ExMC/1227/DV
June 2017

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC SYSTEM FOR CERTIFICATION TO STANDARDS RELATING TO EQUIPMENT FOR USE IN EXPLOSIVE ATMOSPHERES (IECEx SYSTEM)

TITLE: IECEx Assessment Report for the acceptance of Korea Safety Certification Co., Ltd (KSC) as an IECEx Testing Laboratory (ExTL), in the IECEx System, Equipment Scheme, IECEx 02.

INTRODUCTION

This document contains the IECEx Assessment Report for the acceptance of Korea Safety Certification Co., Ltd (KSC) as an IECEx Testing Laboratory (ExTL), in the IECEx System, Equipment Scheme, IECEx 02.

The report is hereby submitted for voting by the ExMC.

Please consider the assessment report and return the completed voting form, a separate Word document, to the Secretariat by **2017 07 06.**

Your speedy response to the voting process will be very much appreciated.

mailto:chris.agius@iecex.com

Chris Agius

IECEx Secretary

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IEC System for certification to standards relating to equipment for use in Explosive Atmospheres (IECEx System)

IECEx Assessment Report Form

IECEx Assessment Report Form for use by IECEx Assessment Teams to report Assessments conducted according to the IECEx Assessment Procedures of

a) Operational Document IECEx OD 003-2 for the Certified Equipment Scheme
b) Operational Document IECEx OD 016 for the Certified Service Facility Scheme
c) Operational Document IECEx OD 022 for the IECEx Conformity Mark Licensing System

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IECEx ExTL assessment report for Korea Safety Certification Co., Ltd (KSC)

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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1 Assessment information

1.1 Type of Body covered by this assessment: <retain appropriate marks>

ExCB for IECEx Certified Equipment Scheme	
ExTL for IECEx Certified Equipment Scheme	✓
ExCB for IECEx Certified Service Facilities Scheme	
ExCB for IECEx Conformity Mark Licensing System	

NOTE 1 ExCB - IECEx Certification Body

NOTE 2 ExTL - IECEx Testing Laboratory

1.2 Type of assessment: <retain appropriate marks>

Pre-assessment for candidate body	
Initial assessment for candidate body	✓
Surveillance	
Re-assessment	
Scope extension	

1.3 Details of body

1.3.1 Country

Korea

1.3.2 Name of body

Korea Safety Certification Co., Ltd (KSC)

1.3.3 Name and title of nominated principal contact

Name	Title	E-mail address
Sanghee Kim	Chief Executive Officer	sh.kim@ksc1.co.kr

1.4 Assessment information

1.4.1 Members of the assessment team

Name	Role (modify as necessary)
Ron Webb	Lead Assessor
Ajay Maira	Expert Assessor

1.4.2 Place(s) of assessment

1106, Cheoinseong-ro, Namsa-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do,17115, Korea

1.4.3 Assessment date(s)

13-14 March 2017

1.5 Application information

Date of application: 11 November 2016

1.6 Scopes

1.6.1 ExCB scope for equipment certification scheme

The Team confirms that the scope of application for this TL matches that of their associated ExCB., namely CML

1.6.2 ExTL scope

Number	Title	Included
IEC 60079-0 Edition 6	Explosive atmospheres - Part 0: Equipment - General requirements	Y
IEC 60079-1 Edition 7	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures “d”	Y
IEC 60079-2 Edition 6	Explosive atmospheres - Part 2: Equipment protection by pressurized enclosure «p»	Y
IEC 60079-5 Edition 4	Explosive atmospheres - Part 5: Equipment protection by powder filling «q»	Y
IEC 60079-6 Edition 4	Explosive atmospheres - Part 6: Equipment protection by oil immersion «o»	Y
IEC 60079-7 Edition 5	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"	Y
IEC 60079-11 Edition 6	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety “i”	Y
IEC 60079-13 Edition 1	Explosive atmospheres - Part 13: Equipment protection by pressurized room 'p'	Y
IEC 60079-15 Edition 4	Explosive atmospheres – Part 15: Equipment protection by type of protection "n"	Y
IEC 60079-18 Edition 4	Explosive atmospheres – Part 18: Equipment protection by encapsulation “m”	Y
IEC 60079-26 Edition 3	Explosive atmospheres - Part 26: Equipment with equipment protection level (EPL) Ga	Y
IEC 60079-28 Edition 2	Explosive atmospheres - Part 28: Protection of equipment and transmission systems using optical radiation	Y
IEC 60079-31 Edition 2	Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure "t"	Y

NOTE 1 Standards shown with an asterisk (*) are superseded standards

NOTE 2 Unless otherwise indicated, earlier editions of standards (even if with a different number) are considered to be covered in the above scope for the purposes of the assessment

1.6.3 ExCB scope for Service Facilities Scheme

Not applicable – ExTL only

1.6.4 ExCB scope for ExMark Scheme

Not applicable – ExTL only

2 Common information

2.1 Legal entity of body

Limited company. Set up in 2010 established as KSC. Two of KSC's member had worked at IECEx CB in Korea more than 7 and 12 years respectively. A member worked as designer of digital and analog circuit in ex-company for 7 years. A member worked as designer of hardware in ex-company for 10 years

2.2 Financial support

Income is primarily from testing and partially from co-ordination of documents preparation for achieving Korean national certificates (KCs) from outside of Korea.

2.3 History

In Nov 2010 Korean Safety Certification Company was established and was located in Incheon city. Korean Safety Certification Company had a total two or three members and was a privately-owned company which aided foreign manufacturers in the preparation of documents for Korean Ex certificates.

In Dec 2013 Korean Safety Certification Co., Ltd., (KSC) was established. At the end of 2015 KSC commenced building a laboratory for Testing at their current site. The new building was opened in the middle of 2016.The site consists of a total enclosed 3,000 m2 area with 660 m2 of available laboratory space.

KSC had established Quality system in accordance with ISO/IEC 17025 and submitted an application for KOLAS accreditation.

KSC had accreditation of KOLAS for Testing Lab .

2.4 Documentation

2.4.1 Quality manual

No.	Contents	Rev.	ISO/IEC 17025
KM-00 KM-0A KM-0B	Table of Contents Terms and definitions Quality Assurance Policy	3 3 1	-
KM-01	Organization and Management	3	4.1
KM-02	Management System	2	4.2
KM-03	Document Control	2	4.3
KM-04	Review of requests and contracts	2	4.4
KM-05	Subcontracting of tests	2	4.5
KM-06	Purchasing services and supplies	2	4.6
KM-07	Service to the customer	2	4.7
KM-08	Complaints	2	4.8
KM-09	Control of nonconforming testing	2	4.9

No.	Contents	Rev.	ISO/IEC 17025
KM-10	Selection and implementation of corrective actions	2	4.11
KM-11	Preventive action	2	4.12
KM-12	Control of records	2	4.13
KM-13	Internal audits	2	4.14
KM-14	Management reviews	2	4.15
KM-15	Technical requirements	2	5.1
KM-16	Personnel	2	5.2
KM-17	Accommodation and environmental conditions	2	5.3
KM-18	Test and calibration methods and method validation	2	5.4
KM-19	Equipment	3	5.5
KM-20	Measurement traceability	3	5.6
KM-21	Sampling	2	5.7
KM-22	Handling of test and calibration items	2	5.8
KM-23	Assuring the quality of test and calibration results	2	5.9
KM-24	Reporting the results	3	5.10

2.4.2 Procedures

There are 28 procedures describing specific functions

2.4.3 Work instructions

There are 40 test methods describing in detail the method for undertaking various tests. These were examined and found to meet the requirements of the IECEx.

2.4.4 Records (including test records where relevant)

Some test results are collected electronically, for example temperature rise by way of a data logger.
Others are collected on electronic forms, together with photographs, if seen to be of benefit.
Samples were viewed and seen to meet the requirements of ISO/IEC 17025, and of the IECEx.

All records were stored electronically, with a hard copy made and signed.

The records are kept permanently in accordance with the quality system. Electronic file is the master and the hard copies are collateral. The manual and procedure, control of records KM-12 and KP-14.

2.4.5 Document change control

Procedure KM03 covers document change control. This was seen to meet the requirements of the IECEx.

KM-03 and KP-04 Control of documents define that the quality manager and technical manager have to check any update of relevant documents; standards, rules, ExTAG Decision sheet etc, monthly. The document is identified with specified number in accordance with both manual and procedure.

2.5 Confidentiality

All staff keep the client's confidentiality according to Quality Manual;KM-01(Organization and management), Prcedure;KP-01(Liability of compensation) KP-02(Independence and participation) and KP-03(Protection of confidential information and property)

2.6 Publications (Hard cover and Electronic)

None

2.7 Recognition and agreements

A signed agreement was sighted covering the agreement with CML, the associated CB

The agreement between Certification Management Limited, CML, GB, and Korea Safety Certification Co., Ltd (KSC) was sighted and is the basis for the operation in the IECEx 02 Scheme. A copy of the agreement is retained by the Secretariat whom has also reviewed this and is satisfied that it meets IECEx requirements

KSC applied for ISO/IEC 17025 accreditation from KOLAS (Korea Laboratory Accreditation Scheme). The audit has been completed, all NCRs cleared and the Accreditation Certificate issued. This is attached as Annex C.

2.8 Internal audit and periodic management review

Internal audit was carried out on December 4, 2016 acc. to Quality Manual; KM-13(Internal audit) and Procedure; KP-15(internal audit). Two NCRs were found, one regarding customer feedback and one regarding correct use of SI units. Corrective action was made for both NCRs.

Management review was carried out on January 18, 2017 acc. to KM-14(Management review) and KP-16(Management review). The effectiveness of the organisation was considered acceptable. IECEx was mentioned together with many pieces of new equipment to support the work.

KSC's plans of internal audit and management review include IECEx documentation from this year. KSC will carry them out based on the latest version of the relevant documents.

2.9 Contracting, subcontracting, use of other labs and use of other locations

No subcontracting for IECEx work is done at the moment but this will be considered as and when necessary. This is controlled by Quality Manual;KM-04(Review of requests and contracts), KM-05(Subcontracting of tests) and Procedure; KP-06(Review of requests and contracts), KP-07(Subcontracting of tests)

For witness testing to OD 024, KP-28 covers this requirement. KP-28, clause 3.27 covers witness and off site tests and makes reference to OD 024. As yet this procedure has not been used but the requirements are fully understood. This meets the requirements of the IECEx

2.10 Training and competence

This is controlled by Quality Manual;KM-16 (Personnel training) and Procedure;KP-17 (Personnel training). The training received for various staff members was reviewed and found to be acceptable. An overall organisation chart was provided as well as an organisation chart for the ExTL. A competency matrix was provided.

2.11 Complaints and appeals (including appeals to IECEx)

Controlled by Quality Manual;KM-08(Complaints) and Prodedure;KP-10(Complaints)
To date, no complaints have been received.

2.12 Special facts to be noted

2.12.1 Supporting documentation

Copies of additional supporting information for this assessment have been provided to the applicant and the IECEx Secretariat. These are included in a site assessment report and include:

- Details of issues raised and how these have been resolved
- Checklist for ISO/IEC 17025
- Completed technical capability document (TCD)
- Photos of the facilities/tests witnessed
- Assessors' notes

2.13 Recommendations

Based on the assessment performed on 13/14 March 2017, KSC is recommended for acceptance in the IECEx scheme as:

- An ExTL in the IECEx Certified Equipment Scheme

	Signed
Ron Webb	**Ajay Maira**
Lead Assessor	**Expert Assessor**

Date: 16 April 2017

3 ExTL for IECEx Certified Equipment Scheme

3.1 Assessment references

a) IECEx02 IECEx Certified Equipment Scheme covering equipment for use in explosive atmospheres – Rules of Procedure

b) IECEx OD003-2 Assessment, surveillance assessment and re-assessment of ExCBs and ExTLs operating in the IECEx 02, IECEx Certified Equipment Scheme

c) IECEx OD009 Issuing of CoCs, ExTRs and QARs

d) ISO/IEC 17025:2005 Edition 2, General requirements for the competence of testing and calibration laboratories

e) IECEx Document OD17 Drawing and documentation guidance

f) IECEx Technical Capability Document (TCD)

g) ExTAG decision sheets (DSs)

NOTE The latest editions of the above documents were applied.

3.2 Candidate ExTL persons interviewed

Name	Position
Sanghee Kim	CEO / Technical Engineer
Daesik Moon	Technical Manager
Hyonggil Kim	Deputy Manager / Technical Engineer
Kwangjin Ka	Manager /Technical Engineer
Yeji Choi	Technical Engineer / Quality Manager

3.3 Associated ExCB(s)

Certification Management Limited (CML), UK

3.4 Organisation

3.4.1 Names, titles and experience of the senior executives

Name	Title	Experience
Sanghee Kim	CEO	14 years / 10 in Ex

3.4.2 Name, title and experience of the quality management representative

Name	Title	Experience
Yeji Choi	Quality Manager	< 1 year

3.4.3 Other employees in ExTL activity

Name	Title/responsibility	Experience in Ex
Daesik Moon	Technical Manager	13 years
Hyonggil Kim	Deputy Manager (Technical Engineer)	4 years
Kwangjin Ka	Manager (Technical Engineer)	1.5 years
Yeji Choi	Technical Engineer / Quality Manager	< 1 year

3.5 Organizational structure

Included as Annex A and Annex B

3.6 Resources

The laboratory and its equipment is located in a building which was opened in July 2016. Previously the office was located in Seoul and the laboratory was located in Incheon city. The present location is entirely suitable. The physical resources are very new and of good quality.

Adequate testing staff and administration staff are available.

3.7 Test reports issued

Number of test reports (ExTRs) issued under for the preceding four years for each type of protection. For new applications these should be for national or regional schemes and for currently accepted bodies IECEx ExTRs should be shown (test reports for other schemes may

Standard numbers	Type of protection or other identifying information	Number of issued reports (ExTRs) (for last 4 years)				
		2013	2014	2015	2016	Total
IEC 60079-1	flameproof				5	5
IEC 60079-2	pressurised		1	1	2	4
IEC 60079-5	powder					
IEC 60079-5	oil				1	1
IEC 60079-7	Increased safety			1	2	3
IEC 60079-11	Intrinsic safety				1	1
IEC 60079-13	Pressurised rooms					
IEC 60079-15	Type ‘n’			2	2	4
IEC 60079-18	encapsulation			1		1
IEC 60079-26	Zone 0				1	1
IEC 60079-28	Optical				1	1
IEC 60079-31	Dust t				4	4

NOTE Above include reports to IEC 60079-0

3.8 National accreditation

KSC have been audited by KOLAS to ISO/IEC 17025 and the certificate and schedule are attached as Annex C. The KOLAS accreditation schedule does not yet include IEC 60079-13 and IEC 60079-26 but these will be added during the next KOLAS visit. Until then KSC will be subject to annual surveillance

3.9 Calibration

Some equipment is calibrated internally using procedure KP-27. Detailed calibration for each piece of equipment is detailed in procedure KR-01

The rest of the equipment is calibrated by KOLAS approved laboratories.

3.10 Uncertainty

Uncertainty calculations have been carried out and recorded.

3.11 Participation in IECEx Proficiency Testing Program

KSC have participated in some of the IECEx Proficiency Testing Programs with the results shown in the table below. They are going to apply for the missing test Programs.

IECEx Proficiency Testing program	Program years	Participated? (Y/N, N/A)	Results in relation to assigned value	Other comments, including whether results are considered satisfactory
Program 1” Explosion pressure”	2011-2012	Y	Result in range of standard deviation of assigned values.	Result were considered satisfactory.

IECEx Proficiency Testing program	Program years	Participated? (Y/N, N/A)	Results in relation to assigned value	Other comments, including whether results are considered satisfactory
Program2 "Spark ignition"	2011-2012	N	-	-
Program 3"Flame Transmission"	2013-2014	Y	PTB have sent the wrong nozzle. So we will take the new nozzle from PTB and retest it.	-
Program 4"Temperature Classification"	2013-2014	Y	Result in range of standard deviation of assigned values.	Result were considered satisfactory.
Program 5"Electrostatic Charge"	2015-2016	N	-	-
Program 6"Intrinsic Safety"	2015-2016	N	-	-

3.12 Comments (including issues found during assessment)

The test facility does not have a means to carry out tests on rotating electrical machines (motors) for Ex e but will utilise the manufacturer's test facility under OD 024.

Several issues were found during the initial visit. The issues included provision of specific procedures and translation of the raw data form the Korean forms into English. These were all subsequently cleared to the satisfaction of the assessment team.

The following tests were witnessed during the assessment visit.

- Measurement of dimensions and flamepaths of flameproof enclosures.
  IEC 60079-0, clause 25
- Flameproof pressure determination (for Group IIC) IEC 60079-1, clause 15.2.2.1
- Use of spark test apparatus IEC 60079-11, clause 10.1.3
- Measurement of surface resistance IEC 60079-0, clause 26.13
- Dielectric strength test on encapsulant IEC 60079-18, clause 8.1.2
- Tests for optical radiation - demonstration of range of test within capability
  IEC 60079-28, clause 5.2.2
- Temperature rise of a luminaire IEC 60079-0, clause 26.5.1.3
- IP6X/X6 test IEC 60529, clauses 13.6.1 and 14.2.6

All tests were performed satisfactorily

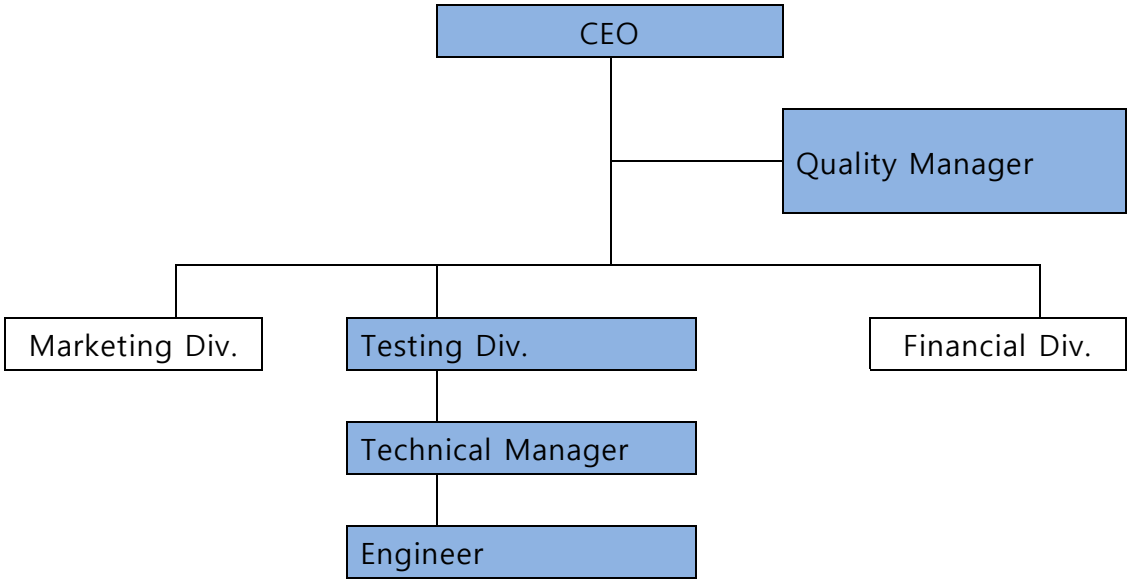
4 Annexes

Annex A Overall Organisation Chart

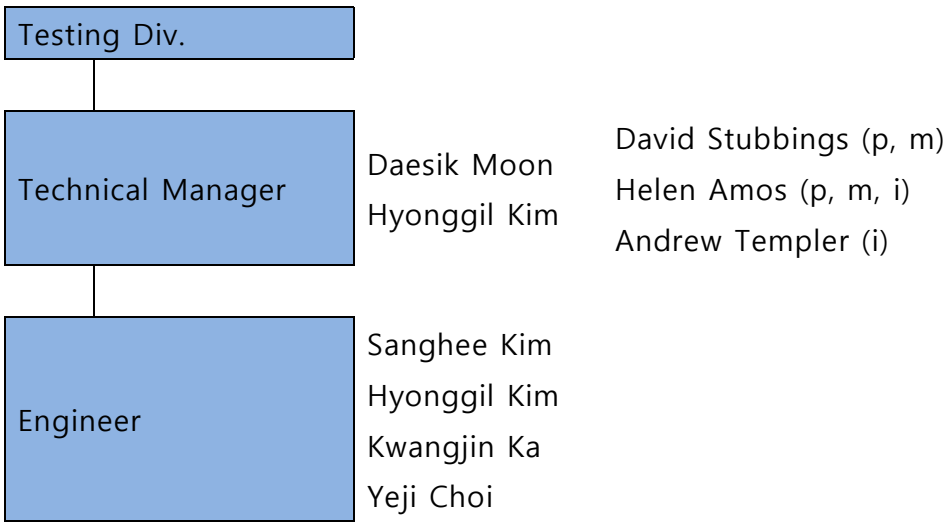
Annex B Organisation Chart of ExTL

Annex C ISO/IEC 17025 certification

Annex A
Overall Organisation Chart



Annex B
Organisation Chart of ExTL



Annex C
ISO/IEC 17025 certificate

Korea Laboratory Accreditation Scheme

CERTIFICATE OF ACCREDITATION

Korea Safety Certification Co., Ltd.

Accreditation No. : KT743

Corporation Registration No. : 120111-0686511

Address of Laboratory : 1106, Cheoinseong-ro, Namsa-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea

date of Initial Accreditation : April 3, 2017

Duration : April 3, 2017 ~ April 2, 2021

Scope of Accreditation : Attached Annex

Date of issue : April 3, 2017

This testing laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025 : 2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated 8 January 2009).

Jung Dong Hee

Administrator
Korea Laboratory Accreditation Scheme

Korea Laboratory Accreditation Scheme(KOLAS) is a signatory of the ILAC mutual recognition arrangement

1/9

Korea Laboratory Accreditation Scheme

No.KT743

03. Electric Test

03.006 Industrial electric equipment

Test method	Standard designation	Test range
KS C IEC 60079-0:2007	Electrical apparatus for explosive gas atmospheres - General requirements <Exception> -26.5.3 Small component ignition -26.10 Resistance to light -26.11 Resistance to chemical agents -26.14 Charging tests	Temp.:(0 ~ 480) ℃ Impact:1 kg, (0.1 ~ 2) m Torque: Max. 340 N · m Temp.,Humid:(-70 ~ 300) ℃, (0 ~ 90 ± 5) % R.H. Surface Resistance: (0.25 ~ 0.5) TΩ Mass: 0.1 mg ~ 252 g, 100 g ~ 200 kg
KS C IEC 60079-1:2012	Electrical apparatus for explosive gas atmospheres - Type of protection "d " <Exception> -10.9.2 Breathing and draining device -15.4.2 Thermal tests -19.3.2 Flammability -Annex B Breathing devices	Reference Pressure: Max. 6894 kPa Overpressure: Max. 6894 kPa
KS C IEC 60079-2:2012	Electrical apparatus for explosive gas atmospheres - Type of protection "p"	Flow rate: Max. 1000 L/min Oxygen analyzer: (0 ~ 100) %
KS C IEC 60079-5:2012	Electrical apparatus for explosive gas atmospheres - Powder filling "q " <Exception> -5.1.4 Dielectric strength test of the filling material	Dielectric strength:1000 V, (0.25 ~ 0.5) TΩ Pressure: Max. 1.5 MPa
KS C IEC 60079-6:2007	Electrical apparatus for explosive gas atmospheres - Oil-immersion "o"	Pressure: Max. 600 kPa

Korea Laboratory Accreditation Scheme

Test method	Standard designation	Test range
KS C IEC 60079-7:2012	Electrical apparatus for explosive gas atmospheres - Increased safety "e " <Exception> -6.3.2.3 Power dissipation of cathodes -6.3.3 Sulphur dioxide test -6.3.4 Vibration test	Dielectric strength: Max. 6 kV Force: (5 ~ 15) N Torque: (0.3 ~ 3) N · m Insulation: Max. 1 MΩ Pull force: Max. 50 N
KS C IEC 60079-11:2007	Electrical apparatus for explosive gas atmospheres - Intrinsically-safe circuits "i " <Exception> -10.7 Small components ignition test -10.12 Diode safety barriers and safety shunts	Gas-Air range:(8.3 ± 0.3) % Methane, (5.25 ± 0.25) % Propane, (7.8 ± 0.5) % ethylene, (21 ~ 60 ± 2) % Hydrogen Force: 30 N Pull test: (30 ~ 50) N Dielectric strength: Max. 6 kV
KS C IEC 60079-15:2007	Electrical apparatus for explosive gas atmosphere- Type of protection "n " <Exception> -Small component ignition, Resistance to light, Charging tests -33.12 Mechanical shock test for batteries -33.14 Additional ignition tests for large or high-voltage machines	Temp.,Humid:(-70 ~ 300) ℃, (0 ~ 90 ± 5) % R.H. Dielectric strength: Max. 6 kV Pressure:-0.3 kPa, 0.4 kPa Torque: (0.3 ~ 2.25) N · m Force: 5 N
KS C IEC 60079-18:2007	Electrical apparatus for explosive gas atmosphere- Encapsulation "m"	Dielectric strength: Max. 6 kV Temp.,Humid:(-70 ~ 300) ℃, (0 ~ 90 ± 5) % R.H. Pressure: Max. 1620 kPa Pull test: (1 ~ 200) N Mass: 0.1 mg ~ 252 g

Korea Laboratory Accreditation Scheme

Test method	Standard designation	Test range
KS C IEC 60079-28:2012	Explosive atmospheres - Part 28: Protection of equipment and transmission systems using optical radiation <Exception> -6.3 Test mixtures -6.4 Tests for pulse trains and pulses between 1 ms to 1 s duration	Energy : 20 μJ ~ 2 J, Power : 10 μW ~ 3 W
KS C IEC 60079-31:2012	Explosive atmospheres- Part 31: Equipment dust ignition protection by enclosure "t"	Pressure: 2 kPa, 4 kPa
KS C IEC 60529:2006	Degrees of protection provided by enclosures(IP Code) <Exception> -14.2.4 a) Oscillating tube	IP24 ~ IP68
IEC 60079-0:2011	Explosive atmospheres—Part0 : Equipment—General requirements <Exception> -25.5.3 Small component ignition test -26.10 Resistance to light -26.11 Resistance to chemical agents -26.15 Verification of ratings of ventilating fans	Temp.:(0 ~ 480) ℃ Impact:1 kg, (0.1 ~ 2) m Torque: Max. 340 N · m Temp.,Humid:(-70 ~ 300) ℃, (0 ~ 90 ± 5) % R.H. Surface Resistance: (0.25 ~ 0.5) TΩ Mass: 0.1 mg ~ 252 g, 100 g ~ 200 kg

Korea Laboratory Accreditation Scheme

Test method	Standard designation	Test range
IEC 60079-1:2014	Explosive atmospheres-Part1:Equipment protection by flameproof enclosures"d" <Exception> -10.9.3 Breathing and draining device -Annex B breathing and draining devices	Reference Pressure: Max. 6894 kPa Overpressure: Max. 6894 kPa
IEC 60079-2:2014	Explosive atmospheres - Part 2: Equipment protection by pressurized enclosure "p"	Flow rate: Max. 1000 L/min Oxygen analyzer: (0 ~ 100) %
IEC 60079-5:2015	Explosive atmospheres - Part 5: Equipment protection by powder filling "q" <Exception> -5.1.3 Dielectric strength test of the filling material	Dielectric strength:1000 V, (0.25 ~ 0.5) TΩ Pressure: Max. 1.5 MPa
IEC 60079-6:2015	Explosive atmospheres -Part 6: Equipment protection by liquid immersion "o"	Pressure: Max. 600 kPa
IEC 60079-7:2015	Explosive atmospheres - Part 7: Equipment protection by increased safety "e" <Exception> -6.2 Rotating electrical machine -6.3.4.3 Power dissipation of cathodes -6.3.5 Sulphur dioxide test -6.3.6 Vibration test -6.6.3 Mechanical shock test -6.6.4 Ventilation of battery	Dielectric strength: Max. 6 kV Force: (5 ~ 15) N Torque: (0.3 ~ 3) N · m Insulation resistance: Max. 1 MΩ Pull force: Max. 50 N

Korea Laboratory Accreditation Scheme(KOLAS) is a signatory of the ILAC mutual recognition arrangement

Korea Laboratory Accreditation Scheme

Test method	Standard designation	Test range
IEC 60079-11:2011	Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i " <Exception> -10.8 Safety shunts	Gas-Air range:(8.3 ± 0.3) % Methane, (5.25 ± 0.25) % Propane, (7.8 ± 0.5) % ethylene, (21 ~ 60 ± 2) % Hydrogen Force: 30 N Pull test: (30 ~ 50) N Dielectric strength: Max. 6 kV
IEC 60079-15:2010	Explosive atmospheres – Part 15: Equipment protection by type of protection "n " <Exception> -22.11 Mechanical shock test for batteries -22.13 high voltage machine Small component ignition, Resistance to light	Temp.,Humid:(-70 ~ 300) ℃, (0 ~ 90 ± 5) % R.H. Dielectric strength: Max. 6 kV Pressure:-0.3 kPa, 0.4 kPa Torque: (0.3 ~ 2.25) N · m Force: 5 N
IEC 60079-18:2014	Explosive atmospheres – Part 18: Equipment protection by encapsulation "m"	Dielectric strength: Max. 6 kV Temp.,Humid:(-70 ~ 300) ℃, (0 ~ 90 ± 5) % R.H. Pressure: Max. 1620 kPa Pull test: (1 ~ 200) N Mass: 0.1 mg ~ 252 g
IEC 60079-28:2015	Explosive atmospheres – Part 28: Protection of equipment and transmission systems using optical radiation<Exception> -6.2 Verification of suitability -6.3 Type tests	Energy : 20 μJ ~ 2 J, Power : 10 μW ~ 3 W
IEC 60079-31:2013	Explosive atmospheres- Part 31: Equipment dust ignition protection by enclosure "t"	Pressure: 2 kPa, 4 kPa

Korea Laboratory Accreditation Scheme

Test method	Standard designation	Test range
IEC 60529:2013	Degrees of protection provided by enclosures(IP Code) <Exception> -14.2.4 a) Oscillating tube	IP24 ~ IP68
BS EN 60079-0:2012	Explosive atmospheres. Equipment. General requirements <Exception> -25.5.3 Small component ignition test -26.10 Resistance to light -26.11 Resistance to chemical agents -26.15 Verification of ratings of ventilating fans	Temp.:(0 ~ 480) ℃ Impact:1 kg, (0.1 ~ 2) m Torque: Max. 340 N · m Temp.,Humid:(-70 ~ 300) ℃, (0 ~ 90 ± 5) % R.H. Surface Resistance: (0.25 ~ 0.5) TΩ Mass: 0.1 mg ~ 252 g, 100 g ~ 200 kg
BS EN 60079-1:2014	Electrical apparatus for explosive gas atmospheres. Flameproof enclosures 'd' <Exception> -10.9.3 Breathing and draining device -Annex B breathing and draining devices	Reference Pressure: Max. 6894 kPa Overpressure: Max. 6894 kPa
BS EN 60079-2:2014	Explosive atmospheres. Equipment protection by pressurized enclosure "p"	Flow rate: Max. 1000 L/min Oxygen analyzer: (0 ~ 100) %
BS EN 60079-5:2015	Explosive atmospheres. Equipment protection by powder filling "q " <Exception> -5.1.3 Dielectric strength test of the filling material	Dielectric strength:1000 V, (0.25 ~ 0.5) TΩ Pressure: Max. 1.5 MPa

Korea Laboratory Accreditation Scheme

Test method	Standard designation	Test range
BS EN 60079-6:2015	Explosive atmospheres. Equipment protection by liquid immersion "o"	Pressure: Max. 600 kPa
BS EN 60079-7:2015	Electrical apparatus for explosive gas atmospheres. Increased safety "e " <Exception> -6.2 Rotating electrical machines -6.3.4.3 Power dissipation of cathodes -6.3.5 Sulphur dioxide test -6.3.6 Vibration test -6.6.3 Mechanical shock test -6.6.4 Ventilation of battery	Dielectric strength: Max. 6 kV Force: (5 ~ 15) N Torque: (0.3 ~ 3) N · m Insulation resistance: Max. 1 MΩ Pull force: Max. 50 N
BS EN 60079-11:2012	Explosive atmospheres. Equipment protection by intrinsic safety "i " <Exception> -10.8 Safety shunts	Gas-Air range:(8.3 ± 0.3) % Methane, (5.25 ± 0.25) % Propane, (7.8 ± 0.5) % ethylene, (21 ~ 60 ± 2) % Hydrogen Force: 30 N Pull test: (30 ~ 50) N Dielectric strength: Max. 6 kV
BS EN 60079-15:2010	Electrical apparatus for explosive gas atmospheres. Type of protection "n " <Exception> -22.11 Mechanical shock test for batteries -22.13 high-voltage machine Small component ignition, Resistance to light	Temp.,Humid:(-70 ~ 300) ℃, (0 ~ 90 ± 5) % R.H. Dielectric strength: Max. 6 kV Pressure:-0.3 kPa, 0.4 kPa Torque: (0.3 ~ 2.25) N · m Force: 5 N
BS EN 60079-18:2015	Explosive atmospheres. Equipment protection by encapsulation "m"	Dielectric strength: Max. 6 kV Temp.,Humid:(-70 ~ 300) ℃, (0 ~ 90 ± 5) % R.H. Pressure: Max. 1620 kPa Pull test: (1 ~ 200) N Mass: 0.1 mg ~ 252 g

Korea Laboratory Accreditation Scheme(KOLAS) is a signatory of the ILAC mutual recognition arrangement

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Test method	Standard designation	Test range
BS EN 60079-28:2015	Explosive atmospheres. Protection of equipment and transmission systems using optical radiation <Exception> -6.2 Verification of suitability -6.3 Type tests	Energy : 20 μJ ~ 2 J, Power : 10 μW ~ 3 W
BS EN 60079-31:2014	Explosive atmospheres. Equipment dust ignition protection by enclosure "t"	Pressure: 2 kPa, 4 kPa
BS EN IEC 60529:2013	Degrees of protection provided by enclosures(IP Code) <Exception> -14.2.4 a) Oscillating tube	IP24 ~ IP68
Notice of Ministry of Employment and Labor 2013-54	Safety certification <Exception> -Annex 6.2 Cl.10 Resistance to light -Annex 6.2 Cl.11 Resistance to chemical agents -Annex 6.2 Cl.14 Charging tests -Annex 7.5 Additional requirements for elements, with non-measurable paths of breathing and draining devices -Annex 9.2 Cl.2 Rotating electrical machines -Annex 11.2 Cl.8 Type tests for diode safety barriers and safety shunts -Annex 14.2 Cl.4 Dielectric strength test of the filling material	Temp.: (0 ~ 480) ℃ Impact:1 kg, (0.1 ~ 2) m Torque: Max.340 N · m Temp.,Humid:(-70 ~ 300) ℃, (0 ~ 90 ± 5) % R.H. Surface Resistance: (0.25 ~ 0.5) TΩ Reference Pressure: Max. 6894 kPa Overpressure: Max. 6894 kPa Flow rate : Max. 1000 L/min Oxygen analyzer: (0 ~ 100) % Dielectric strength: Max. 6 kV Force: (5 ~ 15) N Torque: (0.3 ~ 3) N · m Insulation resistance: Max. 1 MΩ Pull force: Max. 50 N Gas-Air range:(8.3 ± 0.3) % Methane, (5.25 ± 0.25) % Propane, (7.8 ± 0.5) % ethylene, (21 ~ 60 ± 2) % Hydrogen Force: 30 N Pull test: (30 ~ 50) N Mass: 0.1 mg ~ 252 g, 100 g ~ 200 kg

End.