INTERNATIONAL ELECTROTECHNICAL COMMISSION SCHEME FOR CERTIFICATION TO STANDARDS RELATING TO EQUIPMENT FOR EXPLOSIVE ATMOSPHERES (IECEx SCHEME)

Circulation to: Ex Management Committee

Title: IECEx Re-assessment Report for Underwriters Laboratories, UL, an Accepted Ex Test Laboratory (ExTL), and a request for an extension of scope

INTRODUCTION

This document contains the IECEx Re-assessment Report for Underwriters Laboratories, UL, an Accepted Ex Test Laboratory (ExTL). During the re-assessment visit an assessment for an extension of scope was also carried out. ExMC Members are asked to consider UL's request for an extension of scope.

Please complete and return the completed voting form to the Secretariat by 2008 10 30

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

Chris Agius
IECEx Secretariat

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IECEx RE-ASSESSMENT REPORT FOR UL ExTL (IECEx TEST LABORATORY)

Type of Assessment: (please mark)

Re-Assessment of ExTL X

Scope Extension of ExTL X

1. OBJECT AND FIELD OF APPLICATION

1.1. ***Country:***
US

1.2. ***Name of Candidate TL***
Underwriters Laboratories

1.3. ***Members of the Assessment Team***
Jim Munro – Chairman Panel of Assessors – Lead IECEx Assessor
Xu Jianping – Director of NEPSI - IECEx Assessor

1.4. ***Place and Date of Assessment***
Underwriters Laboratories
333 Pfingsten Road
Northbrook, IL 60062-2096

14-15 September 2007 – Jim Munro
20 September 2007 – Xu Jianping

1.5. ***Assessment References***

i) IECEx 02 Third Edition 2006-11 IECEx Scheme rules of procedure
ii) IECEx Operational Document OD 003/V1 IECEx Assessment procedures
iii) IECEx Operational Document OD 009/V1 Issuing of CoCs, ExTRs and QARs
iv) ISO/IEC 17025:2005
v) IECEx Technical Guidance Documents (TGDs)
vi) ExTAG decision sheets (DSs)
vii) Application for scope extension 1November 2007

1.6. Scope of Application (to be selected)
The following was the existing scope of UL at the time of the assessment visit.

Number	Title
60079-0	Electrical apparatus for explosive gas atmospheres Part 0: General requirements
60079-1	Electrical apparatus for explosive gas atmospheres

	Part 1: Construction and verification test of flameproof enclosures of electrical apparatus
60079-2	Electrical apparatus for explosive gas atmospheres Part 2: Electrical apparatus, type of protection 'p' (Pressurization)
60079-5	Electrical apparatus for explosive gas atmospheres Part 5: Powder filling "q"
60079-6	Electrical apparatus for explosive gas atmospheres Part 6: Oil-immersion 'o'
60079-7	Electrical apparatus for explosive gas atmospheres Part 7: Increased safety 'e'
60079-11	Electrical apparatus for explosive gas atmospheres Part 11: Intrinsic safety 'i'
60079-15	Electrical apparatus for explosive gas atmospheres Part 15: Electrical apparatus with type of protection 'n' (Non-Sparking)
60079-18	Electrical apparatus for explosive gas atmospheres Part 18: Encapsulation 'm'
60079-30-1	Explosive atmospheres – Part 30-1: Electrical resistance trace heating - General and testing requirements
61779-1	Electrical apparatus for the detection and measurement of flammable gases Part 1: General requirements and test methods
61779-4	Electrical apparatus for the detection and measurement of flammable gases Part 4: Performance requirements for group II apparatus indicating up to 100% lower explosive limit
61779-5	Electrical apparatus for the detection and measurement of flammable gases Part 5: Performance requirements for group II apparatus indicating a volume fraction up to 100% gas
62086-1	Electrical apparatus for explosive gas atmospheres – Electrical resistance trace heating – Part 1: General and testing requirements

After the assessment visit, UL on 1 November 2007 submitted a request for a scope extension for the following standards:

61241-0	Electrical apparatus for use in the presence of combustible dust Part 0: General requirements
61241-1	Electrical apparatus for use in the presence of combustible dust Part 1: Electrical apparatus protected by enclosures
61241-4	Electrical apparatus for use in the presence of combustible dust Part 4: Type of protection 'pD'
61241-11	Electrical apparatus for use in the presence of combustible dust Part 11: Protection by intrinsic safety 'iD'
61241-18	Electrical apparatus for use in the presence of combustible dust Part 18: Protection by encapsulation 'mD'

1.7. *Candidate TL Persons Interviewed*

These included:

Kerry McManama	General Manager, Global HazLoc, Gas&Oil
Paul Kelly	Lead Operations Manager
Timothy Russell	Quality Manager
Michael Slowinske	Section Manager Hazardous Locations and Head of UL ExTL
Chris Jones	Section Manager, Laboratory
Marcel Hill	Section Manager Technical Support and Calibration

1.8. Legal Entity of The Candidate TL

UL is a not-for-profit incorporated organization. There are bylaws and an Article of incorporation. Copies of these were viewed.

1.9. *Associated ExCB*

The ExCB is integral with the ExTL at the same site.

1.10. *Financial Support*

UL is funded by its testing, certification and other operations.

1.11. History

Underwriters Laboratories Inc. (UL) is an independent, not-for-profit product safety certification organization, whose corporate mission is to serve the public by testing products for safety. UL's principal activity is investigating the safety of many kinds of products, including electrical and electronic equipment and products, mechanical products, building materials, construction systems, fire protection equipment, burglary protection systems and equipment, and marine products. UL also devotes its resources to the development of UL Standards for Safety. These documents contain the safety requirements for products tested by UL. Since the first Standard was developed in 1903, the number of UL Standards for Safety has increased to over 700.

UL was founded in 1894. In the past 113 years, UL has grown to about 6500 employees, some 1000 of which are Engineers. UL's Corporate Headquarters are in Northbrook, Illinois. Additionally, there are four other major domestic testing locations, several local engineering centers, several overseas subsidiaries, and one affiliated laboratory in Canada and also about 200 Inspection Centers. Today, more than 22 billion UL Marks appear on new products annually.

2. ORGANISATION

2.1. Names, Titles and Experience of the Senior Executives

Name	Title	Experience
Kerry McManama	General Manager, Global HazLoc, Gas&Oil	15 years in Ex
Paul Kelly	Lead Operations Manager	14 years in Ex 22 at UL
Michael Slowinske	Section Manager Hazardous Locations and Head of ExTL	12 years in Ex at UL
Chris Jones	Section Manager, Laboratory	28 years in Ex

2.2. Name, Title and Experience of the Quality Management Representative

Name	Title	Experience
Timothy Russell	Quality Manager	33 years at UL over 20 in Quality

2.3. Name and Title of Nominated Principal Contact

Name	Title
Kerry McManama	General Manager, Global HazLoc, Gas&Oil

2.4. Employees

There are 7 verification staff with 90 years total experience with an average of 13 years.

The total number of years of Ex experience of all engineers at UL is 631 years and the average is 10 years.

2.5. Organizational Structure

See Annex 1 for UL overall organization structure and Annex 2 for UL IECEx operation.

3. RESOURCES

UL has a large staff for the Ex field covering evaluation (46), laboratory (6) verification (7) and auditors (2). The above includes an additional 14 new staff who have been recruited over the year prior to the assessment visit and are currently in training. UL has the capability to do all testing covered by standards and so does not do any subcontracting. All the Ex operation is centred at the Northbrook facility, but more broadly based testing, such as for CTI is done elsewhere in UL. The operation is supported by comprehensive procedures and work instructions.

4. DOCUMENTATION

4.1. Quality Manual

There is a global quality manual and under this sits the dedicated global testing laboratory policy manual. There is also a dedicated manual for the IECEx Scheme.

4.2. Test Methods/Procedures

In addition to the above there are a significant number of detailed testing procedures and work instructions, many of which are referenced in the manuals.

4.3. Test Records

Results are captured in a ‘data package’. This document is generated initially by the project handler and serves as a test plan together with the provision to record test results and test conditions. All information is entered directly into the computer system. At this stage there two systems being used but work is progressing to have one integrated system.

4.4. Document Change Control

There is a defined approval process via the electronic system for making changes to documents. Only electronic documents are considered to be controlled. There is an SOP for document management supported by a number of procedures and forms.

5. TEST REPORTS

5.1. Test Reports Issued

Number of ExTRs issued under the IECEx, for the preceding four years for each type of protection:

2007

ExTR	CoC	QAR
Flameproof (d) **7**	Flameproof (d) **7**	Flameproof (d) **5**
Intrinsic Safety (i) **11**	Intrinsic Safety (i) **12**	Intrinsic Safety (i) **4**
Increased Safety (e) **1**	Increased Safety (e) **1**	Increased Safety (e) **2**
		Encapsulation (m) **1**
Heat Tracing **1**	Heat Tracing **1**	Heat Tracing **1**
TOTAL 20	**21**	**13**

2006

ExTR	CoC	QAR
Flameproof (d) **4**	Flameproof (d) **2**	Intrinsic Safety (i) **2**
Intrinsic Safety (i) **22**	Intrinsic Safety (i) **12**	Increased Safety (e) **2**
Increased Safety (e) **5**	Increased Safety (e) **4**	Flameproof (d) **2**
Zone 2 (n) **2**		Encapsulation (m) **1**
Heat Tracing **2**		
TOTAL 35	**18**	**7**

2005

ExTR	CoC	QAR
Flameproof (d) **4**	Flameproof (d) **1**	Flameproof (d) **5**
Intrinsic Safety (i) **12**	Intrinsic Safety (i) **4**	Intrinsic Safety (i) **5**
		Increased Safety (e) **1**
		Zone 2 (n) **1**
		Heat Tracing **1**
TOTAL 16	**5**	**13**

2004

ExTR	CoC	QAR
Flameproof (d) **7**	Flameproof (d) **3**	Flameproof (d) **2**
Intrinsic Safety (i) **10**	Intrinsic Safety (i) **7**	Intrinsic Safety (i) **2**
TOTAL 17	**10**	**4**

There are about 1500 projects involving testing and certification in the Ex field completed each year.

6. CALIBRATION

All calibration is outsourced to accredited laboratories, although internal checks are done. All equipment checked was in calibration. However, some items such as thread gauges

for metric are not in calibrated, although it was advised that all such equipment is gradually being brought into the calibration system. There are other calibrated devises that could be used to check metric threads.

7. CONFIDENTIALITY

Confidentiality is covered in the standards of business conduct. The employee manual has a section in confidentiality. All new employees and long term staff have to sign an agreement that they agree to the confidentiality requirements. An example of a signed confidentiality agreement was viewed. It was advised that existing employees have 'signed electronically' that they agree to the confidentiality requirements.

8. NATIONAL ACCREDITATION

UL holds accreditation from the Standards Council of Canada as a testing laboratory against ISO/IEC 17025. See Annexes 3 and 4.

In addition UL has accreditation from the OSHA, NRTL Scheme which based on ISO/IEC Guide 65 and 17025 and supplemented by their own requirements. Since 13 August 2007 OSHA has been recognising the Zone classification approach of IEC, but it is not yet reflected in the scope for UL.

9. RECOGNITION AND AGREEMENTS

UL is a recognized foreign testing body with Japan. They also have agreements with PTB (DE) and CQST(CN).

10. INTERNAL AUDIT AND PERIODIC REVIEW

During the re-assessment visit a copy of the report for the most recent audit was viewed. This audit occurred from 1 to 2 August 2007. The audits are done against the relevant ISO/IEC standards. There is a comprehensive audit program that covers each area once a year.

The agenda and minutes from the last management review meeting on 10 July 2007 were viewed. These meetings are held annually.

11. COMPLAINTS AND APPEALS (Including appeals to IECEx)

9.5.1 of the IECEx Scheme Manual covers complaints and appeals, including the provision for a complainant to appeal to the IECEx Scheme. There is an IECEx Scheme Service Terms and Conditions document that is provided to customers. This includes reference to their right of appeal to the Scheme.

A complaint that was received from another body about an ExTR was formally deal with through the complaint and CAR processes.

12. SPECIAL FACTS TO BE NOTED

12.1. *Supporting Documentation*

Copies of additional supporting information for this assessment have been provided to the applicant and the IECEx Secretariat. These include:

- A site assessment report
- Details of issues raised and how these have been resolved
- Checklist for ISO/IEC 17025

- Completed technical guidance notes (TGDs) for d, e, gas detectors, i, n, m and dusts.
- Photos of the tests witnessed and some of the facilities

12.2. Tests

The following tests were witnessed:

- IP6X dust testing
- Flameproof pressure determination
- Temperature rise of a luminaire

13. COMMENTS (Including issues found during assessment)

The flowing ExTRs were reviewed:

US/UL ExTR07.0011 - (No CoC issued at the time) for empty flameproof enclosures. This makes reference to IEC certified component plugs. A check of the on-line CoC database showed that such IECEx certified plugs do exist and a check with staff showed that the manufacturer's plugs had been evaluated for compliance with IEC standards.

US/UL ExTR06.033/2 (CoC IECEx UL 03.001 Issue2) - This involved only a minor change to a drawing and so was not reviewed in detail but was satisfactory.

US/UL ExTR06.0036/00 (CoC IECEx UL 06.0010X) - For a signaling device (Ex d and de). This was found to be satisfactory.

US/UL ExTR 07.0003 00 (Ex ia d), US/UL ExTR 06.0036 00(Ex de IIB+H_2 T4) and US/UL ExTR 06.0039 00 (Ex nC IIC T5) were reviewed, and all the original test data were visible by accessing to UL database. They were found to be satisfactory.

There were a number of issues that were identified by the assessment team however these were dealt with by UL to the satisfaction of the assessment team.
They include:

- Validation of the gas-mixing system for flameproof testing and intrinsic safety testing
- Evaluating dust ingress from dust testing
- Clarification regarding suitability of inductors and capacitors for intrinsic safety testing
- Checking of parameters in the spark test apparatus
- Provision of a procedure for calibrating an oxygen analyzer
- Clarification of conditions for temperature rise testing
- Clarification of procedures to cater for changes in standards

The application for scope extension was also considered by the assessors. It was considered that sufficient evidence had been obtained during the assessment visit supported by documentation that was later submitted covering procedures and competency of staff.

14. RECOMMENDATION

Based on the re-assessment performed on 14-15 September 2007 and 20 September 2007, UL is recommended for continued acceptance in the IECEx scheme as an Ex

Testing Laboratory (ExTL) according to the scope of the standards listed in this document together with the addtitional standards sought for the scope extension.

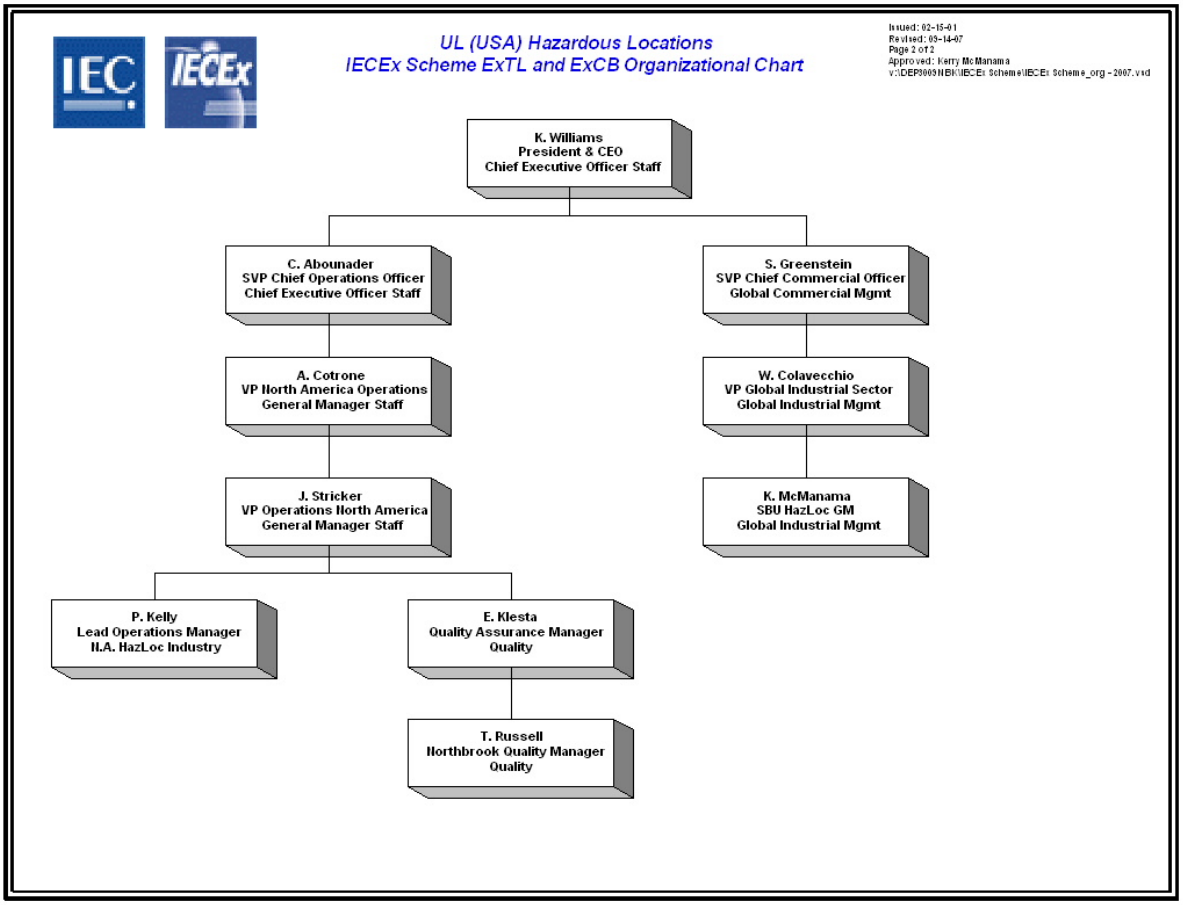
Jim Munro	Xu Jianping
Lead Assessor	Expert Assessor

Date: 11 September 2008

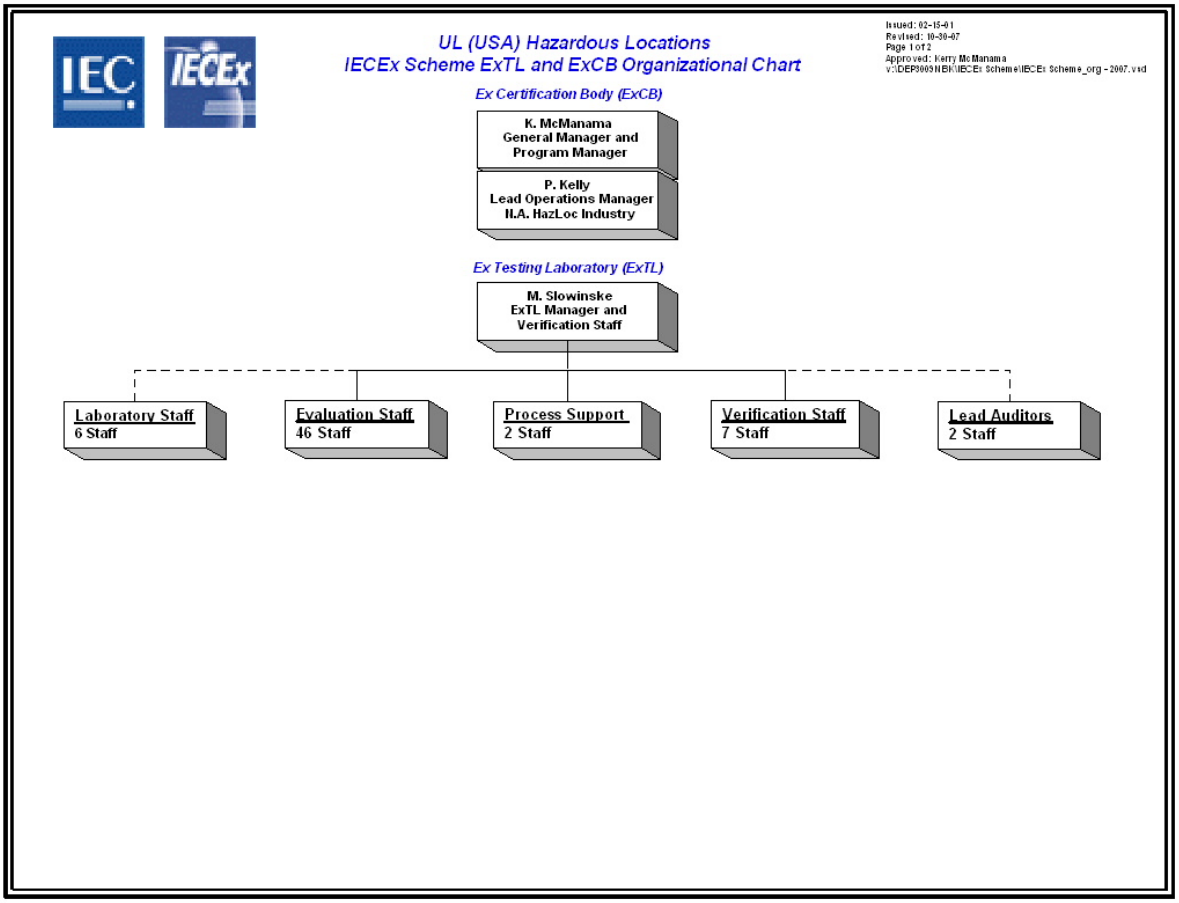
List of Annexes:

1. UL Overall Organization Structure
2. Organization Charts of the UL IECEx Operation
3. Accreditation Certificate from the Standards Council of Canada ISO/IEC 17025
4. Extracts from the Scope for the Accreditation Certificate

Annex 1
UL Overall Organization Structure



Annex 2
Organization Charts of the UL IECEx Operation



Annex 3
Accreditation Certificate from the Standards Council of Canada ISO/IEC 17025

CERTIFICATE OF ACCREDITATION

Standards Council of Canada
Conseil canadien des normes

CERTIFICAT D'ACCRÉDITATION

Underwriters Laboratories Inc.
NORTHBROOK LABORATORIES
333 Pfingsten Road, Northbrook, IL

having been assessed under the authority of the *Standards Council of Canada Act* and found to conform with the requirements of ISO/IEC 17025 and the conditions established by the SCC is hereby recognized as an

ACCREDITED TESTING LABORATORY

for specific tests or types of tests listed in the scope of accreditation approved by the Standards Council of Canada.

ayant été soumis à une évaluation selon la *Loi sur le Conseil canadien des normes* et ayant été trouvé conforme aux prescriptions d'ISO/CEI 17025 et aux conditions établies par le CCN est de fait reconnu comme étant un

LABORATOIRE D'ESSAIS ACCRÉDITÉ

pour les essais ou types d'essais déterminés inscrits dans la portée d'accréditation approuvée par le Conseil canadien des normes.

Accredited Laboratory No.: / Numéro de laboratoire accrédité : 82

Accreditation date: / Date d'accréditation : 1991-10-29

Issued on: / Délivré le : 2004-09-27

Expiry date: / Date d'expiration : 2008-04-29

Chairman (SCC) / Président (CCN)

Assessment performed according to CAN-P-4 (ISO/IEC 17025) and the conditions of the *PALCAN Handbook* D92.6. Laboratories that conform with the requirements of ISO/IEC 17025 operate a Quality Management System for testing and calibration activities that meets the requirements of ISO 9001: 1994 when designing/developing new methods, and/or developing test programs that combine standard and non-standard test and calibration methods; or meets ISO 9002 when only standard methods are used. The scope of accreditation is available from the accredited laboratory or SCC. To verify the validity of the certificate, please see the listing of Accredited Laboratories on www.scc.ca.

Évaluation effectuée conformément du CAN-P-4 (ISO/CEI 17025) et aux conditions du *Guide PALCAN D92.6*. Pour concevoir et développer des méthodes nouvelles et établir des programmes d'essais fondés sur des méthodes d'essai et d'étalonnage normalisées et non normalisées, les laboratoires respectant la norme ISO/CEI 17025 ont, dans leurs essais et leur étalonnage, recours à un système de management de la qualité conforme aux exigences d'ISO 9001: 1994, et à celles d'ISO 9002 dans le seul cas des méthodes normalisées. Pour connaître la portée d'accréditation, s'adresser soit au laboratoire accrédité, soit au CCN. Pour vérifier la validité du présent certificat, consultez la liste des Laboratoires accrédités à l'adresse www.ccn.ca.

This certificate is the property of the Standards Council of Canada (SCC) and must be returned on request; reproduction is prohibited except on written approval of the SCC.
Ce certificat est la propriété du Conseil canadien des normes (CCN) et doit lui être remis sur demande; toute reproduction est interdite sans l'autorisation écrite du CCN.

Canada

Annex 4
Extracts from the Scope for the Accreditation Certificate

Standards Council of Canada
Conseil canadien des normes
200-270, rue Albert St.
Ottawa, ON (Canada)
K1P 6N7
Canada
Tel.: +1 613 238 3222
Fax.: +1 613 569 7808
E-mail/Courriel : info@scc.ca
Internet: http://www.scc.ca

SCOPE OF ACCREDITATION

Underwriters Laboratories Inc.
NORTHBROOK LABORATORIES
333 Pfingsten Road
Northbrook, IL
60062–2096

Accredited Laboratory No. 82
(Conforms with requirements of CAN–P–4E (ISO/IEC 17025:2005))

CONTACT:	Mr. Rick Titus
TEL:	847–664–3281
FAX:	847–313–3281
EMAIL:	rick.a.titus@us.ul.com
CLIENTS SERVED:	Normally internal use only
FIELDS OF TESTING:	Chemical/Physical, Electrical/Electronic, Mechanical/Physical, Thermal & Fire Resistance
ISSUED ON:	2007–07–18
VALID TO:	2011–04–29

IEC 60079−0	Electrical Apparatus for Explosive Gas Atmospheres − Part 0: General Requirements
IEC 60079−1	Electrical Apparatus for Explosive Gas Atmospheres – Part 1: Construction and Verification Test of Flameproof Enclosures of Electrical Apparatus
IEC 60079−11	Electrical Apparatus for Explosive Gas Atmospheres − Part 11: Intrinsic Safety "I"
IEC 60079−1−1	Electrical Apparatus for Explosive Gas Atmospheres − Part 1−1: Flameproof Enclosures "d": Method of Test for Ascertainment of Maximum Experimental Safe Gap
IEC 60079−15	Electrical Apparatus for Explosive Gas Atmospheres − Part 15: Electrical Apparatus with Type of Protection "n"
IEC 60079−18	Electrical Apparatus for Explosive Gas Atmospheres − Part 18: Encapsulation "m"
IEC 60079−2	Electrical Apparatus for Explosive Gas Atmospheres − Part 2: Electrical Apparatus − Type of Protection "P"
IEC 60079−25	Electrical apparatus for explosive gas atmospheres Part 25: Intrinsically safe systems
IEC 60079−26	Electrical apparatus for explosive gas atmospheres Part 26:Construction, test and marking of Group II Zone 0 electrical apparatus
IEC 60079−27	Electrical apparatus for explosive gas atmospheres Part 27: Fieldbus instrinsically safe concept (FISCO) and Fieldbus non−incendive concept (FINCO)
IEC 60079−3	Electrical Apparatus for Explosive Gas Atmospheres – Part 3: Spark−Test Apparatus for Intrinsically−Safe Circuits
IEC 60079−4	Electrical Apparatus for Explosive Gas Atmospheres – Part 4: Method of Test for Ignition Temperature
IEC 60079−5	Electrical Apparatus for Explosive Gas Atmospheres − Part 5: Powder Filling "q"
IEC 60079−6	Electrical Apparatus for Explosive Gas Atmospheres − Part 6: Oil Immersion "o"
IEC 60079−7	Electrical Apparatus for Explosive Gas Atmospheres − Part 7: Increased Safety "e" Except for: 6.3.3 Sulfur Dioxide Explosion Test
IEC 60529	Degrees of Protection Provided by Enclosures (IP Code)
IEC 61241−0	Electrical Apparatus for Use in the Presence of Combustible Dust − Part 0: General Requirements
IEC 61241−1	Electrical Apparatus for Use in the Presence of Combustible Dust − Part 1: Protection by Enclosures "tD"
IEC 61241−11	Electrical apparatus for the use in the presence of combustible dust − Part 11: Protection by intrinsic safety

	"tD"
IEC 61241-1-1	Electrical Apparatus for Use in the Presence of Combustible Dust – Part 1; Electrical Apparatus Protected by Enclosures – Section 1: Specification for Apparatus; CSA-E1241-1-1
IEC 61241-18	Electrical apparatus for the use in the presence of combustible dust Part 18: Protection by encapsulation "mD"
IEC 61241-2-1	Electrical Apparatus for Use in the Presence of Combustible Dust – Part 2: Test Methods – Section 1: Methods for Determining the Minimum Ignition Temperatures of Dust
IEC 61241-2-2	Electrical Apparatus for Use in the Presence of Combustible Dust – Part 2: Test Methods – Section 2: Method for Determining the Electrical Resistivity of Dust in Layers
IEC 61241-2-3	Electrical Apparatus for Use in the Presence of Combustible Dust – Part 2: Test Methods – Section 3: Method for Determining Minimum Ignition energy of Dust/Air Mixtures
IEC 61241-3	Electrical Apparatus for Use in the Presence of Combustible Dust – Part 3: Classification of Areas Where Combustible Dust are or may be Present
IEC 61241-4	Electrical Apparatus for Use in the Presence of Combustible Dust – Part 4: Type of Protection "pD"
IEC 61779-1	Electrical Apparatus for the Detection and Measurement of Flammable Gases – Part 1: General Requirements and Test Methods
IEC 61779-2	Electrical Apparatus for the Detection and Measurement of Flammable Gases – Part 2: Performance Requirements for Group I Apparatus Indicating a Volume Fraction up to 5% Methane in air
IEC 61779-3	Electrical Apparatus for the Detection and Measurement of Flammable Gases – Part 3: Performance Requirements for Group I Apparatus Indicating a Volume Fraction up to 100% Methane in Air
IEC 61779-4	Electrical Apparatus for the Detection and Measurement of Flammable Gases – Part 4: Performance Requirements for Group II Apparatus Indicating a Volume Fraction up to 100% Lower Explosive Limit
IEC 61779-5	Electrical Apparatus for the Detection and Measurement of Flammable Gases – Part 5: Performance Requirements for Group II Apparatus Indicating a Volume Fraction up to 100% Gas
IEC 61779-6	Electrical Apparatus for the Detection and Measurement of Flammable Gases – Part 6: Guide for the Selection, Installation, Use and Maintenance of Apparatus for the Detection and Measurement of Flammable Gases
IEC 62086 1	Electrical Apparatus for Explosive Gas Atmospheres Electrical Resistance Trace Heating Part 1: General and Testing Requirements