	Avoidance of a build-up of electrostatic charge on equipment for Group III		N / A
7.5	Threaded holes	There are no threaded holes in non-metallic materials.	N / A
8	METALLIC ENCLOSURES AND METALLIC PARTS OF ENCLOSURES		Pass
8.1	Material Composition	The material of enclosure is ACD12(aluminium alloy).	Pass
8.1.1	Group I	Group II equipment.	N / A
8.1.2	Group II	The enclosure of transducer contains 0.3% in total of Mg. Refer to the documents provided by the manufacturer.	Pass
8.1.3	Group III	Group II equipment.	N / A
8.2	Threaded Holes	The thread form of the threaded hole for fasteners is compatible with the material of the enclosure.	Pass
9	FASTENERS		Pass
9.1	General	The screws are made of stainless steel. It could only be disassembled with screwdriver.	Pass
9.2	Special fasteners	Special fasteners are not included.	N / A
9.3	Holes for special fasteners	Special fasteners are not included.	N / A
9.3.1	Thread engagement		N / A
9.3.2	Tolerance and clearance		N / A
9.3.3	Hexagon socket set screw		N / A

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
10	INTERLOCKING DEVICES	Interlocking devices are not included.	N / A
11	BUSHINGS	The wires through two compartments are encapsulated by compound(casting resin PU 403FL/35).	Pass
12	MATERIALS USED FOR CEMENTING	The compound between two compartment is WEVO-Casting resin PU 403FL/35. The temperature range of use: -50℃~+165℃. RTI is 155℃. The WD6608 rubber gasket-free adhesive is used to adhere the glass to the display cover. The temperature range is -50℃ ~+200℃. For the temperature of them, see Cl. 26.5.1	Pass
13	EX COMPONENTS		N / A
13.1	General	Ex components are not included.	N / A
13.2	Mounting		N / A
13.3	Internal Mounting		N / A
13.4	External Mounting		N / A
14	CONNECTION FACILITIES AND TERMINAL COMPARTMENTS		Pass
14.1	General	Terminals in connection chamber are used to connect the connection facilities of external circuit.	Pass
14.2	Termination compartment	The volume of connection chamber is 49cm^3. The diameter of this compartment is 71mm. The conductor can be readily connected.	Pass
14.3	Type of protection	The compartment is of type “d”.	Pass
14.4	Creepage and clearance	type “d”	N / A
15	CONNECTION FACILITIES FOR EARTHING OR BONDING CONDUCTORS		Pass
15.1	Equipment requiring earthing	The internal and external earthing screws are provided.	Pass
15.1.1	Internal	The internal earthing connection facility is a M4 ×8 bolt, which is in the connection chamber.	Pass
15.1.2	External	The external earthing connection facility is a M4 ×8 bolt, which is on the enclosure.	Pass

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
15.2	Equipment not requiring earthing	The transducer requires earthing.	N / A
15.3	Size of conductor connection	An M4 bolt is provided to the external earthing to ensure effective connection of a cross-sectional area of 4mm^2.	Pass
15.4	Protection against corrosion	All connection facilities used for earthing are made of stainless steel(304) which can effectively protect against corrosion.	Pass
15.5	Secureness of electrical connections	All connection facilities used for earthing are applied with spring washers against loose and twist.	Pass
16	ENTRIES INTO ENCLOSURES		Pass
16.1	General	The entries are threaded holes located in the wall of the enclosure.	Pass
16.2	Identification of entries	Thread specifications of the entries are marked on the enclosure.	Pass
16.3	Cable glands	Cable glands are not included.	N / A
16.4	Blanking elements	Plugs used to block the entry holes, can only be removed by wrenches for hexagon socket screws.	Pass
16.5	Temperature at branching point and entry point	The maximum temperature is 82℃. See clause 26.5. The heat resistant temperature of entry cable should be higher than 85℃, see operation manual.	Pass
16.6	Electrostatic charges of cable sheaths	Reference only	Pass
17	SUPPLEMENTARY REQUIREMENTS FOR ROTATING ELECTRICAL MACHINES		N / A
17.1	Fans and fan hoods	Rotating electrical machines are not included.	N / A
17.2	Ventilation openings for external fans		N / A
17.3	Construction and mounting of the ventilation systems		N / A

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
17.4	Clearances for the ventilating systems		N / A
17.5	Materials for external fans and fan hoods		N / A
17.6	Equipotential bonding conductors		N / A
18	SUPPLEMENTARY REQUIREMENTS FOR SWITCHGEAR		N / A
18.1	Flammable dielectric	Switchgears are not included.	N / A
18.2	Disconnectors		N / A
18.3	Group I – Provisions for locking		
18.4	Doors and covers		N / A
19	SUPPLEMENTARY REQUIREMENTS FOR FUSES	Fuses are not included.	N / A
20	SUPPLEMENTARY REQUIREMENTS FOR PLUGS, SOCKETS OUTLETS AND CONNECTORS		N / A
20.1	Interlocking	Plugs, sockets and connectors are not included.	N / A
20.1.1	Explosive gas atmospheres		N / A
20.1.2	Explosive dust atmospheres		N / A
20.2	Energized plugs		N / A
21	SUPPLEMENTARY REQUIREMENTS FOR LUMINAIRES		N / A
21.1	General	Luminaires are not included.	N / A
21.2	Covers for luminaires of EPL Gb or EPL Db		N / A
21.3	Covers for luminaires of EPL Gc or EPL Dc		N / A
21.4	Special lamps		N / A
22	SUPPLEMENTARY REQUIREMENTS FOR CAPLIGHTS AND HANDLIGHTS		N / A

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
22.1	Group I caplights	Caplights and handlights are not included.	N / A
22.2	Group II and Group II caplights and handlights		N / A
23	APPARATUS INCORPORATING CELLS AND BATTERIES		N / A
23.1	General	Batteries are not included.	N / A
23.2	Batteries		
23.3	Cell types		
23.4	Cells in a battery		N / A
23.5	Ratings of batteries		N / A
23.6	Interchangeability		N / A
23.7	Charging of primary batteries		N / A
23.8	Leakage		N / A
23.9	Connections		N / A
23.10	Orientation		N / A
23.11	Replacement of cells or batteries		N / A
23.12	Replaceable battery pack		N / A
24	DOCUMENTATION	Documents provided by the manufacturer give a full and correct specification of the explosion safety aspects of the electrical equipment.	Pass
25	COMPLIANCE OF PROTOTYPE OR SAMPLE WITH DOCUMENTS		Pass
26	TYPE TESTS		
26.1	General	Tests were carried out according to IEC60079-0:2007, IEC60079-1:2007.	Pass

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
26.2	Test configuration	Tests were carried out under the most unfavorable conditions.	Pass
26.3	Tests in explosive test mixtures	Explosive test mixtures used in tests comply with the requirements of standard.	Pass
26.4	Tests of enclosures		Pass
26.4.1	Order of tests		Pass
26.4.1.1	Metallic enclosures, metallic parts of enclosures and glass of parts of enclosures	For the test order refers to clause 26.4.1.2.2.	Pass
26.4.1.2	Non-metallic enclosures or non-metallic parts of enclosures	The transducer is a group II equipment. The O ring is made of S70X silicon rubber, WEVO-Casting resin PU 403FL/35, and WD6608 rubber gasket-free adhesive are considered as non-metallic part.	Pass
26.4.1.2.1	Group I electrical equipment	Group II equipment.	N / A
26.4.1.2.2	Group II and Group III electrical equipment	Two samples are tested in the following order: 1. the tests of thermal endurance to heat; 2. thermal endurance to cold; 3, tests for resistance to impact; 4. tests for degrees of protection; 5. test of ability of the enclosure to withstand pressure; 6. test for non-transmission of an internal ignition. 7. Any other tests specific to the type of protection concerned	Pass
26.4.2	Resistance to impact	The temperature of tests environment is 23℃ Test was carried out on two sample enclosures. Each sample was tested once at two different positions with impact energy 7J each time. The display glasses were tested three times with impact energy 4J.	Pass
26.4.3	Drop test		N / A
26.4.4	Acceptance criteria	No damage affecting the explosion-proof performance has been found.	Pass
26.4.5	Degree of protection (IP) by enclosures		Pass
26.4.5.1	Test procedure	The test procedure was according to IEC60529. The protection degree is IP66.	Pass
26.4.5.2	Acceptance criteria	No ingress of dust or water after tests for degree of protection by enclosure.	Pass
26.5	Thermal tests		Pass
26.5.1	Temperature measurement		Pass
26.5.1.1	General	The transducer was installed as the normal position during the test.	Pass

<table>
<tr><td colspan="4">IEC 60079-0</td></tr>
<tr><td>Clause</td><td>Requirement – Test</td><td>Result – Remark</td><td>Verdict</td></tr>
<tr><td>26.5.1.2</td><td>Service temperature</td><td>Use maximum surface temperature instead of service temperature.</td><td>Pass</td></tr>
<tr><td>26.5.1.3</td><td>Maximum surface temperature</td><td>The power supply of transmitter was 33VDC.
The measured data are as follows:
<table><tr><td>Part measured</td><td>Maximum temperature rise(K)</td></tr><tr><td>Enclosure</td><td>2</td></tr><tr><td>Display glass</td><td>7</td></tr><tr><td>O-seal ring</td><td>2</td></tr><tr><td>Compound</td><td>6</td></tr><tr><td>Entry</td><td>2</td></tr><tr><td>Terminal</td><td>14</td></tr></table>The temperature class complies with T6 when the ambient temperature is -40℃～+60℃.
The temperature class complies with T5 when the ambient temperature is -40℃～+80℃</td><td>Pass</td></tr>
<tr><td>26.5.2</td><td>Thermal shock test</td><td>After the measurement of maximum surface temperature, use a jet of water of about 1 mm diameter at a temperature 10℃ to spray on the glass window with temperature 87.0℃(under the environment temperature 80℃). No breaking on the glass window.</td><td>Pass</td></tr>
<tr><td>26.5.3</td><td colspan="2">Small component ignition test (Group I and Group II)</td><td>N / A</td></tr>
<tr><td>26.5.3.1</td><td>General</td><td></td><td>N / A</td></tr>
<tr><td>26.5.3.2</td><td>Procedure</td><td></td><td>N / A</td></tr>
<tr><td>26.5.3.3</td><td>Acceptance criteria</td><td></td><td>N / A</td></tr>
<tr><td>26.6</td><td colspan="2">Torque test for bushings</td><td>N / A</td></tr>
<tr><td>26.6.1</td><td>Test procedure</td><td></td><td>N / A</td></tr>
<tr><td>26.6.2</td><td>Acceptance criteria</td><td></td><td>N / A</td></tr>
<tr><td>26.7</td><td colspan="2">Non-metallic enclosures or non-metallic parts of enclosures</td><td>Pass</td></tr>
<tr><td>26.7.1</td><td>General</td><td>Non-metallic parts of enclosure include O-seal ring.</td><td>Pass</td></tr>
<tr><td>26.7.2</td><td>Test temperatures</td><td></td><td>N / A</td></tr>
<tr><td>26.8</td><td>Thermal endurance to heat</td><td>The sample was stored at the environment with temperature as 95℃, humidity as 90% for 14 days. Then the sample was stored at the environment with temperature as 110℃ for 14 days.</td><td>Pass</td></tr>
<tr><td>26.9</td><td>Thermal endurance to cold</td><td>The sample is stored at the environment with temperature as -45℃ for 24 hours.</td><td>Pass</td></tr>
<tr><td>26.10</td><td colspan="2">Resistance to light</td><td>N / A</td></tr>
</table>

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
26.10.1	Test procedure	The enclosure is not made of non-metallic material.	N / A
26.10.2	Acceptance criteria		N / A
26.11	Resistance to chemical agents for Group I electrical equipment	Group II equipment.	N / A
26.12	Earth continuity	The enclosure is not made of non-metallic material.	N / A
26.13	Surface resistance test of parts of parts of enclosures of non-metallic materials	The enclosure is not made of non-metallic material.	N / A
26.14	Charging tests		N / A
26.14.1	Introduction	The enclosure is not made of non-metallic material.	N / A
26.14.2	Principle of the test		N / A
26.14.3	Samples and test apparatus		N / A
26.14.4	Ambient conditions		N / A
26.14.5	Conditioning		N / A
26.14.6	Determination of the most efficient charging method		N / A
26.14.6.1	Method A: Rubbing with a pure polyamide cloth		N / A
26.14.6.2	Method B: Rubbing with a cotton cloth		N / A
26.14.6.3	Method C: Charging by influence with a d.c. high-voltage power supply		N / A
26.14.7	Assessment of discharge		N / A
26.15	Measurement of capacitance		N / A
26.15.1	Test procedure	The enclosure is not made of non-metallic material.	N / A
26.15.2	Acceptance criteria		N / A
27	Routine tests	See clause 16.1 in part IEC 60079-1: 2007	N / A
28	MANUFACTURER'S RESPONSIBILITY		
28.1	Conformity with the documentation	The manufacturer carries out the verifications or tests. The sample conforms to the documentation.	Pass
28.2	Certificate	The transmitter complies with the requirements of IEC60079-0:2007, IEC60079-1:2007.	Pass

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
28.3	Responsibility for marking	The transmitter is designed and manufactured, assessed and tested according to IEC60079-0:2007, IEC60079-1:2007, IEC 60079-11: 2006. The sample complies with the document. Refer to Cl. 29 for the content of nameplate.	Pass
29	MARKING	The nameplate comply with the requirements of IEC60079-0:2007, IEC60079-1:2007, IEC 60079-11: 2006.	Pass
29.1	Location	The nameplate is made by 3M and sticked on the enclosure cover.	Pass
29.2	General	For the nameplate, see the cover of this reprot.	Pass
29.3	Ex marking for explosive gas atmospheres	Ex d ⅡC T5/T6 Gb Ex ia ⅡC T5 Gb	Pass
29.4	Ex marking for explosive dust atmospheres	Not be used in explosive dust atmospheres.	N / A
29.5	Combined types of protection	Only one type of protection.	N / A
29.6	Multiple types of protection	Protection “d” and “ia” separately.	Pass
29.7	Ga using two independent Gb types of protection		N / A
29.8	Ex components	Ex components are not included.	N / A
29.9	Small equipment and small Ex components		N / A
29.10	Extremely small equipment and extremely small Ex components		N / A
29.11	Warning markings	The transmitter have warning words on the display cover.	Pass
29.12	Alternate marking of equipment protection levels (EPLs)	Alternate marking is not included.	N / A
29.12.1	Alternate marking of type of protection for explosive gas atmospheres		N / A
29.12.2	Alternate marking of type of protection for explosive dust atmospheres		N / A

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
29.13	Cells and batteries	Cells and batteries are not included.	N / A

30	INSTRUCTIONS		
30.1	General	The instruction manual includes application range, Nomenclature, compliances, working conditions, technical parameters, installation, usage and maintenance, outline and installation dimension, electric schematic diagram, transportation, storage and ordering information.	Pass

30.2	Cells and batteries	Cells and batteries are not included.	N / A

Annex A (Normative)	SUPPLEMENTARY REQUIREMENTS FOR CABLE GLANDS		N / A
A.1	General	Cable glands are not included.	N / A
A.2	Constructional requirements		
A.2.1	Cable sealing		N / A
A.2.2	Filling compounds		N / A
A.2.3	Clamping		
A.2.3.1	General		N / A
A.2.3.2	Group II or Group III cable glands		N / A
A.2.4	Lead-in of cable		
A.2.4.1	Sharp edges		N / A
A.2.4.2	Point of entry		N / A
A.2.5	Released by a tool		N / A
A.2.6	Fixing		N / A
A.2.7	Degree of protection		N / A
A.3	Type tests		
A.3.1	Tests of clamping of non-armoured and braided cables		N / A
A.3.1.1	Cable glands with clamping by the sealing ring		N / A
A.3.1.2	Cable glands with clamping by the filling compound		N / A
A.3.1.3	Cable glands with clamping by means of a clamping device		N / A
A.3.1.4	Tensile test		N / A
A.3.1.5	Mechanical strength		N / A
A.3.2	Tests of clamping of armoured cables		N / A
A.3.2.1	Tests of clamping where the armourings are clamped by a device within the gland		N / A
A.3.2.1.1	Tensile test		N / A
A.3.2.1.2	Mechanical strength		N / A

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
A.3.2.2	Tests of clamping where the armourings are not clamped by a device within the gland		N / A
A.3.3	Type test for resistance to impact		N / A
A.3.4	Test for degree of protection (IP) of cable glands		N / A
A.4	Marking		
A.4.1	Marking of cable glands		N / A
A.4.2	Marking of cable sealing rings		N / A

Annex B (Normative)	Table B.1 – Clauses with which Ex components shall comply	N / A

IECEx TEST REPORT
IEC 60079-1
Explosive atmospheres - Part 1:
Equipment protection by flameproof enclosures "d"

ExTR Reference Number.....:	
ExTR Free Reference Number.....:	CQM/PCEC/ExTR11.0020
Complied by + signature (ExTL).....:	Qiao Qin
Reviewed by + signature (ExTL).....:	Xu Jianwen
Date of issue.....:	Feb. 3, 2012
Ex Testing Laboratory (ExTL).....:	Supervision & Test Center of Ex-products of China Petroleum & Chemical Industry
Address.....:	No 85, No. 3 Rd, Dingzigu, Hongqiao District, Tianjin, 300131, P.R. China
Applicant's name.....:	Dandong Top Electronics Instrument Group Co. Ltd
Address.....:	No.10 Huanghai Street, Zhenxing District, Dandong City,118000, Liaoning Province, China
Standard.....:	IEC 60079-1:2007, Sixth edition
Test procedure.....:	IECEx Scheme
Test Report Form No.....:	ExTR60079-1_6A
TRF Originator.....:	Underwriters Laboratories Inc.
Master TRF.....:	dated 2007-05

Instructions for Intended Use of Ex Test Report:
This ExTR blank document is to be compiled and reviewed by the ExTL. The ExTR package in which this ExTR is incorporated (comprised of a single ExTR document or multiple ExTR documents) is to be accompanied by a single ExTR Cover Sheet, which is to be approved by the ExCB. IECEx Test Report Addendum(s) and/or IECEx Test Report of National Differences may also supplement this ExTR.

Possible test case verdicts:

- test case does not apply to the test object .....:N / A
- test object does meet the requirement.....:Pass

General remarks:
The tests results presented in this report relate only to the object tested.
This report shall not be reproduced except in full without the written approval of the testing laboratory.

"(see Attachment #)" refers to additional information appended to the report.
"(see Appended table)" refers to a table appended to the report.

Throughout this report, a point is used as the decimal separator.

IEC 60079-1			
Clause	Requirement – Test	Result – Remark	Verdict
1	SCOPE		
2	NORMATIVE REFERENCES		
3	TERMS AND DEFINITIONS		
4	EQUIPMENT GROUPING AND TEMPERATURE CLASSIFICATION	The transducer is of IIC equipment, T5/T6 temperature class.	Pass
5	FLAMEPROOF JOINTS		
5.1	General requirements	The transducer complies with requirements of Clause 5 and is smeared with TYF-5 Soft film anti-rust oil. Refer to technical document provided by the manufacturer.	Pass
5.2	Non-threaded joints		
5.2.1	Width of joints (L)	There are two compartments. The volume of main chamber is 86cm^3, and the volume of connection chamber is 49cm^3. The cylindrical joint between transducer enclosure and protecting pipe: material is ADC12 and 316L, L=13.3mm(request 9.5mm$\leqslant$L$\leqslant$15.8mm), i=0.075mm(request i$\leqslant$0.10mm), Ra3.2/3.2.	Pass
5.2.2	Gap (i)	See clause 5.2.1	Pass
5.2.3	Spigot joints	See clause 5.2.1	Pass
5.2.4	Holes in joint surfaces	Holes in joint surfaces are not included.	N / A
5.2.4.1	Flanged joints with holes outside the enclosure (see Figures 3 and 5)		N / A
5.2.4.2	Flanged joints with holes inside the enclosure (see Figure 4)		N / A
5.2.4.3	Spigot joints where, to the edges of the holes, the joint consists of a cylindrical part and a plane part (see Figure 6)		N / A
5.2.4.4	Spigot joints where, to the edges of the holes, the joint consists only of the plane part (see Figures 7 and 8), in so far as plane joints are permitted (see 5.2.7)		N / A
5.2.5	Conical joints	Conical joints are not included.	N / A
5.2.6	Joints with partial cylindrical surfaces (not permitted for Group IIC)	Joints with partial cylindrical surfaces are not included.	N / A

IEC 60079-1			
Clause	Requirement – Test	Result – Remark	Verdict
5.2.7	Flanged joints for acetylene atmospheres	Flanged joints are not included.	N / A
5.2.8	Serrated joints	Serrated joints are not included.	N / A
5.3	Threaded joints	1. power enclosure cap/ transducer enclosure Pitch: M64X1.5mm Axial engagement length:12mm Number of full thread engagement: 8 2. display cover/ transducer enclosure Pitch: M92X1.5mm Axial engagement length:13.5mm Number of full thread engagement: 9 3. blanking element/ transducer enclosure Pitch: M20X1.5mm Axial engagement length:18mm Number of full thread engagement: 12 Two positions Metric thread complies with the requirements of 6g/6H fit tolerance. All Metric threads can fulfill the requirements of medium tolerance in ISO965-1 and ISO965-3.	Pass
5.4	Gaskets (including O-rings)	O-seal rings for protection are provided to the threaded joints. O-seal ring are not counted in the length of explosion-proof joints, and do not separate the joint surface as well.	Pass
5.5	Equipment using capillaries	Capillaries are not included.	N / A
6	CEMENTED JOINTS		
6.1	General	The display cover and display glass is cemented by adhesive. The wires through two compartments are encapsulated by compound(casting resin PU 403FL/35) For related test see clauses 26.8, 26.9 in IEC60079-0.	Pass

IEC 60079-1			
Clause	Requirement – Test	Result – Remark	Verdict
6.2	Mechanical strength	The compression is use to maintain the mechanical strength of cemented joint between display cover and display glass. The locking ring is used to maintain the mechanical strength of compound between two compartments. For the pressure tests, see report IEC60079-1, clause 15.1.3.	Pass
6.3	Width of cemented joints	The width of cemented joint between display glass and display cover is 14mm. The length of bushing is 20mm.	Pass
7	OPERATING RODS		
7.1	Diameter of operating rod	Operating rods are not included.	N / A
7.2	Diametrical clearance		N / A
8	SUPPLEMENTARY REQUIREMENTS FOR SHAFTS AND BEARINGS		
8.1	Joints of shafts	Shafts and bearings are not included.	N / A
8.1.1	Cylindrical joints		N / A
8.1.2	Labyrinth joints		N / A
8.1.3	Joints with floating glands		N / A
8.2	Bearings		
8.2.1	Sleeve Bearings		N / A
8.2.2	Rolling-element bearings		N / A
9	LIGHT-TRANSMITTING PARTS	The light-transmitting parts is made of glass.	Pass
10	BREATHING AND DRAINING DEVICES WHICH FORM PART OF A FLAMEPROOF ENCLOSURE	Breathing and draining devices are not included.	N / A
10.1	Openings for breathing or draining		N / A
10.2	Composition limits		N / A
10.3	Dimensions		N / A

IEC 60079-1			
Clause	Requirement – Test	Result – Remark	Verdict
10.4	Elements with measurable paths		N / A
10.5	Elements with non-measurable paths		N / A
10.6	Removable devices		N / A
10.7	Mounting arrangements of the elements		N / A
10.8	Mechanical strength		N / A
10.9	Breathing devices and draining devices when used as Ex components		N / A
10.9.1	Mounting arrangements of the elements and components		N / A
10.9.2	Type tests for breathing and draining devices used as Ex components		N / A
10.9.2.1	Test of the ability of the breathing and draining device to withstand pressure		
10.9.2.1.1	Test procedure		N / A
10.9.2.1.2	Acceptance criteria		N / A
10.9.2.2	Thermal tests		N / A
10.9.2.2.1	Test procedure		N / A
10.9.2.2.2	Acceptance criteria		N / A
10.9.2.3	Test for non-transmission of an internal ignition		N / A
10.9.2.3.1	Test procedure		N / A
10.9.2.3.2	Acceptance criteria		N / A
10.9.3	Ex component certificate		N / A
11	FASTENERS, ASSOCIATED HOLES AND CLOSING DEVICES		
11.1	Type of fastener	Special fastener are not included.	N / A
11.2	Plastic material or light alloys		N / A
11.3	Yield stress		N / A
11.4	Studs		N / A
11.5	Fasteners through walls		N / A

IEC 60079-1			
Clause	Requirement – Test	Result – Remark	Verdict
11.6	Blind holes	The remaining thickness of the wall of the enclosure is more than 3mm.	Pass
11.7	Screws into blind holes	The fastener are installed with gaskets.	N / A
11.8	Closing of through holes	Through holes are not included.	N / A
11.9	Closure of apertures and compliance of blanking elements	Use blanking element for blocking, which complies with the requirements of Cl.11.9.2.	Pass
11.9.1	Closing device removable from outside		N / A
11.9.2	Tool used to remove closing device	Install and remove the blanking element only with wrench.	Pass
11.9.3	Special removal technique		N / A
11.9.4	Blanking element used with an adapter		N / A
11.10	Separate fastening arrangements for threaded doors/covers	The display cover and power enclosure cap are fastened by a M4 screw and a latch segment.	Pass
12	MATERIALS AND MECHANICAL STRENGTH OF ENCLOSURES – MATERIALS INSIDE THE ENCLOSURES		
12.1	Tests prescribed by Clauses 14 to 16	The transducer is submitted to the tests specified from Cl.14 to Cl.16.	Pass
12.2	Assembly of multiple flameproof enclosures	The flameroof enclosure is assembled by 2 compartments.	Pass
12.3	Intercommunicating enclosure compartments	Intercommunicating enclosure compartments are not included.	N / A
12.4	Use of cast iron	Cast iron is not inlcuded.	N / A
12.5	Use of liquids	Liquids are not included.	N / A
12.6	Insulating materials for Group I apparatus	Group II equipment.	N / A
12.7	Zinc content	The enclosure is made of aluminium alloy, which contains 1.0% Zn.	Pass
13	ENTRIES FOR FLAMEPROOF ENCLOSURES	The thread specification and the number of entry is marked on the enclosure.	Pass

IEC 60079-1			
Clause	Requirement – Test	Result – Remark	Verdict
13.1	Cable glands		N / A
13.2	Conduit sealing devices		N / A
13.2.1	Permitted for Group II only		N / A
13.2.2	Requirements for sealing device		N / A
13.3	Plugs and sockets and cable couplers		
13.3.1	Construction & mounting		N / A
13.3.2	Flameproof joints of contact parts		N / A
13.3.3	Flameproof properties in the event of internal explosion		N / A
13.3.4	Exemption & warning label		N / A
13.4	Bushings	The wires through two compartments are encapsulated by compound(casting rasin PU 403FL/35). For the related test see annex C.	N / A
14	VERIFICATION AND TESTS	The maximum surface temperature was measured under the condition of 110% rated voltage. The tests were carried out according to IEC60079-0 and IEC60079-1.	Pass
15	TYPE TESTS	Tests were carried out on samples which have been tested for mechanical performance according to Cl.15. 1. Samples were tested according to the following sequence: reference pressure measurement, overpressure test, test for non-transmission of an internal ignition.	Pass
15.1	Tests of ability of the enclosure to withstand pressure		
15.1.1	General	Tests of ability of the enclosure to withstand pressure were carried out according to Cl.15.1.2 and Cl.15.1.3. The reference pressure measurement and overpressure tests were carried out on the main chamber and connection chamber. After the tests, no permanent damage or deformation had been found.	Pass
15.1.2	Determination of explosion pressure (reference pressure)	The volume of main chamber is 86cm^3. The volume of connection chamber is 49cm^3. The reference pressure is measured under the normal ambient temperature(20℃).	Pass

<table>
<tr><td colspan="4">IEC 60079-1</td></tr>
<tr><td>Clause</td><td>Requirement – Test</td><td>Result – Remark</td><td>Verdict</td></tr>
<tr><td>15.1.2.1</td><td>Test procedure</td><td>The explosive gas mixtures used in tests were 31% hydrogen and 14% acetylene in volume. Test three times for each gas mixture.
The explosion pressures of main chamber are as follows:
<table>
<tr><td>Hydrogen (31%)</td><td>Acetylene (14%)</td></tr>
<tr><td>344 kPa</td><td>361 kPa</td></tr>
<tr><td>341 kPa</td><td>383 kPa</td></tr>
<tr><td>336 kPa</td><td>367 kPa</td></tr>
</table>
The test factor is 1.45 under the minimum ambient temperature -40℃.
So the reference pressure is assumed to be as follows:
<table>
<tr><td>Hydrogen (31%)</td><td>Acetylene (14%)</td></tr>
<tr><td>499 kPa</td><td>523 kPa</td></tr>
<tr><td>494 kPa</td><td>555 kPa</td></tr>
<tr><td>487 kPa</td><td>532 kPa</td></tr>
</table>
The explosion pressures of connection chamber are as follows:
<table>
<tr><td>Hydrogen (31%)</td><td>Acetylene (14%)</td></tr>
<tr><td>331kPa</td><td>334 kPa</td></tr>
<tr><td>312 kPa</td><td>320 kPa</td></tr>
<tr><td>315 kPa</td><td>310kPa</td></tr>
</table>
The test factor is 1.45 under the minimum ambient temperature -40℃.
So the reference pressure is assumed to be as follows:
<table>
<tr><td>Hydrogen (31%)</td><td>Acetylene (14%)</td></tr>
<tr><td>480kPa</td><td>484 kPa</td></tr>
<tr><td>452 kPa</td><td>464kPa</td></tr>
<tr><td>457kPa</td><td>450 kPa</td></tr>
</table></td><td>Pass</td></tr>
<tr><td>15.1.2.2</td><td>Rotating electrical machines</td><td>No rotating electrical machines</td><td>N / A</td></tr>
<tr><td>15.1.2.3</td><td>Pressure-piling</td><td>No pressure piling</td><td>N / A</td></tr>
<tr><td>15.1.2.4</td><td>Apparatus intended for use in a single gas</td><td>Not a apparatus intended for use in a single gas</td><td>N / A</td></tr>
<tr><td>15.1.3</td><td>Overpressure test</td><td>The mechanical performance of material used on transducer is not affected in the low temperature environment. The over pressure test was carried out at the normal room ambient temperature.</td><td>Pass</td></tr>
</table>

IEC 60079-1			
Clause	Requirement – Test	Result – Remark	Verdict
15.1.3.1	Overpressure test - First method (static)	The Volume of main chamber ≤86cm^3 Test pressure for compartment is 4 times greater than reference pressure: 2.5MPa. Test duration: 10~12s. The Volume of connection chamber ≤ 49cm^3 Test pressure for compartment: 2.5MPa. Test duration: 10~12s. No damage to the enclosure affecting the explosion-proof performance had been found after the tests.	Pass
15.1.3.2	Overpressure test - second method (dynamic)	Test was carried out according to the first method.	N / A
15.2	Test for non-transmission of an internal ignition	Remove the gaskets before test for non-transmission of an internal ignition. No reduction was made.	Pass
15.2.1	Electrical equipment of groups I, IIA and IIB		
15.2.1.1	Test gap and test gas	Group II equipment.	N / A
15.2.1.2	Increasing of gaps for test		N / A
15.2.1.3	Number of tests and acceptance criterion		N / A
15.2.2	Electrical apparatus of group IIC	Test for non-transmission of an internal ignition was carried out according to the second method.	Pass
15.2.2.1	First method	Test was carried out according to the second method.	N / A
15.2.2.2	Second method	Tests were carried out under the 1.5 times atmospheric pressure, the explosive gas mixture used in tests is 27.5% hydrogen and 7.5% acetylene in volume. Test five times for each gas mixture. The explosion was not transmitted.	Pass
15.2.2.3	Single constructions	Not a single piece production	N / A
15.3	(Reserved for future use)		
15.4	Tests of flameproof enclosures with breathing and draining devices	Breathing and draining devices are not included.	N / A
15.4.1	Tests of ability of the enclosure to withstand pressure		N / A
15.4.1.1	Replacement of breathing and draining devices		N / A
15.4.1.2	Over pressure test		N / A
15.4.2	Thermal tests		
15.4.2.1	Test procedure		N / A

IEC 60079-1			
Clause	Requirement – Test	Result – Remark	Verdict
15.4.2.2	Acceptance criterion		N / A
15.4.3	Tests for non-transmission of an internal ignition		N / A
15.4.3.1	Test procedure		N / A
15.4.3.2	Non-transmission test for breathing and draining devices		N / A
15.4.3.2.1	Method A		N / A
15.4.3.2.2	Method B		N / A
15.4.3.3	Acceptance criterion		N / A
16	ROUTINE TESTS		
16.1	General	The first method were used during the routine test.	Pass
16.1.1	Routine overpressure test – first method	The static pressure test was carried out on the protecting tube. Test pressure: 1MPa. Test duration: 10~12s. No damage to the structure or permanent deformation affecting the explosion-proof performance should been found. 4 times the reference pressure for the other parts of enclosure(see clause 15.1.3.1), so they were not subject the routine overpressure test.	Pass
16.1.2	Routine test – second method		N / A
16.1.3	Routine test – empty enclosure & parts of enclosure		N / A
16.2	Routine tests – where not required		N / A
16.3	Routine tests – acceptance criterion		N / A
17	SWITCHGEAR FOR GROUP I	Switchgears are not included.	N / A
17.1	Means of isolation		N / A
17.1.1	Fitted inside Ex d enclosure		N / A
17.1.2	Fitted inside another enclosure		N / A
17.1.3	Plug and socket or a cable coupler – Compliance with 13.3		N / A
17.2	Doors or covers		
17.2.1	Quick-acting doors or covers		N / A
17.2.1.1	Retention of properties		N / A
17.2.1.2	Closure of isolator		N / A
17.2.2	Doors or covers fixed by screws		N / A

IEC 60079-1			
Clause	Requirement – Test	Result – Remark	Verdict
17.2.3	Threaded doors or covers		N / A
18	LAMPHOLDERS AND LAMP CAPS	Lampholders and lamp caps are not included.	N / A
18.1	Device preventing lamps working loose		N / A
18.2	Holders and caps for lamps with cylindrical caps		
18.2.1	Holders and caps for tubular fluorescent lamps		N / A
18.2.2	Other holders		N / A
18.3	Holders for lamps with threaded caps		
18.3.1	Resistant to corrosion		N / A
18.3.2	Contact separation		N / A
18.3.3	E26/E27 and E39/E40 threaded lampholders		N / A
19	NON-METALLIC ENCLOSURES AND NON-METALLIC PARTS OF ENCLOSURES	The enclosure is made of metallic.	N / A
19.1	(Reserved for future use)		
19.2	Special constructional requirements		
19.2.1	Resistance to tracking and creepage distances on internal surfaces of the enclosure walls		N / A
19.3	Supplementary requirements for type tests		N / A
19.3.1	Tests for flameproofness		
19.3.1.1	Test procedure		N / A
19.3.1.2	Tests of ability of the enclosure to withstand pressure		N / A
19.3.1.3	Test of erosion by flame		N / A
19.3.1.4	Test for non-transmission of an internal ignition		N / A
19.3.2	Flammability		N / A
20	MARKING		
20.1	General	The marking complies with the additional requirements for flameproof enclosure specified in IEC 60079-1.	Pass

IEC 60079-1			
Clause	Requirement – Test	Result – Remark	Verdict
20.2	Caution and warning markings	Warning words "keep tight when circuit alive" are on the display cover and power connection cap.	Pass
20.3	Informative markings	The thread specification is marked on the enclosure.	Pass
Annex A (Normative)	ADDITIONAL REQUIREMENTS FOR CRIMPED RIBBON ELEMENTS AND MULTIPLE SCREEN ELEMENTS OF BREATHING AND DRAINING DEVICES		
A.1	Crimped ribbon and multiple screen elements	Crimped ribbon and multiple screen elements of breathing and draining devices are not included.	N / A
A.2	Path dimensions		N / A
A.3	Annex B requirements		N / A
A.4	Type tests		N / A
Annex B (Normative)	ADDITIONAL REQUIREMENTS FOR ELEMENTS, WITH NON-MEASURABLE PATHS, OF BREATHING AND DRAINING DEVICES		
B.1	Sintered metal elements		
B.1.1	Construction	Sintered metal elements are not included	N / A
B.1.2	Bubble test pore size		N / A
B.1.3	Density		N / A
B.1.4	Open porosity and/or fluid permeability		N / A
B.1.5	Identification		N / A
B.2	Pressed metal wire elements		
B.2.1	Construction	Pressed metal wire elements are not included.	N / A
B.2.2	Specifications		N / A
B.2.3	Bubble test pore size		N / A
B.2.4	Density		N / A
B.2.5	Open porosity and or fluid permeability		N / A
B.2.6	Identification		N / A
B.3	Metal foam elements		
B.3.1	Construction	Metal foam elements are not included.	N / A
B.3.2	Chromium content		N / A
B.3.3	Bubble test pore size		N / A

IEC 60079-1			
Clause	Requirement – Test	Result – Remark	Verdict
B.3.4	Density		N / A
B.3.5	Open porosity and/or fluid permeability		N / A
B.3.6	Identification		N / A

Annex C (Normative)	ADDITIONAL REQUIREMENTS FOR FLAMEPROOF ENTRY DEVICES

C.1	General	The unused holes in the enclosure are closed by blanking elements.	Pass

C.2	Constructional requirements		
C.2.1	Sealing methods		
C.2.1.1	Cable glands with elastomeric sealing rings		
C.2.1.1.1	Minimum uncompressed axial height		N / A
C.2.1.1.2	Cable glands with only one specific elastomeric sealing ring		N / A
C.2.1.2	Cable glands sealed with setting compound		N / A
C.2.1.3	Conduit sealing devices with setting compound		N / A
C.2.1.4	Bushings	Bushings between two compartments is sealed with compound. For the length of the compound refer to clause 6.3. Thermal endurance tests were carried out on the sample. The static pressure test was done according to clause C3.1.1. 3MPa is maintained for 10s. No leakage was found.	Pass
C.2.2	Threads	See Clause 5.3.	Pass
C.2.3	Constructional requirements for Ex blanking elements		
C.2.3.1	Design requirements	The blanking elements are type of 22b.	Pass
C.2.3.2	Parallel threads	See Clause 5.3.	Pass
C.2.4	Constructional requirements for Ex thread adapters		
C.2.4.1	Compliance of threads	Ex thread adapters are not included.	N / A
C.2.4.2	Threads co-axial		N / A
C.2.4.3	Length and internal volume		N / A

C.3	Type tests		
C.3.1	Sealing test		N / A
C.3.1.1	Cable glands and conduit sealing devices with sealing ring		N / A
C.3.1.2	Cable glands sealed with setting compound		N / A
C.3.1.3	Conduit sealing devices sealed with setting compound		N / A
C.3.2	Test of mechanical strength		

IEC 60079-1			
Clause	Requirement – Test	Result – Remark	Verdict
C.3.2.1	Cable glands with a threaded compression element		N / A
C.3.2.2	Cable glands with a compression element fixed by screws		N / A
C3.2.3	Cable glands sealed with setting compound		N / A
C3.2.4	Acceptance criteria		N / A
C.3.3	Type tests for Ex blanking elements		
C.3.3.1	Torque test	The blanking elements complied with Cl. 11.9.2. Apply torque 40N·m to tighten the M20 blanking element, which could reach the right thread engaging number. No damage has been found during remove. Apply further torque 65N·m to tighten the M20 blanking element, protruding edges of the sample did not thread in completely to the thread holes.	Pass
C.3.3.2	Over-pressure test	The over-pressure test was done to the blanking element. Tests pressure:3Mpa; Test duration: 10~12s. No damage to plugs affecting the explosion-proof performance had been found after the tests.	Pass
C.3.4	Type tests for Ex thread adapters		
C.3.4.1	Torque test	Ex thread adapters are not included.	N / A
C.3.4.2	Impact test		N / A
C.3.4.3	Over-pressure test		N / A

Annex D (Normative)	EMPTY FLAMEPROOF ENCLOSURES AS EX COMPONENTS

D.1	General

D.2	Introductory remarks

D.3	Ex component enclosure requirements		
D.3.1	Compliance with IEC 60079-0 & 60079-1	Not an empty flamepoof Ex enclosure.	N / A
D.3.2	Geometry of enclosure		N / A
D.3.3	Rotating machines		N / A
D.3.4	Means of mounting		N / A
D.3.5	Drilled holes		N / A
D.3.6	Reference pressure		N / A
D.3.7	Over-pressure		N / A
D.3.8	Marking internally		N / A
D.3.9	External marking provision		N / A

IEC 60079-1			
Clause	Requirement – Test	Result – Remark	Verdict
D.3.10	Information in certificate		N / A

D.4	Utilization of an Ex component enclosure certificate to prepare an equipment certificate		
D.4.1	Procedure		N / A
D.4.2	Application of the schedule of limitations		N / A

Annex E (Normative)	CELLS AND BATTERIES USED IN FLAMEPROOF “D” ENCLOSURES

E.1	Introductory remarks

E.2	Acceptable electrochemical systems	Cells and batteries are not included.	N / A

E.3	General requirements for cells (or batteries) inside flameproof enclosures		
E.3.1	Restrictions		N / A
E.3.2	Warning label		N / A
E.3.3	Mounting		N / A
E.3.4	Relative movement		N / A

E.4	Arrangement of safety devices		
E.4.1	Prevention of excessive temperature and cell damage		
E.4.1.1	Short circuit condition		N / A
E.4.1.2	Infallible components		N / A
E.4.2	Prevention of cell polarity reversal or reverse charging by another cell in the same battery		
E.4.2.1	Additional protection		N / A
E.4.2.2	Protection against polarity reversal or revere charging		N / A
E.4.3	Prevention of inadvertent charging of a battery by other voltage sources in the enclosure		N / A

E.5	Recharging of secondary cells inside flameproof enclosures		
E.5.1	Allowable cell type		N / A
E.5.2	Charging condition and safety devices		N / A
E.5.3	Reverse charging		N / A
E.5.4	Additional safety device(s)		N / A
E.5.5	Recharging within enclosure		N / A

E.6	Rating of protection diodes and reliability of protection devices		N / A
E.6.1	Voltage rating & compliance with E.4.2		N / A
E.6.2	Voltage rating & compliance with E.4.3		N / A
E.6.3	Current rating		N / A

IEC 60079-1			
Clause	Requirement – Test	Result – Remark	Verdict
E.6.4	Safety integrity		N / A

Annex F (Informative)	MECHANICAL PROPERTIES FOR SCREWS AND NUTS

Annex G (Informative)	INTRODUCTION OF AN ALTERNATIVE RISK ASSESMENT METHOD ENCOMPASSING “EQUIPMENT PROTECTION LEVELS” FOR EX EQUIPMENT

IEC: International Electrotechnical Commission

IECEx Scheme: IEC Scheme for Certification to Standards relating to Equipment for Explosive Atmospheres

IECEx TR Ref. No.

CQM/PCEC/ExTR11.0020

IECEx ASSESSMENT AND TEST REPORT FOR EXPLOSIVE ATMOSPHERES EQUIPMENT PROTECTION BY INTRINSIC SAFETY "i"
IEC 60079 Part 0 and Part 11

Product (including Model/type Ref.)	DLT9000 Displacer Level Transducer
Ex code	Ex ia IIC T5 Gb
Name and address of the applicant	Dandong Top Electronics Instrument Group Co. Ltd No.10 Huanghai Street, Zhenxing District, Dandong City,118000, Liaoning Province, China
Name and address of the manufacturer	Dandong Top Electronics Instrument Group Co. Ltd No.10 Huanghai Street, Zhenxing District, Dandong City,118000, Liaoning Province, China
Additional Information (if necessary)	
Documentation and representative sample of the product were assessed and tested (as necessary) and found to be in conformity with	**PUBLICATION** / **EDITION** IEC 60079-0:2007 / 5 IEC 60079-11:2006 / 5
Internal Test Report Ref. No. of the IECEx CB or TL (if necessary)	
Internal File Ref. No. of the IECEx CB or TL	
Degree of Ingress Protection, and specific particulars of installation, use	IP66
Date of Issue	

This IEC ExTR is issued by the following:

IEC ExTL: PCEC

Add: No 85, No. 3 Rd, Dingzigu, Hongqiao District, Tianjin, 300131，China

IECEx CB:
xxx xxx Road
xxx State nnnn
COUNTRY

Signature

This is a consolidated report, comprising all the requirements of IECEx for the Cover Sheet and Ex Test Reports for Explosive Atmospheres Part 0: General Requirements and Part 11: Intrinsic Safety "i"

- This report is to be compiled and verified by the ExTL, with the ExCB giving the final approval. ExTR Addendums and ExTR Report of National Differences may also supplement this ExTR.
- This report shall only be used for a compliance verdict. If the assessment or test was not in compliance with the Standards, this report shall not be issued in its present format with IECEx TR number.
- The test results presented in this report relate only to the specific object tested, and the assessment results relate only to the documents listed in the documents list of this report.
- Throughout this report, a point is used as the decimal separator.
- The report number, page number and total number of pages must be included on all pages of this report.
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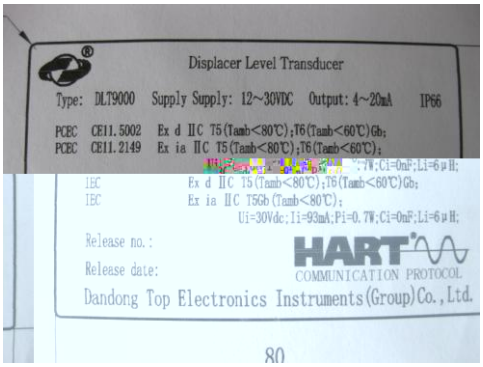

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This report was written by:	Name: Position: Project engineer	Zhuang Xiaoyu Signature
This report was verified by:	Name: Position: Director	Li Changkun Signature

The version number of this report template is ExTR60079-11_Version2

1 Scope

This report covers the testing and assessment of DLT9000 Displacer Level Transducer according to IEC60079-0: 2007 and IEC60079-11: 2006.

2 Equipment

The following samples were submitted for assessment and testing:

The sample is DLT9000 Displacer Level Transducer.

3 Test and assessment

3.1 General aspects

The material of enclosure of DLT9000 Displacer Level Transducer is aluminium alloy; the circuit board is packaged in the enclosure, using connector to connect to the external. Although the product circuit complies with the requirements of type of protection "ia", because the material of enclosure is aluminium alloy, protection level of DLT9000 is Gb.

3.1.1 Description of enclosure

3.1.1.a Metallic enclosures – light metal requirements

The material of enclosure is aluminium alloy, protection level of DLT9000 is Gb..

3.1.1.b Non-metallic enclosure requirements

Excluded.

3.1.2 Thermal endurance requirements (only for non-metallic enclosures using Annex F)

Excluded.

3.1.3 Resistance to chemical agents (only Group I non-metallic enclosures using Annex F)

Excluded.

3.1.4 Impact test / assessment (only for enclosures using Annex F)

Excluded.

3.1.5 Drop test / assessment

Not applicable, stationary equipment.

3.1.6 Ingress protection method and test (including gasket retention)

Both power enclosure cover and LCD cover are provided with an O-Sealing ring. The O-sealing rings are fixed in the undercuts.

3.1.7 Resistance to light test / assessment (only for non-metallic enclosures using Annex F)

Excluded.

3.1.8 Connection arrangement, including entry provisions and transient protection requirements

Not applicable.

3.1.9 Dielectric strength test

AC500V dielectric strength test is carried out on the intrinsic safety end and the enclosure. The duration is 1 minute. There are no breakdown and flashover. It complies with the requirement.

3.1.10 Earthing, bonding and circulating currents

Not applicable.

3.1.11 Encapsulation, including sealing test

Not applicable, the measuring board is completely encapsulated, but encapsulation surface do not directly constitute the outer surface of the equipment.

3.1.12 Plastic electrostatic hazard assessment and tests
Not applicable.

3.1.13 Printed circuit board, conformal coating, and coating to Annex F requirements
The measuring board is completely encapsulated, the rest is coated with insulating varnish.

3.1.14 Partitions, including earth screens
Not applicable.

3.1.15 Cable pull test
Not applicable.

3.1.16 Internal connectors
Internal connection uses connectors, which have measure to prevent from mispluging and loosening. Terminals are used for connection of entry line of power supply, and the connection is compressed by wiring metals, complying with the requirements of IS.

3.1.17 Internal wiring
Internal wirings adopt copper conductor, which is inner diameter of 0.5mm and covered by plastic skin, the maximum current in the circuit is 93 mA, less than 6.9A, complying with the requirements of IS.

3.1.18 Marking requirements, including warning markings
The material of the nameplate is 3M plastics, the contents of nameplate include product type: DLT9000, name: Displacer Level Transducer, Ex marking: Ex ia IIC T5 Gb, Ex certificate number, ambient temperature: -20℃≤Ta≤+80℃, basic parameters, product number, date of production, manufacturer name.

3.1.19 Instructions, including live maintenance procedures (if any)
The instruction lists product overview, technical parameters and executive standards, the rule of product model, function features, outline structure of the product, the methods of installation and connection. The product must be connected according to the methods of instructions and only used in the hazardous areas of zones 1 and 2.

3.1.20 Any other general aspects
Not applicable.

3.2 Spark ignition assessment and tests
3.2.1 Design of equipment to comply with spark ignition requirements
The nominal voltage of circuit is 24V DC, the maximum input voltage is 30V, and the maximum input current is 93mA. The test circuit board is completely encapsulated, the power supply 24V goes though R1(10Ω) and diodes V1~V3(SS14), supplies the circuit and turns to 5V DC though U1(TLVH431). The power supply 5V connects to the triple zener diodes in parallel (1N4733A 5.1V@1W 5%). After zener diodes the maximum voltage is 5.1V×（1+5%）=5.355V, the other output ports in the circuit are all though triple zener diodes(1N4733A 5.1V@1W 5%), the maximum output voltage should be less than 5.355V, the sum of capacitances is 42.01μF, considering the safety factor of 1.5, for 42.01μF capacitance the minimum ignition voltage permitted is 5.9V which is greater than 5.335V, complying with the requirement of intrinsic safety ⅡC, so the spark ignition test is omitted.

The liquid crystal display circuit is connected to measuring board, the maximum voltage is 5.355V, there is no capacitance and inductance in the circuit, complying with the requirement of intrinsic safety ⅡC, so the spark ignition test is omitted.

3.2.2 Apparatus supply and input/output parameters
Ui :30V Ii:93mA Ci:0nF Li: 6μH Pi:0.7W

3.2.3 Protection against polarity reversal
Not applicable.

3.2.4 Resistive spark ignition assessment and tests
The maximum input voltage of the circuit is 30V and the maximum input current is 93mA, the intrinsic safety requirement is complied with, so the spark ignition test is omitted.

3.2.5 Capacitive spark ignition assessment and tests
The distance though casting compound of the test circuit board is less than the requirements of the standard, considering the non-countable fault such as short circuit, the sum of capacitance of the circuit is 42.01μ , the power supply 24V DC is changed to 5V DC though U1(TLVH431). The power supply 5V connects to the triple zener diodes in parallel (1N4733A 5.1V@1W 5%). After zener diodes the maximum voltage is 5.1V×（1+5%）=5.355V, the sum of capacitances is 42.01μF, considering the safety factor of 1.5, for the 42.01 μF capacitance the minimum ignition voltage permitted is 5.9V which is greater than 5.335V, complying with the requirement of intrinsic safety ⅡC, so the spark ignition test is omitted.

3.2.6 Inductive spark ignition assessment and tests
The inductive components in the circuit are L1,L2, and both are 10μH(0.01mH), the maximum current is 93mA, considering the safety factor of 1.5, for the 93mA the inductance permitted is 4mH which is greater than 0.01mH, complying with the requirement of intrinsic safety ⅡC, so the spark ignition test is omitted.

3.2.7 Combination of resistive, capacitive and inductive assessment and tests
Not applicable.

3.2.8 Let-through energy assessment and tests
Not applicable.

3.2.9 Any other spark ignition assessments and tests
Not applicable.

3.3 Thermal ignition assessment and tests
3.3.1 Design of equipment to comply with thermal ignition requirements
The circuit Ui=30V, Ii=93mA, P_{max}=1/4×30V×0.093A=0.7W.

3.3.1.1 The test circuit board is completely encapsulated, and the encapsulating material is Dow Corning organic silicon encapsulating glue, its use temperature range is -45℃~200℃, the maximum input power is 0.7W, complying with group T5.

3.3.1.2 Display board

The display circuit board contains resistors, driver IC and liquid crystal display, though temperature test, complying with temperature class T5. For the test see annex B.1.

3.3.2 Components temperature assessment and tests, including small component ignition test
Though temperature test, it complies with temperature grade T5. For the test see annex B.1.

3.3.3 Wiring temperature assessment and tests
Internal wirings adopt copper conductor, which is inner diameter of 0.5mm and covered by plastic skin, the maximum input power is 0.7W, less than 1W, complying with the temperature grade T5.

3.3.4 Printed board tracks assessment and tests

The material of PCB is FR-4. The thickness of copper foil is 35μ m. The minimum track width is 0.254mm. Ii is 100mA. Pi is 0.7 W, the measuring circuit board is completely encapsulated, complying with temperature group T5.
The power and communication of display circuit board come from measuring board; the maximum input voltage is 5.335V, and the running current is less than 200μ A, considering the maximum input power is 0.7W, less than 1W, complying with the requirement of T5.

3.3.5 Enclosure external temperature assessments and tests
Not applicable.

3.3.6 Service temperature determination and assessment
The measuring circuit board is completely encapsulated, and the encapsulating material is Dow Corning organic silicon encapsulating glue, its temperature tolerance is -45℃~200℃, the maximum input power is 0.7W, complying with group T5.
The display board, though temperature test, complies with temperature class T5.

3.3.7 Any other thermal ignition assessments and tests
Not applicable.

3.4 Segregation requirements
For the 24V part on the circuit board the distance though casting compound is 0.7mm. For the not greater than 5V part on the circuit board the distance though casting compound is 0.254mm. Considering the non-countable fault such as shout circuit, the requirements are complied with. For the details see clause 3.2.5.

3.5 Safety components

3.5.1 Transformers
Not applicable.

3.5.2 Resistors
Not applicable.

3.5.3 Capacitors
Not applicable.

3.5.4 Semiconductors
V1,V2,V3 in the measuring board：SS14, withstand voltage is 40V, greater than 30V, complying with the requirement of IS.

3.5.5 Opto-isolators
Not applicable.

3.5.6 Relays
Not applicable.

3.5.7 Fuses
Not applicable.

3.5.8 Infallible connections
Not applicable.

3.5.9 Infallible windings
Not applicable.

3.5.10 Any other safety components used

Not applicable.

3.5.11 Ratings of safety components

Component designation	Value	Rating used * (W2)	Maximum rating (W1)	W1 / W2	Calculation
Schematic diagram HB-TOP-SCH01					
V5～V27	1N4733A	0.5	1	2	Pmax=0.093A×5.1V×1.05=0.5W

(***** "Rating used" is a term used to describe the maximum voltage, current and/or power which the component may be subjected to when applying the number of faults as prescribed in the Standards)

3.6 Requirements of specific components

3.6.1 Batteries

Not applicable.

3.6.1.a Determination of charge capacity on discharge at normal load

Not applicable.

3.6.1.b Electrolyte leakage during charge with one cell fully discharged or with polarity reversal.

Not applicable.

3.6.1.c Electrolyte leakage during discharge into short circuit

Not applicable.

3.6.1.d Determination of equivalent internal resistance

Not applicable.

3.6.1.e Spark ignition assessment or test

Not applicable.

3.6.1.f Surface temperature test when short circuited

Not applicable.

3.6.1.g Battery container ventilation and pressure test

Not applicable.

3.6.2 Piezo electric devices

Not applicable.

3.6.3 Optical and RF energy

Not applicable.

3.6.4 Safety barriers – assessments and tests

Not applicable.

3.6.5 Simple apparatus

Not applicable.

3.6.6 Determination of parameters of loosely specified components

Not applicable.

3.6.7 Ex components and their mounting method

Not applicable.

3.6.8 Any other components
Not applicable.

4 Results
Comply with the requirements of IEC 60079-0:2007 and IEC 60079-11:2006.

5 Additional information

6 Conditions
6.1 Conditions of manufacture
Not applicable.

6.2 Conditions of safe use
The equipment must be installed and used according to installation drawing in the operating instruction.

7 Schedule
The tests and assessments provided in this report are considered applicable to the following range of equipment:
DLT9000 Displacer Level Transducer

8 Documents
The following documents were assessed in the course of preparing this report. The documents listed give a full and correct specification of the safety aspects of the electrical equipment.

Document No.	Sheets	Document Title	Issue	Date (yyyy/mm/dd)
DLT9000.1.1	1	General drawing	/	2012.1.16
DLT9000.1.1.3.1	1	Connection diagram	/	2012.1.16
HB-TOP-SCH01	1	Measuring Board Circuit Diagram	/	2012.1.16
DLT9000.1.1.2DL	1	Sensor Board Circuit Diagram	/	2012.1.16
DLT9000.4.1.1DL	1	LCD Circuit Diagram	/	2012.1.16
DLT9000.5.1DL	1	Connection Board Circuit Diagram	/	2012.1.16
DLT9000.1.1.2	1	Sensor Board(silkscreen)	/	2012.1.16
DLT9000.4.1.1	1	LCD Silkscreen	/	2012.1.16
DLT9000.5.1	1	Connection Board BOOM	/	2012.1.16
DLT9000.1.1.2-1	1	Sensor Board Layout	/	2012.1.16
DLT9000.4.1.1-1	1	LCD Layout	/	2012.1.16
DLT9000.5.1-1		Circuit Diagram Layout	/	2012.1.16
HB-TOP-PCBBOLY HB-TOP-PCBTOLY	2	Element Arrangement Figure	/	2012.1.16
HB-TOP-PCBTOP HB-TOP-PCBBOT	2	PCB Layout	/	2012.1.16
	3	Components Material List	/	2012.1.16
DLT9000.1.1.3 DLT9000.1.1.4	2	Measuring Board Components Figure and Encapsulation Technology	/	2012.1.16
DLT9000-12	1	Nameplate	/	2012.1.16

SECTION A COMPLIANCE CHECK LISTS

Section A.1

IEC 60079-0:2004 Edition 4 **Electrical apparatus for explosive gas atmospheres - Part 0: General requirements**			
No:	**Heading of clause**	**Report section no., or 'Excluded' or 'No requirement'**	**Notes**
1	Scope	1	Pass
2	Normative references	No requirement	
3	Terms and definitions	No requirement	
4	Apparatus grouping and temperature classification		
4.1	Apparatus grouping	1, 3.1.18 3.2	Pass
4.2	Group II	1, 3.2	N/A
4.2.1	Group II subdivisions	1, 3.2	Pass
4.2.2	Group II – Surface temperature marking	1, 3.1.18, 3.3	Pass
4.2.3	Apparatus for a particular explosive atmosphere	1, 3.1.18	N/A
5	Temperatures		
5.1	Environmental influences		
5.1.1	Ambient temperature	1, 3.1.18, 3.3	Pass
5.1.2	External source of heating or cooling	1, 3.3.1, 6.2	N/A
5.2	Service temperature	3.3.6	Pass
5.3	Maximum surface temperature		
5.3.1	Determination of maximum surface temperature	3.3	Pass
5.3.2	Limitation of maximum surface temperature		
5.3.2.1	Group I electrical apparatus	1, 3.3	N/A
5.3.2.2	Group II electrical apparatus	1, 3.3	Pass
5.4	Surface temperature and ignition temperature	1, 3.3	Pass
5.5	Small components	1, 3.3.2	Pass
6	Requirements for all electrical apparatus		
6.1	General	1, 3, 4	Pass
6.2	Mechanical strength of apparatus	3.1.4, 3.1.5, 3.1.6	N/A
6.3	Opening times	Excluded	N/A
6.4	Circulating currents	3.1.10	N/A
6.5	Gasket retention	3.1.6	N/A
7	Non-Metallic enclosures and non-metallic parts of enclosures		
7.1	General		
7.1.1	Applicability	3.1.1.b	N/A
7.1.2	Specification of materials	3.1.1.b	N/A
7.1.3	Plastic materials	3.1.1.b	N/A
7.2	Thermal endurance	3.1.2	N/A
7.3	Electrostatic charges on external non-metallic materials of enclosures		
7.3.1	Applicability	3.1.12	N/A
7.3.2	Avoidance of a build-up of electrostatic charge	3.1.12, 3.1.18, 6.2	N/A
7.4	Threaded holes	Excluded	
8	Enclosures containing light metals		
8.1	Material composition		
8.1.1	Group I	3.1.1.a	N/A
8.1.2	Group II	3.1.1.a	Pass
8.2	Threaded holes	Excluded	
9	Fasteners	Excluded	
10	Interlocking devices	Excluded	
11	Bushings	Excluded	

IEC 60079-0:2004 Edition 4 **Electrical apparatus for explosive gas atmospheres - Part 0: General requirements**			
No:	**Heading of clause**	**Report section no., or 'Excluded' or 'No requirement'**	**Notes**
12	Materials used for cementing	Excluded	
13	Ex components		
13.1	General	3.6.7	N/A
13.2	Mounting internal to apparatus	3.6.7	N/A
13.3	Mounting external to apparatus	3.6.7	N/A
14	Connection facilities and terminal compartments	Excluded	
15	Connection facilities for earthing or bonding conductors	Excluded	
16	Entries into enclosures		
16.1	General		
16.2	Identification of entries	3.1.6, 3.1.8	N/A
16.3	Cable glands	3.1.6, 3.1.8	N/A
16.4	Blanking elements	3.1.8	N/A
16.5	Conductor temperature	Excluded	
17	Supplementary requirements for rotating electrical machines	Excluded	
18	Supplementary requirements for switchgear	Excluded	
19	Supplementary requirements for fuses	Excluded	
20	Supplementary requirements for plugs and sockets	Excluded	
21	Supplementary requirements for luminaires	Excluded	
22	Supplementary requirements for caplights and handlights	Excluded	
23	Apparatus incorporating cells and batteries	3.6.1	N/A
23.1	Batteries	3.6.1	N/A
23.2	Cell types	3.6.1	N/A
23.3	Cells in a battery	3.6.1	N/A
23.4	Ratings of batteries	3.6.1	N/A
23.5	Mixture of cells	3.6.1	N/A
23.6	Interchangeability	3.6.1	N/A
23.7	Charging of primary batteries	3.6.1	N/A
23.8	Leakage	3.6.1	N/A
23.9	Connections	3.6.1	N/A
23.10	Orientation	3.6.1, 3.1.18, 6.2	N/A
23.11	Replacement of cells or batteries	3.6.1, 3.1.18, 6.2	N/A
24	Documentation	8	Pass
25	Compliance of prototype or sample with documents	2, 3, 8	Pass
26	Type tests		
26.1	General	2, 3, 7, 8	Pass
26.2	Test configuration	3	Pass
26.3	Tests in explosive test mixtures	3	N/A
26.4	Tests of enclosures		
26.4.1	Order of tests		
26.4.1.1	Metallic enclosures, metallic parts of enclosures and glass of parts of enclosures	3.1.4, 3.1.5, 3.1.6	N/A
26.4.1.2	Non-metallic enclosures or non-metallic parts of enclosures	3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.1.6	N/A
26.4.1.2.1	Group I electrical apparatus	3.1.2, 3.1.3, 3.1.4,	N/A

IEC 60079-0:2004 Edition 4 **Electrical apparatus for explosive gas atmospheres - Part 0: General requirements**			
No:	**Heading of clause**	**Report section no., or 'Excluded' or 'No requirement'**	**Notes**
		3.1.5, 3.1.6, 3.1.7	
26.4.1.2.2	Group II electrical apparatus	3.1.2, 3.1.4, 3.1.5, 3.1.6, 3.1.7	N/A
26.4.2	Resistance to impact	3.1.4	N/A
26.4.3	Drop test	3.1.5	N/A
26.4.4	Acceptance criteria	3.1.4, 3.1.5	N/A
26.4.5	Degree of protection (IP) by enclosures		
26.4.5.1	Test procedure	3.1.6	Pass
26.4.5.2	Acceptance criteria	3.1.6	Pass
26.5	Thermal tests		
26.5.1	Temperature measurement	1, 3.1.18, 3.3, 6.2	Pass
26.5.2	Thermal shock test	Excluded	
26.5.3	Small component ignition test		
26.5.3.1	General	3.3.2	Pass
26.5.3.2	Procedure	3.3.2	Pass
26.5.3.3	Acceptance criteria	3.3.2	Pass
26.6	Torque test for bushings	Excluded	
26.7	Non-metallic enclosures or non-metallic parts of enclosures		
26.7.1	General	3.1.1.b, 3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.1.6, 3.1.7	N/A
26.7.2	Temperature during tests	3.3.6	N/A
26.8	Thermal endurance to heat	3.1.2	N/A
26.9	Thermal endurance to cold	3.1.2	N/A
26.10	Resistance to light		
26.10.1	Applicability	3.1.7, 6.2	N/A
26.10.2	Test procedure	3.1.7	N/A
26.10.3	Acceptance criteria	3.1.7	N/A
26.11	Resistance to chemical agents for Group I electrical apparatus	3.1.3	N/A
26.12	Earth continuity	Excluded	
26.13	Surface resistance test of parts of enclosures of non-metallic materials	3.1.12	N/A
26.14	Charging tests		
26.14.1	Introduction	3.1.12	N/A
26.14.2	Principle of the test	3.1.12	N/A
26.14.3	Samples and apparatus	3.1.12	N/A
26.14.4	Ambient conditions	3.1.12	N/A
26.14.5	Conditioning	3.1.12	N/A
26.14.6	Determination of the most efficient charging method		
26.14.6.1	Method A: Rubbing with a pure polyamide cloth (Figure 6)	3.1.12	N/A
26.14.6.2	Method B: Rubbing with a cotton cloth	3.1.12	N/A
26.14.6.3	Method C: Charging by influence with a d.c. high-voltage power supply (Figure 8)	3.1.12	N/A
26.14.7	Assessment of discharge	3.1.12	N/A
26.15	Measurement of capacitance		

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No:	**Heading of clause**	**Report section no., or 'Excluded' or 'No requirement'**	**Notes**
26.15.1	Test procedure	3.1.12	N/A
26.15.2	Acceptance criteria	3.1.12	N/A
27	Routine verifications and tests	6.1	N/A
28	Manufacturer's responsibility		
28.1	Certificate	No requirement	
28.2	Responsibility for marking	No requirement	
29	Marking		
29.1	Location	3.1.18	Pass
29.2	General	3.1.18	Pass
29.3	Different type of protection	3.1.18	Pass
29.4	Order of marking	3.1.18	Pass
29.5	Ex components	3.1.18	N/A
29.6	Small apparatus and Ex components	3.1.18	N/A
29.7	Extremely small apparatus and Ex components	3.1.18	N/A
29.8	Warning markings	3.1.18	N/A
29.9	Cells and batteries	3.1.18	N/A
29.10	Examples of marking[3]	3.1.18	N/A
30	Instructions		
30.1	General	3.1.19	N/A
30.2	Cells and batteries	3.1.19	N/A
Annex A	Ex cable glands	Excluded	
Annex B	Requirements for Ex components	3.6.7	N/A
Annex C	Example of rig for resistance to impact test	3.1.4	N/A

Section A.2

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No:	**Heading of clause**	**Report section no., or 'Excluded' or 'No requirement'**	**Notes**
1	Scope	1	Pass
2	Normative references	No requirement	
3	Terms and definitions	No requirement	
4	Grouping and classification of intrinsically safe apparatus and associated apparatus	1	Pass
5	Levels of protection and ignition compliance requirements of electrical apparatus		
5.1	General	1, 3.1.18, 3.1.19, 3.2.1, 3.2.2, 3.3.1, 3.4, 6.2	Pass
5.2	Level of protection "ia"	1, 3.1.18, 3.2, 3.3, 3.4	N/A
5.3	Level of protection "ib"	1, 3.1.18, 3.2, 3.3, 3.4	Pass
5.4	Level of protection "ic"	1, 3.1.18, 3.2, 3.3, 3.4	Pass
5.5	Spark ignition compliance	3.2	Pass
5.6	Thermal ignition compliance		
5.6.1	General	3.3	Pass
5.6.2	Temperature for small components	3.3.2	Pass
5.6.3	Wiring within apparatus	3.3.3	Pass
5.6.4	Tracks on printed circuit boards	3.3.4	Pass
5.7	Simple apparatus	3.6.5	Pass
6	Apparatus construction		
6.1	Enclosures	3.1.1, 3.1.6	Pass
6.1.1	Apparatus complying with Table 5	3.1.1, 3.1.5, 3.1.6, 3.4	Pass
6.1.2	Apparatus complying with Annex F	3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.1.6, 3.1.7, 3.1.13, 3.4	Pass
6.2	Facilities for connection of external circuits		
6.2.1	Terminals	3.1.8, 3.4	Pass
6.2.2	Plugs and sockets	3.1.8, 3.1.10, 3.4	Pass
6.2.3	Determination of maximum external inductance to resistance ratio (Lo/Ro) for resistance limited power source	3.2.2, 3.2.6	N/A
6.2.4	Permanently connected cable	3.1.8, 3.1.15	N/A
6.3	Separation distances	3.4	Pass
6.3.1	Separation of conductive parts	3.1.14, 3.2.1, 3.3.1 3.4	Pass
6.3.1.1	Distances according to Table 5	3.4	Pass
6.3.1.2	Distances according to Annex F	3.4	Pass
6.3.2	Voltage between conductive parts	3.4	Pass
6.3.3	Clearance	3.1.14, 3.4	Pass
6.3.4	Separation distances through casting compound	3.1.9, 3.1.11, 3.4	Pass
6.3.5	Separation distances through solid insulation	3.1.9, 3.4	N/A
6.3.6	Composite separations	3.4	N/A
6.3.7	Creepage distance	3.1.13, 3.1.14, 3.4	N/A
6.3.8	Distance under coating	3.1.13, 3.4	Pass
6.3.9	Requirements for assembled printed circuit boards	3.1.13, 3.4	Pass
6.3.10	Separation by earth screens	3.1.10, 3.1.14, 3.4	N/A

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No:	**Heading of clause**	**Report section no., or 'Excluded' or 'No requirement'**	**Notes**
6.3.11	Internal wiring	3.1.9, 3.1.17, 3.4	Pass
6.3.12	Dielectric strength requirement	3.1.9	Pass
6.3.13	Relays	3.1.10, 3.1.14, 3.4, 3.5.6	N/A
6.4	Protection against polarity reversal	3.2.3	N/A
6.5	Earth conductors, connections and terminals	3.1.8, 3.1.10	Pass
6.6	Encapsulation	3.1.11	Pass
7	Components on which intrinsic safety depends		
7.1	Rating of components	3.2.2, 3.5.11	Pass
7.2	Connectors for internal connections, plug-in cards and components	3.1.10, 3.1.16	Pass
7.3	Fuses	3.1.11, 3.2.2, 3.5.7, 3.5.11	Pass
7.4	Primary and secondary cells and batteries	3.6.1	N/A
7.4.1	General	3.1.18, 3.1.19, 3.6.1, 6.2	N/A
7.4.2	Electrolyte leakage and ventilation	3.1.11, 3.6.1.b, 3.6.1.c	N/A
7.4.3	Cell voltages	3.2.1, 3.3.1, 3.6.1	N/A
7.4.4	Internal resistance of cell or battery	3.6.1.d	N/A
7.4.5	Batteries in apparatus protected by other means of protection	3.2.1, 3.2.2, 3.5.11 3.6.1, 6.2	N/A
7.4.6	Batteries used and replaced in explosive gas atmospheres	3.1.5, 3.1.11, 3.6.1	N/A
7.4.7	Batteries used but not replaced in explosive gas atmospheres	3.1.5, 3.1.18, 3.1.19, 3.6.1	N/A
7.4.8	External contacts for charging batteries	3.1.8, 3.2.2, 3.6.1	N/A
7.4.9	Battery construction	3.1.11, 3.2.3, 3.6.1	N/A
7.5	Semiconductors		
7.5.1	Transient effects	3.5.4	Pass
7.5.2	Shunt voltage limiters	3.2.8, 3.5.4, 3.5.11	Pass
7.5.3	Series current limiters	3.5.4, 3.5.11	N/A
7.6	Failure of components, connections and separations	1, 3.1.17, 3.2.1, 3.2.5, 3.2.6, 3.3.2, 3.5.11	Pass
7.7	Piezo-electric devices	3.6.2	N/A
7.8	Electrochemical cells for the detection of gases	3.2.1, 3.2.4, 3.2.5	N/A
8	Infallible components, infallible assemblies of components and infallible connections on which intrinsic safety depends	1, 4	Pass
8.1	Mains transformers	3.5.1	N/A
8.1.1	Protective measures	3.5.1, 3.5.7, 3.5.11	N/A
8.1.2	Transformer construction	3.1.9, 3.4, 3.5.1, 3.5.7, 3.5.11	N/A
8.1.3	Transformer type tests	3.1.9, 3.4, 3.5.1, 3.5.11	N/A
8.1.4	Routine test of mains transformers	3.5.1, 6.1	N/A
8.2	Transformers other than mains transformers	3.5.1, 3.5.11, 6.1	N/A
8.3	Infallible windings		
8.3.1	Damping windings	3.5.9, 3.5.11	N/A

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No:	**Heading of clause**	**Report section no., or 'Excluded' or 'No requirement'**	**Notes**
8.3.2	Inductors made by insulated conductors	3.5.9, 3.5.11	N/A
8.4	Current-limiting resistors	3.5.2, 3.5.11	Pass
8.5	Blocking capacitors	3.1.9, 3.5.3, 3.5.11	N/A
8.6	Shunt safety assemblies		
8.6.1	General	3.2.8, 3.5.4, 3.5.7, 3.5.11	Pass
8.6.2	Safety shunts	3.5.4	N/A
8.6.3	Shunt voltage limiters	3.5.4	Pass
8.7	Wiring, printed circuit board tracks, and connections	3.1.13, 3.1.16, 3.5.8	Pass
8.8	Galvanically separating components		
8.8.1	General	3.5.5, 3.5.6	N/A
8.8.2	Isolating components between intrinsically safe and non-intrinsically safe circuits	3.1.9, 3.5.5, 3.5.6, 3.5.11	N/A
8.8.3	Isolating components between separate intrinsically safe circuits	3.1.9, 3.5.5, 3.5.6, 3.5.11	N/A
9	Diode safety barriers		
9.1	General	3.5.4, 3.5.11, 3.6.4, 6.1	N/A
9.2	Construction		
9.2.1	Mounting	3.6.4	N/A
9.2.2	Facilities for connection to earth	3.1.10, 3.6.4	N/A
9.2.3	Protection of components	3.1.1, 3.1.11, 3.6.4	N/A
10	Type verifications and type tests		
10.1	Spark ignition test		
10.1.1	General	3.2, 3.4	Pass
10.1.2	Spark test apparatus	3.2, 3.4, 3.5.8	Pass
10.1.3	Test gas mixtures and spark test apparatus calibration current		
10.1.3.1	Explosive test mixtures suitable for tests with a safety factor of 1.0 and calibration current of the spark test apparatus	3.2	Pass
10.1.3.2	Explosive test mixtures suitable for tests with a safety factor of 1.5 and calibration current of the spark test apparatus	3.2	Pass
10.1.4	Tests with the spark test apparatus		
10.1.4.1	Circuit test	1, 3.2	Pass
10.1.4.2	Safety factors	1, 3.2	Pass
10.1.5	Testing considerations		
10.1.5.1	General	3.2	Pass
10.1.5.2	Circuits with both inductance and capacitance	3.2.7	Pass
10.1.5.3	Circuits using shunt short-circuit (crowbar) protection	3.2.4, 3.2.8	Pass
10.1.5.4	Results of spark tests	3.2	Pass
10.2	Temperature tests	3.3, 3.3.2, 3.3.3, 3.3.4, 3.5.1	Pass
10.3	Dielectric strength tests	3.1.9, 6.1	Pass
10.4	Determination of parameters of loosely specified components	3.6.6	N/A
10.5	Tests for cells and batteries		
10.5.1	General	3.6.1, 3.1.6.1.a	N/A

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No:	**Heading of clause**	**Report section no., or 'Excluded' or 'No requirement'**	**Notes**
10.5.2	Electrolyte leakage test for cells and batteries	3.6.1.b, 3.6.1.c	N/A
10.5.3	Spark ignition and surface temperature of cells and batteries	3.6.1.d, 3.6.1.e, 3.6.1.f	N/A
10.5.4	Battery container pressure tests	3.1.2, 3.1.5, 3.4, 3.6.1.g	N/A
10.6	Mechanical tests		
10.6.1	Casting compound	3.1.4, 3.1.11	N/A
10.6.2	Sealing of components before encapsulation	3.1.11, 3.5.7	N/A
10.6.3	Partitions	3.1.14	N/A
10.7	Tests for apparatus containing piezoelectric devices	3.1.4, 3.6.2, 6.2	N/A
10.8	Type tests for diode safety barriers and safety shunts	3.5.4, 3.6.4	N/A
10.9	Cable pull test	3.1.15	N/A
10.10	Transformer tests	3.1.9, 3.5.1	N/A
11	Routine verifications and tests		
11.1	Routine tests for diode safety barriers		
11.1.1	Completed barriers	3.6.4, 6.1	N/A
11.1.2	Diodes for 2-diode "ia" barriers	3.6.4, 6.1	N/A
11.2	Routine tests for infallible transformers	3.1.9, 3.5.1, 6.1	N/A
12	Marking		
12.1	General	3.1.18	Pass
12.2	Marking of connection facilities	3.1.6, 3.1.8, 3.1.18	Pass
12.3	Warning markings	3.1.18, 6.2	Pass
12.4	Examples of marking	3.1.18	Pass
13	Documentation	3.1.18, 3.1.19, 3.2.2, 6.2, 8	Pass
Annex A	Assessment of intrinsically safe circuits		
A.1	Basic criteria	3.2, 3.3, 3.4	
A.2	Assessment using reference curves and tables	3.2	
A.3	Examples of simple circuits	No requirement	
A.4	Permitted reduction of effective capacitance when protected by a series resistance	3.2.5	
Annex B	Spark test apparatus for intrinsically safe circuits		
B.1	Test methods for spark ignition		
B.1.1	Principle	3.2	
B.1.2	Apparatus	3.2	
B.1.3	Calibration of spark test apparatus	3.2	
B.1.4	Preparation and cleaning of tungsten wires	3.2	
B.1.5	Conditioning of new cadmium disc	3.2	
B.1.6	Limitations of the apparatus	3.2	
B.1.7	Modifications of test apparatus for use at higher currents	3.2	
Annex C	Measurement of creepage distances, clearances and separation distances through casting compound and through solid insulation (informative only)		
C.1	Clearances and separation distances through casting compound and through solid insulation	3.4	
C.2	Creepage distances	3.4	
Annex D	Encapsulation (informative only)		
D.1	Adherence	3.1.11	

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No:	**Heading of clause**	**Report section no., or 'Excluded' or 'No requirement'**	**Notes**
D.2	Temperature	3.1.11	
Annex E	Transient energy test (informative only)		
E.1	Principle	3.2.8	
E.2	Test	3.2.8	
Annex F	Alternative separation distances for assembled printed circuit boards and separation of components		
F.1	General	1, 3.1.6, 3.1.13, 3.1.18, 3.1.19, 3.5.5, 3.5.6	
F.2	Control of pollution access	3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.1.6, 3.1.7, 3.1.11, 3.1.13, 3.1.18, 3.1.19, 3.4, 6.2	
F.3	Distances for printed circuit boards and separation of components		
F.3.1	Level of protection "ia" and "ib"	3.1.11, 3.1.13, 3.1.18, 3.1.19, 3.4, 6.2	
F.3.2	Level of protection "ic"	3.1.8, 3.1.13, 3.1.18, 3.1.19, 3.4, 6.2	

SECTION B: Tests

B.1 Temperature test

Equipment Tested	Displacer Level Transducer LCD
Date of Test	2011\10\13
Standards	Cl.10.2 of IEC60079-11:2006 and Cl. 26.5.1 of IEC 60079-0:2007

B.1.1 Test Procedure

Solder the power input terminal 5.35V DC to lead wires and connect lead wires with DC power supply, measure the maximum surface temperature of the components with thermocouples.

B.1.2 Results

No.	Component No.	Component Name	Type	Test Temperature (℃)	Test Ambient Temperature(℃)	Maximum Ambient Temperature(℃)	Maximum Surface Temperature(℃)
1	R3	resistor	5.1K	22.6	22.1	80	80.5
2	BL	LED	MZPP496A	29.5			87.4
3	U1	Chip	HT16220	28.1			86
4	LCD	Display Screen	YDDC8139 AAFDHPN	25.4			83.3

Though test, the maximum surface temperature is 87.4℃, complying with temperature class T5.

B.2 Test for degree of protection (IP) of cable glands

Equipment Tested	Displacer Level Transducer
Date of Test	2011\06\24
Standards	Cl.26.4.5 of IEC60079-0:2007

B.2.1 Test procedure and result

Dust protection test

Test type: I
Dust protection degree: IP6X
Test duration: 8h
Test result: No ingress of dust

Water protection test

The temperature of the sample tested is 20℃ and the temperature of the water is 18℃.
Water protection degree: IPX6
Water flow: 100L/min
Test duration: 3min
Test result: No ingress of water

B.3 Test and sample photos