

”Quick Introduction” to: **DANISH TECHNOLOGICAL INSTITUTE**

The Danish Technological Institute is a self-owned and not-for-profit institution.

We develop, apply and disseminate research- and technologically-based knowledge for the Danish and International business sectors.

As such, we participate in development projects, which are of use to society in close collaboration with leading research and educational institutions both in Denmark and abroad.

On top of this, we carry out consultancy and standardisation services, which contribute to a dynamic and harmonious development of society.

ATEX Certification

Danish Technological Institute’s department Certification & Inspection is an independent accredited inspection body in Denmark (Notified Body - ExNB) for electrical and none-electrical equipment Ex-equipment (Notified Body nr. 0396) and is authorised to issue ATEX certificates for equipment to be used in potentially explosive atmospheres (Ex atmospheres).

Danish Technological Institute can issue the following certificates in accordance with Directive 2014/34/EU:

- ✓ **EU Type Examination Certificate** – in accordance with Appendix III
- ✓ **EU Unit Verification Certificate** – in conformity with Appendix IX
- ✓ **EU Product Verification** – in conformity with Annex V
- ✓ **Internal Production Control** – in conformity with Appendix VIII

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ATEX - GUIDE

A short introduction to ATEX Terminology



What is Ex-equipment / areas?

Electrical or non-electrical equipment used in an area where there is a risk of presence of a flammable atmosphere (gas or dust) - are popularly called "Ex-equipment" or equipment for use in Hazardous Areas.

Ex-equipment are typically used in places like:

- The chemical industry
- Oil refineries
- Off shore installations (platforms)
- Filling stations
- Tunnels/ sewers/ drains
- Milling industry/ printing-house / painting industry
- Farmer's installations
- Mining industry

Scope of the ATEX Directive 2014/34/EU

The Directive covers Electrical and Non-electrical equipment!

- "Equipment": Machines, apparatus, instruments, fixed or mobile devices, control components and so on.
- "Protective systems": e.g. equipment that can stop or delay an explosion
- "Components": Essential parts for the safety but with no autonomous function.
- Safety control and regulation equipment intended to be used outside the Ex-area - but with a function, that secures the safety in the Ex-area.

Frequently used Standards - (not complete)

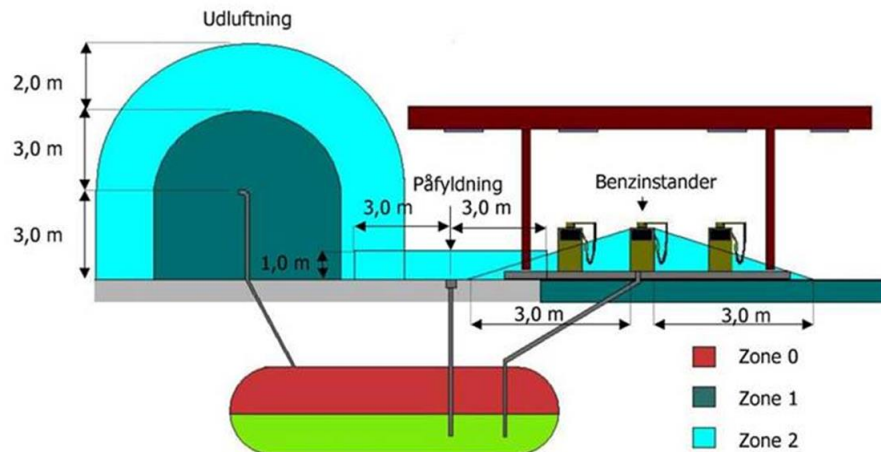
Electrical / Non-Electrical – Installation – Quality Requirements etc.

Protection Principles (Gas areas)	Standards
General Requirements	EN 60079-0
Oil Immersion – "o"	EN 60079-6
Pressurized Apparatus – "p"	EN 60079-2
Powder Filling – "q"	EN 60079-5
Flameproof Enclosure – "d"	EN 60079-1
Increased Safety – "e"	EN 60079-7
Intrinsic Safety – "i"	EN 60079-11
Encapsulation – "m"	EN 60079-18
Field Bus Concept (FISCO)	EN 60079-27
Laser Optics/radiation	EN 60079-28
Intrinsically Safe Systems	EN 60079-25
Zone 0 Standard Equipment with equipment protection level (EPL) Ga	EN 60079-26
Zone 2 Standards: Type "n" Protection	EN 60079-15
Dust Standards	
Dust – General requirements	EN 60079-0
Protection by intrinsic "iD"	EN 60079-11
Encapsulation in dust "mD"	EN 60079-18
Protection by enclosure "tD"	EN 60070-31
Construction & test	
Classification of dust areas	EN 60079-10
Non-Electrical	
Basic concepts and methodology	EN 1127-1
Basic Requirements	EN 13463-1
Non-electrical protection principles	EN 13463-2 to -8
Group II engines	EN 1834-1
Petrol filling stations	EN 13012
ATEX Quality Requirements	EN 80079-34
Installations	EN 60079-14
Installations/Inspection/maintenance	EN 60079-17
Equipment repair, overhaul, and reclamation	EN 60079-19
Classification of hazardous areas	EN 60079-10

Places to find Ex-information / current Harmonized Standards:

<http://www.teknologisk.dk/ydelsler>
<http://ec.europa.eu/growth/sectors/mechanical-engineering/atex/>
<http://ec.europa.eu>
<http://eur-lex.europa.eu>
<http://www.ds.dk>

Example of Zone Classification (Filling Station)



Jf. Brandteknisk vejledning nr. 19

Remark:

- ▶ In **Zone 0** – Ex-equipment must be designed for **Category 1** use
- ▶ In **Zone 1** – Ex equipment must be designed for **Category 2** use
- ▶ In **Zone 2** – Ex equipment must be designed for **Category 3** use

IP Classification's – Ingress Protection to EN 60529

Definition 1 st code index	Code	IP Class	Code	Definition 2 nd code index
No protection	0	Example: IP 5 6	0	No protection
Objects greater than D: 50 mm	1		1	Vertically falling water drops
Objects greater than D: 12,5 mm	2		2	75° to 90° vertically falling water
Objects greater than D: 2,5 mm	3		3	Spraying water 60° from vertical
Objects greater than D: 1 mm	4		4	Splashing water from any direction
Dust protected	5		5	Water jets from any direction
Dust-tight	6		6	Powerful jets from any direction
			7	Protection at immersion
			8	Protected at continuous immersion

(D = Diameter)

Exclusions from the ATEX Scope

- Medical devices intended for use in medical environment.
- Equipment and protective systems intended to for use in relation with unstable chemical substances.
- Equipment intended to for use in domestic and non-commercial environments where flammable atmosphere is only a result of accidents.
- Personal protective equipment covered by Directive 89/686/EEC. Seagoing vessels and mobile offshore units together with equipment on board such units.
- Means of transport i.e. vehicles, trailers, planes used for transportation. (Vehicles used in potential explosive atmosphere are not excluded).

Essential Health and Safety Requirements Annex II of Directive 2014/34/EU

- Principle of integrated safety
- Specific conditions of inspection and maintenance
- Environmental conditions
- Marking
- Instructions for use
- Choice of materials
- Design and manufacture
- Risk caused by software
- Ex atmospheres caused by the presence of gas, vapours and mist.
- Explosive atmospheres caused by presence of air-dust mixtures.
- Potential ignition sources:
 - Sparks, flames, electric arcs
 - High surface temperatures
 - Acoustic energy, radiation: optical,
 - Electromagnetic or other sources

Classification by Group and Category according to intended use - **Surface industry** (not mining)

Area	Category of Equipment to ATEX Definitions	Presence or Duration of Explosive Atmosphere	Level of Protection Faults to Allow for	Comparison with Present Practice
Equipment Group II (surface industry)	1	Continuous presence Long Periods Frequent	Very high level of protection: 2 types of protection or 2 independent faults	Group II Zone 0 (gas) Zone 20 (dust)
	2	Likely to occur	High level of protection: 1 type of protection. Habitual frequent malfunction	Group II Zone 1 (Gas) Zone 21 (dust)
	3	Unlikely to occur Present for a short period	Normal protection: Required level of protection.	Group II Zone 2 (gas) Zone 22 (dust)

Inflammable substances for all 3 Categories can be Gas, Vapours, Mist, or Dust

Temperature Classes – (T-class)

	T1	T2	T3	T4	T5	T6
Maximum Surface temperature of equipment – taking the maximum Ambient temperature into account.	450 °C	300 °C	200 °C	135 °C	100 °C	85 °C

To ensure Ex-equipment can be safely used, the Gas Group must be known and the Temperature Class must be compared with the spontaneous temperature of the present flammable atmospheres.

GENERAL ELECTRICAL PROTECTION CONCEPTS						
EN / IEC STANDARD		Code		Protection Principle	ZONE	
Gas	Dust	Gas	Dust		Gas	Dust
60079-0				General Requirements		
60079-1		Ex da Ex db Ex dc		Flameproof	0 (gas sensors) 1 2	
	60079-31		Ex ta Ex tb Ex tc	Enclosure		20 21 22
60079-2			Ex pxb Ex pyb Ex pzc	Pressurized	1 1 2	21 22
60079-5		Ex q		Powder Filling	1	
60079-6		Ex o		Oil Filled	1	
60079-7		Ex e		Increased Safety	1	
60079-11			Ex ia Ex ib Ex ic	Intrinsic Safety	0 1 2	20 21 22
60079-15		Ex nA EX nR Ex nC		Non-sparking Restricted breathing Enclosed break	2	
60079-18			Ex ma Ex mb Ex mc	Encapsulation	0 1 2	20 21 22

Marking Plate Minimum requirements (example)

Explo United Inc.
Bethoven Road 15
21759 Buchs

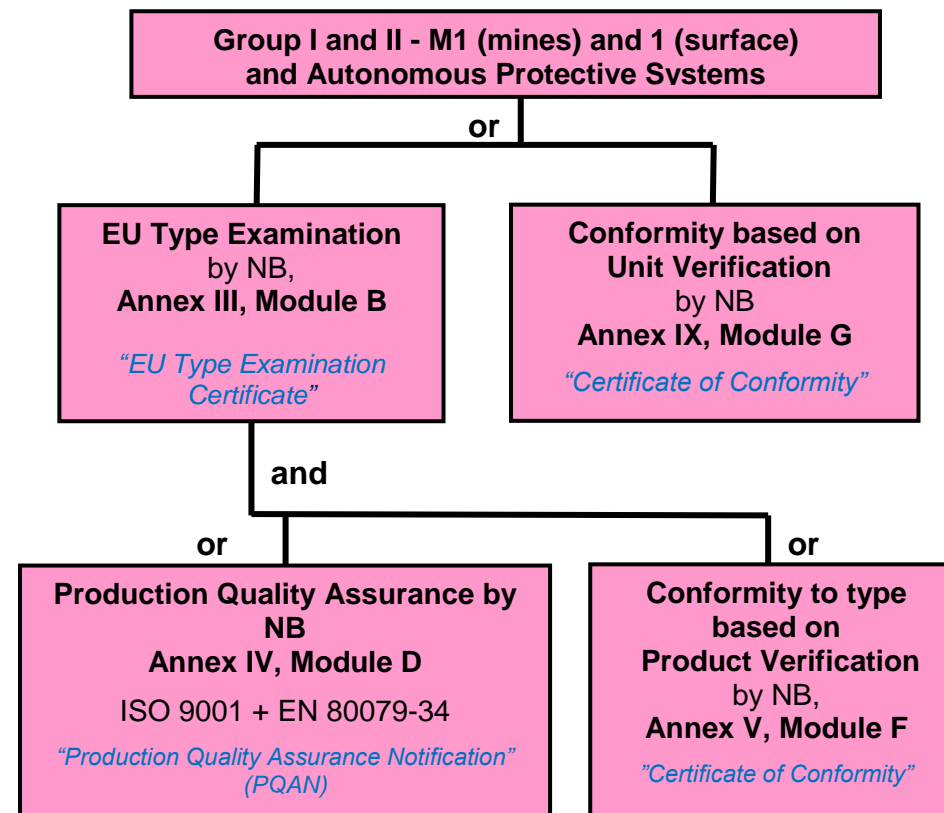
Load Cell Type: 1709Ex, series 041116
 CE 0396 Ex II 1G, DTI 16 ATEX 1234X

Ex ia IIC T4
 Ui: 28 V, Ii: 98 mA
 Ci.: 10 nF. Li: 0 mH. Pi: 0.85 W

Explosion Groups – Temperature Classification according to MESG (Maximum Experimental Safety Gap)			
Temperature Class	IIA > 0,9 mm	IIB ≤ 0,9 to 0,5 mm	IIC < 0,5 mm
T1 > 450 °C	Acetone Ammonia Benzene – pure Acetic acid Ethane Ethyl chloride Carbon monoxide Methane Methanol Methylene chloride Naphthalene Phenol Propane Toluene	Town gas	Hydrogen
T2 >300... ≤ 450 °C	Ethyl alcohol i-amyl acetone n-butane n-butyl alcohol Cyclohexane Acetic anhydride	Ethylene Ethylene oxide	Ethine (acetylene)
T3 >200... ≤ 300 °C	Petroleum spirit – gen. Diesel fuel Jet propulsion fuel Heating fuel DIN 51603 n-hexane	Ethylene glycol Hydrogen sulphide	
T4 >135... ≤ 200 °C	Acetaldehyde	Ethyl ether	
T5 >100... ≤ 135 °C			
T6 >85... ≤ 100 °C			Carbon bisulphide

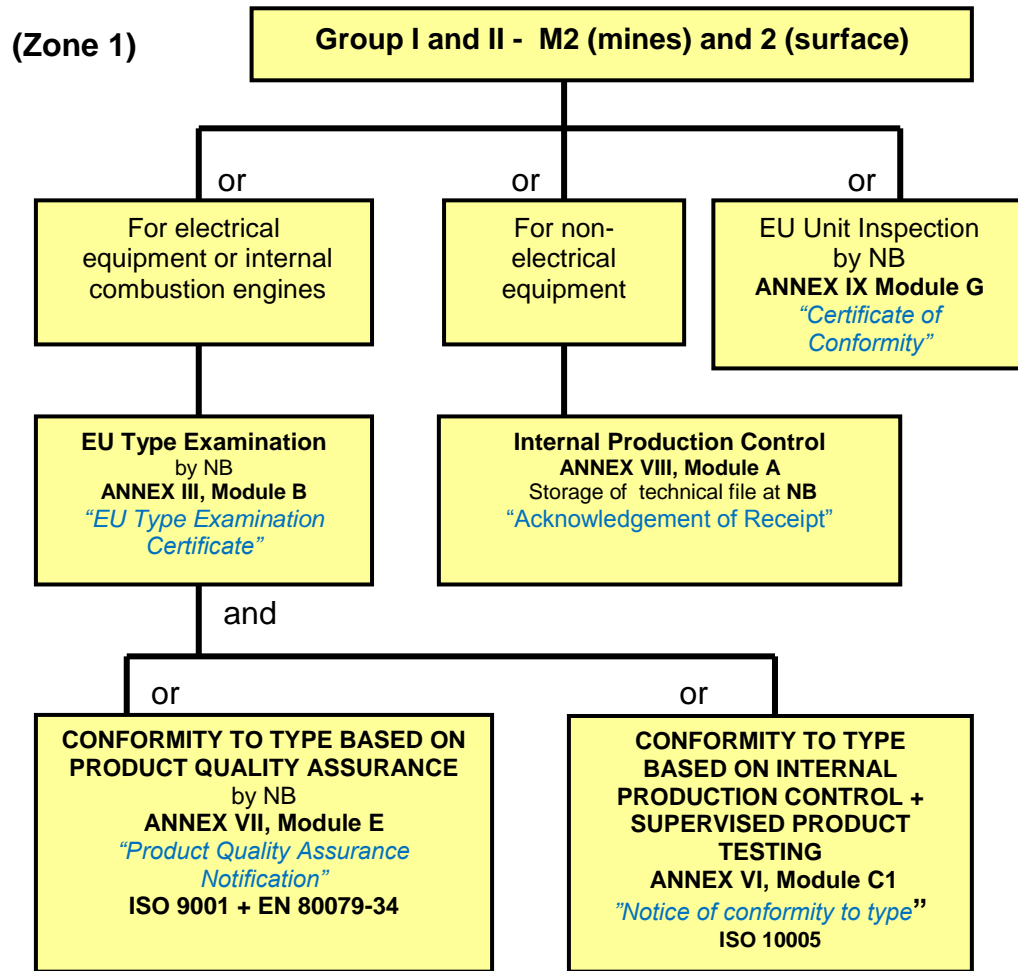
Conformity assessment procedure - Equipment-Category 1 and M1

(Zone 0)



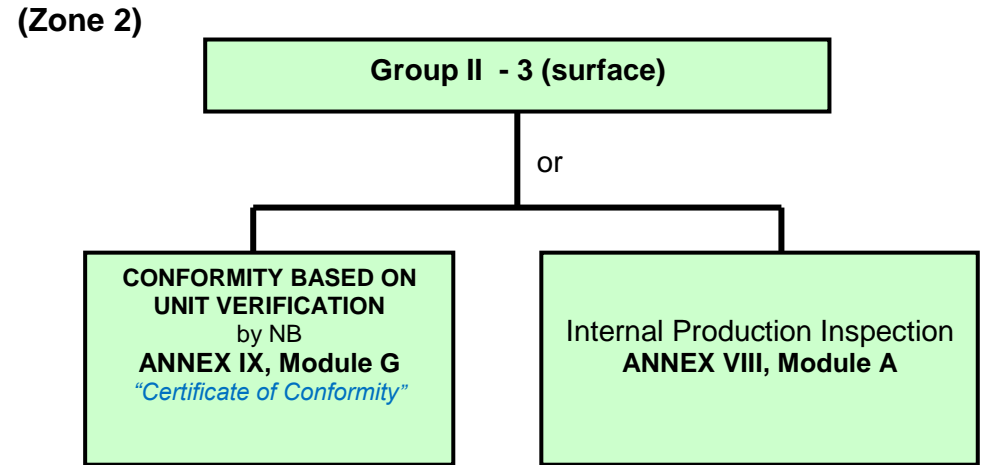
NB: Notified Body

Conformity assessment procedure, equipment-category 2 and M2



NB: Notified Body

Conformity assessment procedure, equipment-category 3



Marking of equipment to 2014/34/EU

In addition to the required CE marking, equipment must carry specific marking for potentially explosives atmospheres:

