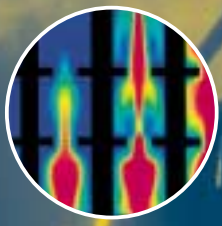


ATEX Pocket Guide

Equipment for potentially explosive atmospheres

BUREAU VERITAS 1828

LCIE

For the benefit of business and people

Introduction

LCIE has produced this booklet to help its clients and provide useful information for manufacturers, technicians, engineers, fitters, marketing staff and end users.

This handy guide has been designed for quick and easy reference. Readers will find concise answers to any queries they may have about the regulations concerning equipment for potentially explosive atmospheres.

To cover certain aspects in more depth, LCIE has also created a number of technical assistance modules, ASSIST PRESS, together with a series of FORMATEX training sessions. These have been developed to provide clients with relevant and up-to-date information.

Contents

Services provided by LCIE

Certification

LCIE is approved by the French Ministry of Industry to certify a wide range of electrical equipment.

Examination in accordance with ATEX 94/9/EC Directive

LCIE is recognized by the European Commission as a notified body (identification no. 0081) for all modules of this directive, and as such may examine equipment, protective systems, components, safety devices, controlling devices and regulating devices.
LCIE is approved by French accreditation committee COFRAC - Laboratory section (Test sector) for tests on equipment for potentially explosive atmospheres (accreditation No. 1-0311).

Special tests or tests to foreign standards

LCIE performs equipment tests to international (IEC) or foreign standards.

In the framework of reciprocal agreements, LCIE carries out verifications and tests according to the standards in effect in the following countries:

- Canada: CSA
- U.S.A.: UL - FM
- Australia: QAS - Test Safe - Simtars
- Brazil: UCIEE
- Argentina: BVA

LCIE is also authorized to perform tests by the Japanese Ministry of Labour (TIIS) by the SIPAI, the CQST, the PCEC (China), and by the KGS (Korea)..

Training

FORMATEX training sessions are regularly run by LCIE or on company premises. The main subjects covered are:

- regulations, protection principles, hazardous areas, use and installation of equipment
- manufacture according to standardized types of protection: d, i, e, p, m, o, q, dust
- Directive 94/9/EC: principle, classification of equipment, conformity assessment procedures, CE marking, specific marking.

The organisation of the training sessions is run by BV.

Services provided by LCIE

Audits, expert analysis, studies, assessment

Fields covered include standardization development, special explosion tests, numerical simulation, risk research (thermodynamics, heat science, mechanics, chemistry, etc.), quality assurance and electrostatics.

Site inspection and control

Inspections which are generally performed on-site are based on the following documents:

- National regulations
- European standards EN 50014 and above
- French standard NFC 15100 (risk BE3)
- European standard EN 60079-14
- International standard IEC 60079.14

Technical assistance

Technical assistance provided by LCIE particularly concerns:

- identification of hazardous areas
- verification of equipment with respect to hazardous areas
- ASSIST PRESS

Fields covered

Under the certification procedure, LCIE examines all types of electrical and electronic equipment in the following fields:

- rotating machines
- transformers
- telecommunications
- detection, measurement, analysis
- control and signalling
- lighting
- electrical connections
- heating

Over 5,000 certificates have been issued, to very different kinds of manufacturers.

Two ATEX directives are existing.

The Directive 99/92/EC concerns the end-users e.g..: Refineries, gas compressing-units.

This Directive stipulates that as of June 2003 new equipment bought by the end user shall be conforming to Directive 94/9/EC. For equipment already in place end-users have three years to assess their Ex safety level in order to determine whether it can be kept in operation as such or need to be updated or partially retested, or replaced. Before starting up, new equipment should have proven their compliance with the 94/9/EC Directive.

It is defined that the zoning responsibility lies on the shoulder of the end-user. This means he must update the zoning of its premises every time a change affecting the zoning occurs e.g.: changing its progress, changing the organisation, of its units, revamping them or putting in operation assemblies that due to their intended use bring their own zoning.

This, of course includes the new assemblies in relation to the conditions that may affect them e.g.: existing zoning, temperature condition.

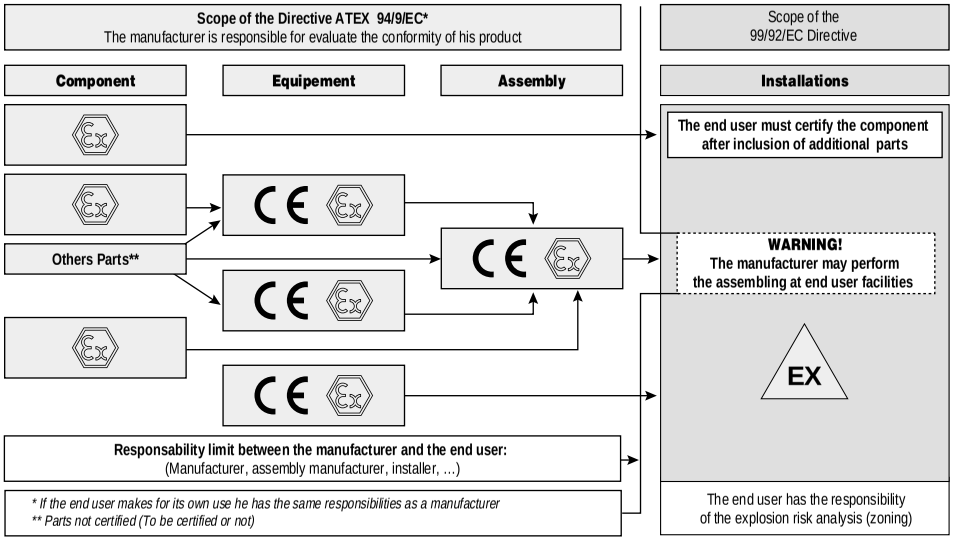
The ATEX 94/9/EC concerns the manufacturers e.g.: of products, of small, medium big size assembly. They have to determine whether their equipment have to be submitted to the Directive. The Directive 94/9/EC ATEX Guide for this Directive gives the way to conduct this assessment.

A manufacturer is the person responsible for the design, the construction and for the progress of certification.

All these tasks may be subcontracted provided the manufacturer keeps the whole responsibility. When producing product or assembly the manufacturer has the duty to determine the conditions applicable to the equipment. When it is a product made in serie, he defines the category applicable to its product. When he produces a specific product, he shall obtain the necessary information (ex. existing zoning), from its customer, who generally is the end-user.

ATEX directives

ATEX assemblies and installations



Standards and types of protection

It is essential to know which standards apply to equipment according to the type of protection chosen.

Each type of protection corresponds to a specific concept.

ELECTRICAL PRODUCTS

Gas			Dusts	
Cenelec	IEC	Type of protection symbol	Cenelec/IEC	Type of protection symbol
EN 60079-0	CEI 60079-0	- general requirements	EN/CEI 61241-0	- general requirements
EN 50015	CEI 60079-6	o - oil immersion	EN/CEI 61241-1	tD - protection by enclosure
EN 50016	CEI 60079-2	p - pressurized apparatus	EN/CEI 61241-4	pD - protection by overpressurization
EN 50017	CEI 60079-5	q - powder filling	EN/CEI 61241-11	iD - protection by intrinsic safe
EN 60079-1	CEI 60079-1	d - flameproof enclosure	EN/CEI 61241-18	mD - protection by encapsulation
EN 60079-7	CEI 60079-7	e - increased safety		
EN 50020	CEI 60079-11	i - intrinsic safety		
EN 60079-15	CEI 60079-15	n - concept category 3 apparatus		
EN 60079-18	CEI 60079-18	m - encapsulation		
EN 62013-1		- cap lights (mines)		
EN 60079-25	CEI 60079-25	syst. – intrinsically safe systems		
EN 50050		- electrostatic spraying equipment		
	CEI 60079-26	- equipment for zone 0		

PRODUITS NON ELECTRIQUES

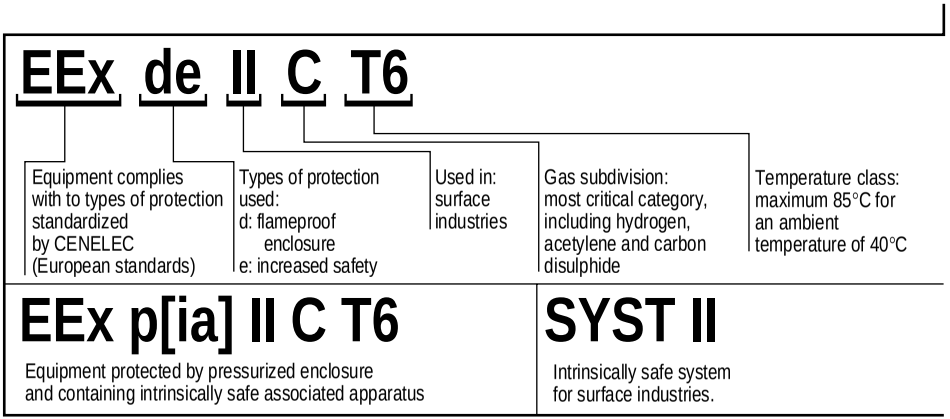
CEN	Type of protection symbol	Concept
EN 13463-1	general requirements	
EN 13463-2	fr	- flow restriction enclosure
EN 13463-3	d	- flameproof enclosure
EN 13463-4	g	- inherent safety
EN 13463-5	c	- constructional safety
EN 13463-6	b	- control of ignition source
EN 13463-7	p	- pressurization
EN 13463-8	k	- liquid immersion

CENELEC: European Committee for Electrotechnical Standardization - **IEC**: International Electrotechnical Commission - **CEN**: European Committee for Standardization

Meaning of marking codes

The Community marking is of fundamental importance as it indicates the suitability of equipment for use in the hazardous areas concerned.

Its full meaning must therefore be understood.



Marking temperatures, gas groups and hazardous areas

To ensure equipment can be safely used in hazardous areas, its gas group must be known and its temperature class must be compared with the spontaneous ignition temperature of the gas mixtures concerned.

Gas groups

Place of use	Group : CENELEC / IEC	Group/class/zone Canada and USA		Representative gas
Mines susceptible to firedamp	I	Gaseous mines		Methane
Surface industries	II A	D-Cl I Div 1/2	II A-Cl I Zone 0/1/2	Propane
	II B	C-Cl I Div 1/2	II B-Cl I Zone 0/1/2	Ethylene
	II C	B-Cl I Div 1/2 A-Cl I Div 1/2	II C-Cl I Zone 0/1/2	Hydrogen Acetylene

Marking temperatures

Temperature class (CENELEC / IEC) Group II	T1	T2	T3	T4	T5	T6
Maximum surface temperature	450°C	300°C	200°C	135°C	100°C	85°C

The maximum surface temperature of equipment must always be lower than the ignition temperature of the gas present in the hazardous area.

Classification of hazardous locations

Explosive atmosphere	Continuous presence	Intermittent presence (normal operation conditions)	Occasional presence (abnormal operation conditions)
IEC,Europe, France	Zone 0 (gas) Zone 20 (dust)	Zone 1 (gas) Zone 21 (dust)	Zone 2 (gas) Zone 22 (dust)
Canada (CEC) [1] USA (NEC) [2]	Cl I Div 1 / Cl I Zone 0 (gas) Cl II Div 1 (dust) Cl III Div 1 (fibres)	Cl I Div 1 / Cl I Zone 1 (gas) Cl II Div 1 (dust) Cl III Div 1 (fibres)	Cl I Div 2 / Cl I Zone 2 (gas) Cl II Div 2 (dust) Cl III Div 2 (fibres)

(1) **CEC** : Canadien Electricity Code / (2) **NEC** : National Electrical Code

Degrees of protection

Full enclosure protection is often required, either in the standards concerning potentially explosive atmospheres or for other specific needs.

Correlation between IP (IEC) and NEMA[1] 250 standards

IP 10	NEMA 1
IP 11	NEMA 2
IP 14	NEMA 3R
IP 52	NEMA 5-12-12K
IP 54	NEMA 3-3S-13
IP 56	NEMA 4-4X
IP 67	NEMA 6-6P

(1) National Electrical Manufacturers Association (US)

Note: enclosures to NEMA standards 7 to 10 concern equipment for hazardous areas.

Enclosure protection indices

IEC 60529

First figure indicates protection against dangerous access and solid foreign objects	Index	IP	Index	Second figure indicates protection against water penetration
Non-protected	0		0	Non-protected
Back of a hand solid objects 50 mm Ø or more	1		1	Vertically falling water drops
Finger solid objects 12.5 mm Ø or more	2		2	Vertically falling water drops when enclosure tilted up to 15°
Tool solid objects 2.5 mm Ø or more	3		3	Spraying water up to 60° from vertical
Wire 1 mm solid objects 1 mm Ø or more	4	5 4	4	Splashing water from any direction
Wire 1 mm Dust-protected	5		5	Jets of water from any direction
Wire 1 mm Dust-tight	6		6	Powerful jets of water from any direction
			7	Immersion
			8	Continuous immersion

For the benefit of business and people

33, av du Général Leclerc - 92260 Fontenay-aux-Roses - France
Tel: +33 1 40 95 60 60 - Fax: +33 1 40 95 86 56
contact@lcie.fr - www.lcie.com

Classification

LCIE is notified for all modules of this new approach Directive (annexes III to IX).
(LCIE identification no. 0081).

Equipment is classified by group and category according to its intended use

	Category of equipment	Inflammable substances	Level of protection	Fault protection	Comparison with present practice and IEC
Apparatus group I (mines)	**M1**	Methane, dust	Very high level	2 types of protection or 2 independent faults	Group I
	M2	Methane, dust	High level	1 type of protection Normal operation	Group I
Apparatus group II (surface)	**1**	Gas, vapours, mist, dust	Very high level	2 types of protection or 2 independent faults	Group II Z 0 (gas) / Z20 (dust)
	2	Gas, vapours, mist, dust	High level	1 type of protection Habitual frequent malfunction	Group II Z 1 (gas) / Z21 (dust)
	3	Gas, vapours, mist, dust	Normal	Required level of protection	Group II Z 2 (gas) / Z22 (dust)

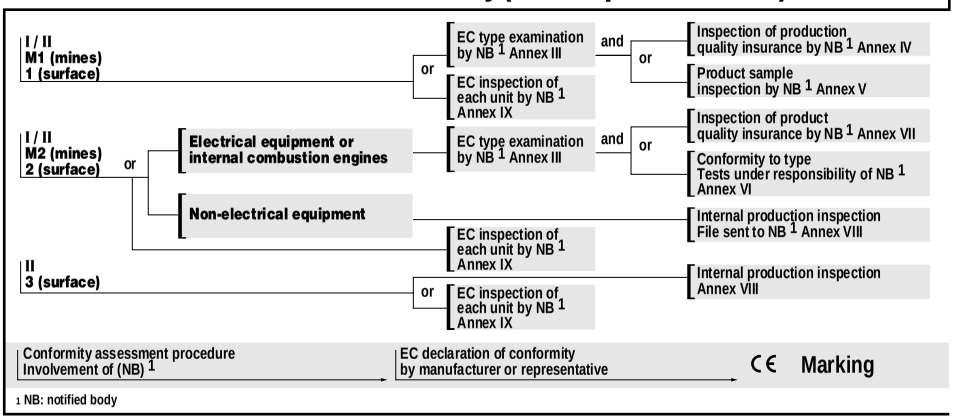
CE Ex ATEX 94/9/EC Directive

Conformity assessment procedures

LCIE is competent to perform EC type examinations and to assess **production and product quality assurance systems.**

For the latter, notified bodies use identical specific reference systems like EN 13980.
These reference standards are based on ISO standards: ISO 9000(1994) or ISO 9001(2000).

Procedures for assessment of conformity (various possible cases)



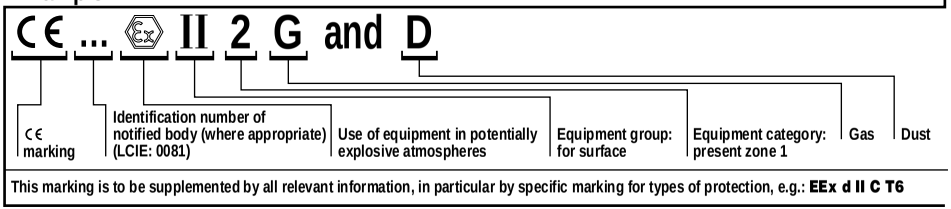
1 NB: notified body

(March 23 1994)

Marking of equipment CE

In addition to the required CE marking, equipment must carry specific marking for potentially explosive atmospheres.

Example



This marking is to be supplemented by all relevant information, in particular by specific marking for types of protection, e.g.: **EEx d II C T6**

Essential safety requirements:

These cover a wide field, fully detailed in annex II of the new Directive.

- ➜ Integrated safety principle
- ➜ Specific conditions of inspection and maintenance
- ➜ Environmental conditions
- ➜ Marking
- ➜ Instructions for use
- ➜ Choice of materials
- ➜ Design and manufacture
- ➜ Potential ignition sources
  - ■ sparks
  - ■ flames
  - ■ electric arcs
  - ■ high surface temperatures
  - ■ acoustic energy
  - ■ radiation: optical, electromagnetic or other sources
- ➜ Risks caused by software
- ➜ Explosive atmospheres caused by the presence of gas, vapours and mist
- ➜ Explosive atmospheres caused by the presence of air-dust mixtures.

Equipment covered by the Directive 94/9/EC must also meet the requirements of the **other relevant Directives**:

- ➜ **Electromagnetic Compatibility Directive (EMC)**
  89/336/EEC, modified by 92/31/EEC and 93/68/EEC
  mandatory application as from January 1, 1996.
  LCIE is a competent and notified body for this directive.
- ➜ **Machinery Directive**
  98/37/EC, 89/392/EEC, modified by 91/368/EEC, 93/44/EEC and 93/68/EEC
  application as from January 1, 1995.
  LCIE is a notified body (B1-B2 safety components)

Other Directives must also be taken into account in certain cases, such as those concerning simple pressure vessels (87/404/EEC) and gas appliances (90/396/EEC), along with others presently being drawn up. It should be noted that the Low Voltage Directive (73/23/EEC, modified by Directive 93/68/EEC) explicitly excludes equipment for potentially explosive atmospheres. Manufacturers must nevertheless guarantee that their equipment fully complies with current safety regulations. The rules defined in the Low Voltage Directive may serve as a guideline.

LCIE provides certification and assessment for companies all around the world

... Belgium - Canada - Denmark - European Union - Finland France - Germany - Hungary - Indonesia - Italy - Japan The Netherlands - Norway - Russia - Singapore - Sweden Switzerland - United Kingdom - USA ...

... 3M France - ABB - ABB Process Analytics - Air Liquide - Alfa Laval Alstom/ACEC - Ametek - A puissance 3 - ASCO - Atlas Copco - Atochem A.T.X. - Auxitrol - Balston - Barksdale - Bartec - Bovar - BP - Butagaz Capri Codec - CDF Chimie - CEA - Cégélec - CE Nancy - Cetal - Ciba Geigy Clemessy - Cray Valley - Crouzet - DCAN - DTS - Du Pont de Nemours - Ecans Eckardt - EI - ELF - Elsag Bailey - Endress & Hauser - Enraf - Entrelec Esso - Etirex - Exxon - Fillon Pichon - FIR - Fisher Controls - Fluidystème Foster Wheeler - Foxboro - Gaz de France - GEC Alsthom - Georgin - Gorse GTIE - Hartmann & Braun - Haver & Boecker - Hewlett Packard - Hoechst Honeywell - Icare - ICI - IFP - Intertechnique - Jeumont Schneider Joucomatic - KEM - Kestner - Kienzle - Kodak Pathé - Krohne - KSB - Landia Leroy Somer - Le Las - Litwin - L'Oréal - Lorilleux - Mc Dermott Mannesman - Maréchal - Masoneilan - Matsushima - Merlin Gérin - Mettler Mobil Oil - Montabert - Motorola - Naphtachimie - Nippon Steel - Nuovo Pignone Otic Fisher et Porter - Parker - Peperl und Fuchs - Petrel - Philips - Pompes Mouvex - Primagaz - Procon - Raychem - Rhône Poulenc - Rolls Royce Rosemount Analytical - Rotork - Roussel Uclaf - Saab Marine - Sammode Sanofi - Saunier Duval - SBM - Schulz und Heinisch - Sereg Schlumberger Serete - SFIM - Shell - Sicme Motori - Siemens - SNPE - Sogelerg Solar Turbines - Solvay - Sony - Souriau - SPIE Trindel - Stahl - Technip Technor - Télémécanique - Telxon - Thermodyn - Thermon France - Tokheim Total - Tuboméca - VeederRoot - Whessoe Varec - Woodward Governor Yaskawa...

Industry trusts these companies...
They have all trusted LCIE...
Join them in full confidence...

We certify and evaluate

Services offered by LCIE

Testing according to foreign standards

- CSA, UL, FM, BS, IEC, MIL, others.

Certification / EC type examination

- Equipment, assemblies, systems, components.

Audits, surveys, studies, assessments, training

- Quality insurance, standardization development, risk analysis, zoning, site inspection, electrostatics, special explosion tests. FORMATEX sessions, at LCIE or on site.

Technical assistance

- Certification procedures.
- Identification of standards.

Further information:

Customer Service Department
ATEX Contact:

Tel : **+33 1 40 95 63 11**
Fax : **+33 1 40 95 89 37**

www.lcie.com

Services offered by LCIE

Index

Notes

Notes

Notes

Notes

Notes

Notes

This booklet has been prepared with care and the information provided in it is given in good faith.

LCIE cannot be held responsible for any errors or omissions it may contain.

The use or interpretation of the information contained in this booklet is the sole responsibility of the user.