

An aerial view of a large offshore oil rig in the middle of the ocean. The rig is a complex of steel structures, including a central processing platform, various cranes, and a tall derrick on the right. The sea is a deep blue, and the sky is overcast with grey clouds.

ATEX GUIDE

A SHORT GUIDE TO ATEX TERMINOLOGY

EQUIPMENT FOR USE IN FLAMMABLE
ATMOSPHERES - DIRECTIVE 2014/34/EU



DANISH
TECHNOLOGICAL
INSTITUTE

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.

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

FREQUENTLY USED STANDARDS

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 Safety “i”	EN 60079-11
Encapsulation in dust “m”	EN 60079-18
Protection by enclosure “t”	EN 60079-31
Classification of dust areas	EN 60079-10-2

Protection Principles (Gas areas)	Standards
Non-Electrical	
Basic concepts and methodology	EN 1127-1
Basic Requirements	EN 80079-36
Non-electrical protection principles	EN 80079-37
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 60079-10-1
Protective Systems	
Explosion resistant equipment	EN 14460
Dust explosion venting protective systems	EN 14491
Explosion isolating systems	EN 15089

Places to find Ex-information / current Harmonized Standards:

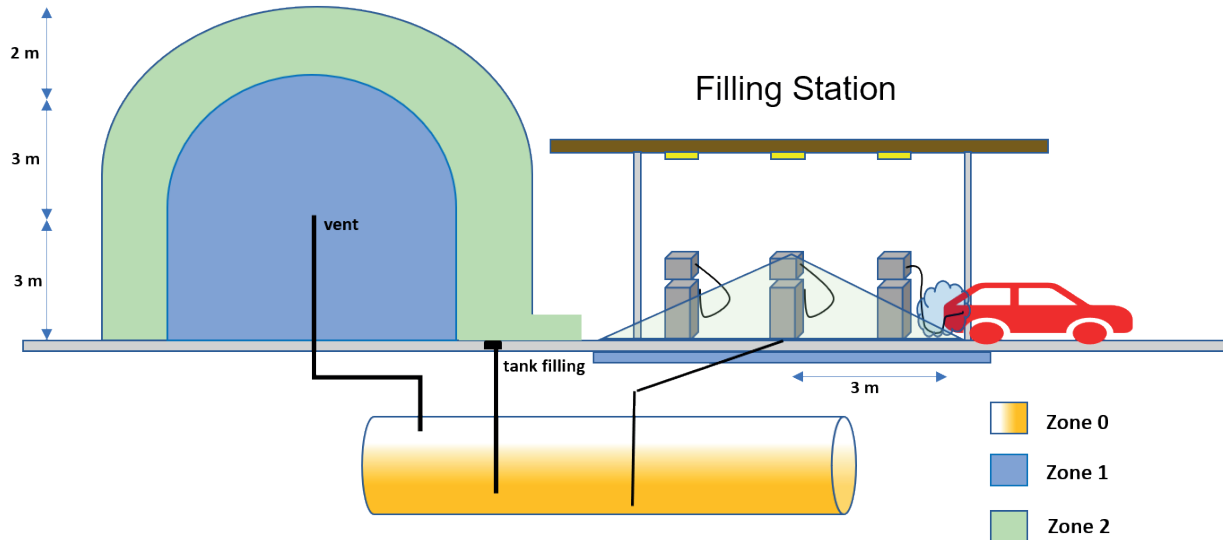
<http://www.teknologisk.dk/ydelser/atex/38372>

<http://www.atexdirektivet.dk>

<http://www.dancert.dk/certificeringer/atex-certificering/>

<http://ec.europa.eu/growth/sectors/mechanical-engineering/atex/>

EXAMPLE OF ZONE CLASSIFICATION (FILLING STATION)



















In **Zone 0** – Ex-equipment must be marked for **Category 1**

In **Zone 1** – Ex equipment must be marked for **Category 2**

In **Zone 2** – Ex equipment must be marked for **Category 3**

IP CLASSIFICATION'S – INGRESS PROTECTION TO EN 60529

FIRST NUMBER Protection against solid objects		SECOND NUMBER Protection against liquids	
IP	TEST REQUIREMENT	IP	TEST REQUIREMENT
0 	No protection	0 	No protection
1 	Protected against solid objects over 50 mm e.g. accidental touch by hands	1 	Vertically falling water drops
2 	Protected against solid objects over 12 mm e.g. fingers	2 	75° to 90° degrees vertically falling water
3 	Protected against solid objects over 2,5 mm (tools +small wires)	3 	Spraying water in angle of 60° from vertical
4 	Protected against solid objects over 1 mm (tools + small wires)	4 	Splashing water from any direction
5 	Protected against dust – limited ingress permitted (no harmful deposit - test under vacuum)	5 	Water jets from any direction
6 	Totally protected against dust (test under vacuum)	6 	Powerful jets from any direction
		7 	Protection at immersion
		8 	Protected at continuous immersion

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 AND PROTECTION PRINCIPLES

Maximum Surface temperature of equipment – taking the maximum Ambient temperature into account	T1	T2	T3	T4	T5	T6
	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.

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

GAS GROUPS AND TEMPERATURE CLASS

- EXAMPLES OF MARKING PLATE



Examples of flammable gases and their belonging Gas Group and temperature class								
Group	Gas (example)	Ignition Temperature [°C]	Temperature Class					
			T1	T2	T3	T4	T5	T6
I	Methane	595	X					
IIA	Propane	450		X				
	Benzene	498	X					
	Ethyl nitrite	95						X
	Methanol	440		X				
	Acetone	539	X					
	Ethane	515	X					
IIB	Hexane	225			X			
	Ethylene	440		X				
	Diethyl-ether	175				X		
	Ethylene oxide	429		X				
	Ethanol	400		X				
IIC	Methyl ether	240			X			
	Acetylene	305		X				
IIC	Hydrogen	560	X					
	Carbon disulfide	90						X

Source: EN/IEC 60079-20-1

Marking Gas

EX-Safety Corp.
 Bahnhofstrasse 2, CH-8712 Buchs

Load Cell Type: 1709Ex, series 116



 0396 II 1G

DTI 18ATEX 1234X
Ex ia IIC T6 Ga

Ui: 28 V, Ii: 98 mA
 Ci: 10 nF, Li: 0 mH, Pi: 0,85 W

Marking Dust

EX-Safety Corp.
 Bahnhofstrasse 2, CH-8712 Buchs

Spotlight Type: Light 20"
 series no. 469



 0396 II 1D

DTI 18ATEX 5678X
Ex ma IIIC T120 °C Da

-15 °C < T_{amb} < 90 °C

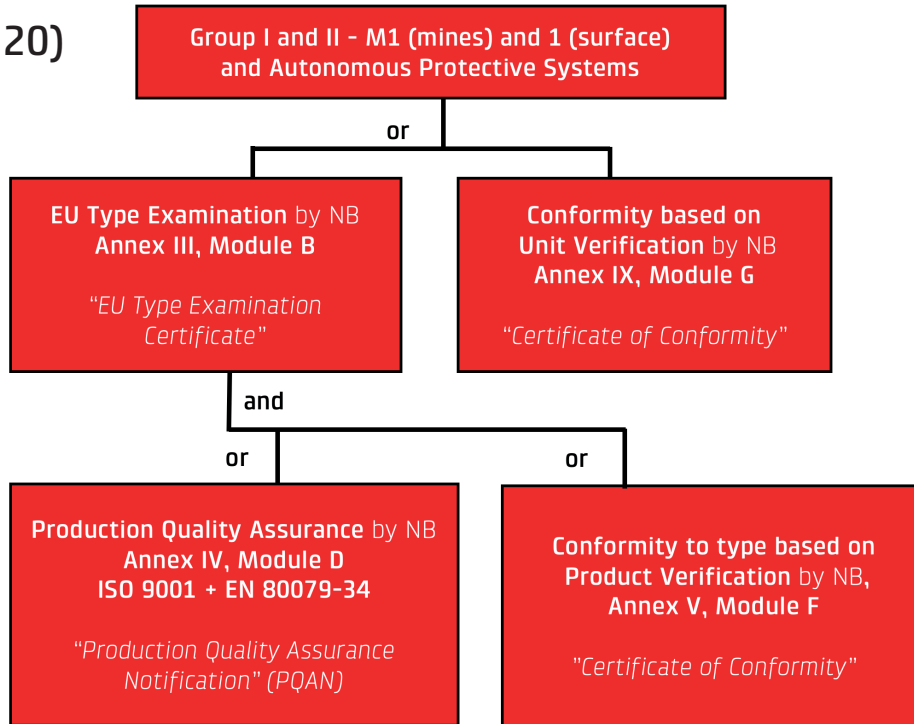
DUST GROUP CLASSIFICATION AND IGNITION TEMPERATURES

Classification of Dust Groups		
IIIA	Combustible flying's	e.g. cotton L > 0,5 mm
IIIB	Non-conductive dust	$R > 100 \Omega/m$
IIIC	Conductive dust	$R \leq 1000 \Omega/m$

Ignition Temperature of dust (examples)		
Material	Cloud [°C]	Layer [°C]
Coal Dust	380	225
Polythene	420	(melts)
Methyl Cellulose	420	320
Starch	460	435
Flour	490	340
Sugar	490	460
Grain Dust	510	300
Phenolic Resin	530	>450
Aluminium	590	>450
PVC	700	>450
Soot	810	570

CONFORMITY ASSESSMENT PROCEDURE - EQUIPMENT CATEGORY 1 AND M1

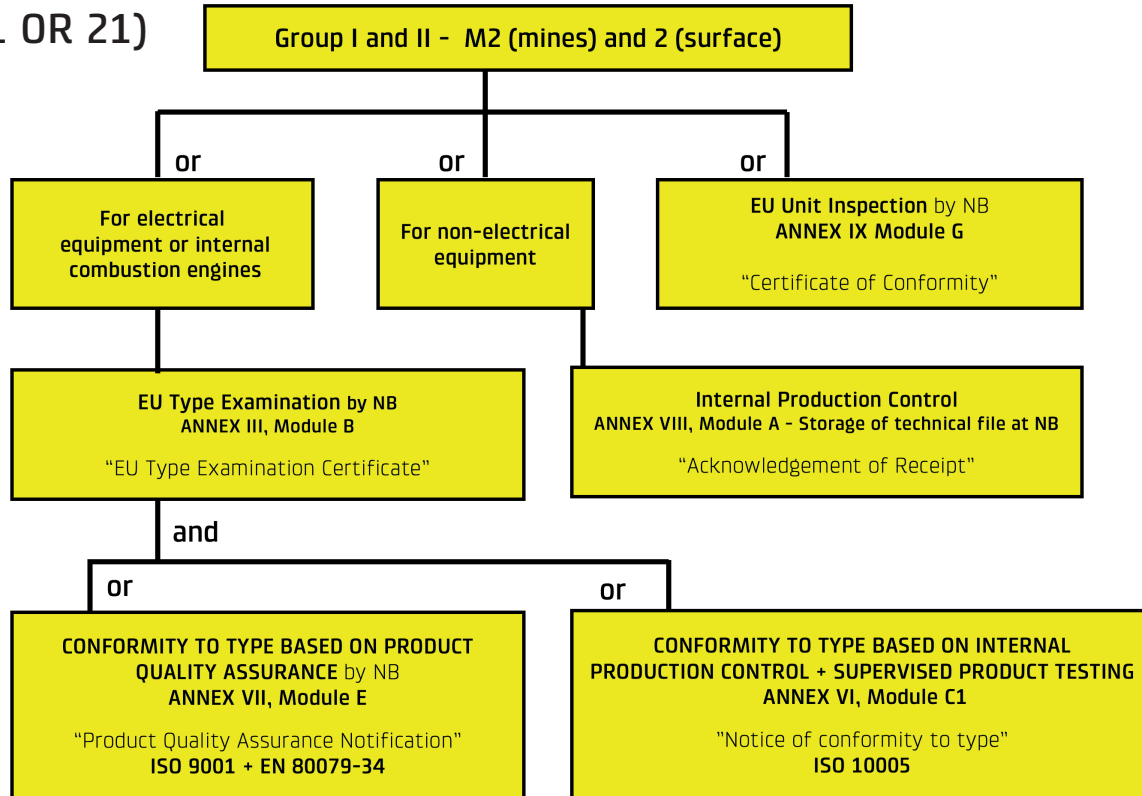
(ZONE 0 OR 20)



NB: Notified
Body

CONFORMITY ASSESSMENT PROCEDURE, EQUIPMENT CATEGORY 2 AND M2

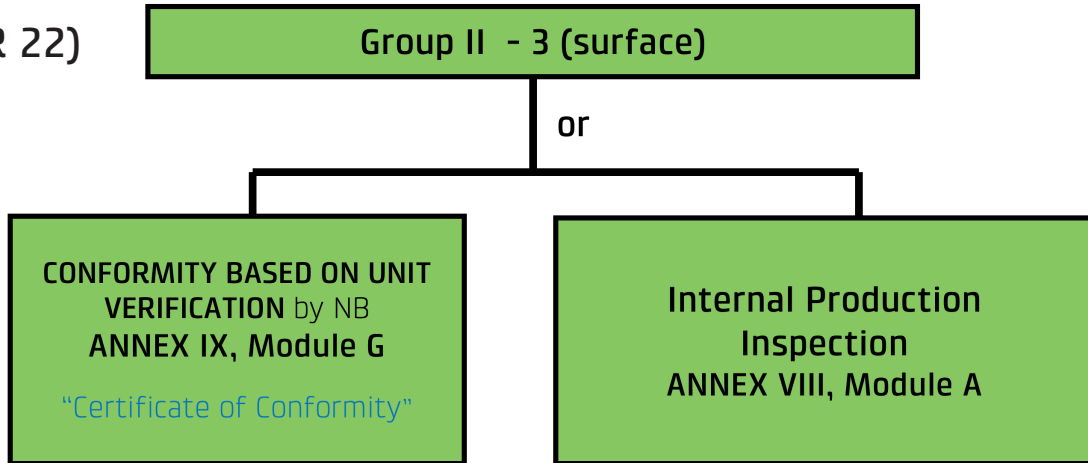
(ZONE 1 OR 21)



NB: Notified Body

CONFORMITY ASSESSMENT PROCEDURE, EQUIPMENT CATEGORY 3

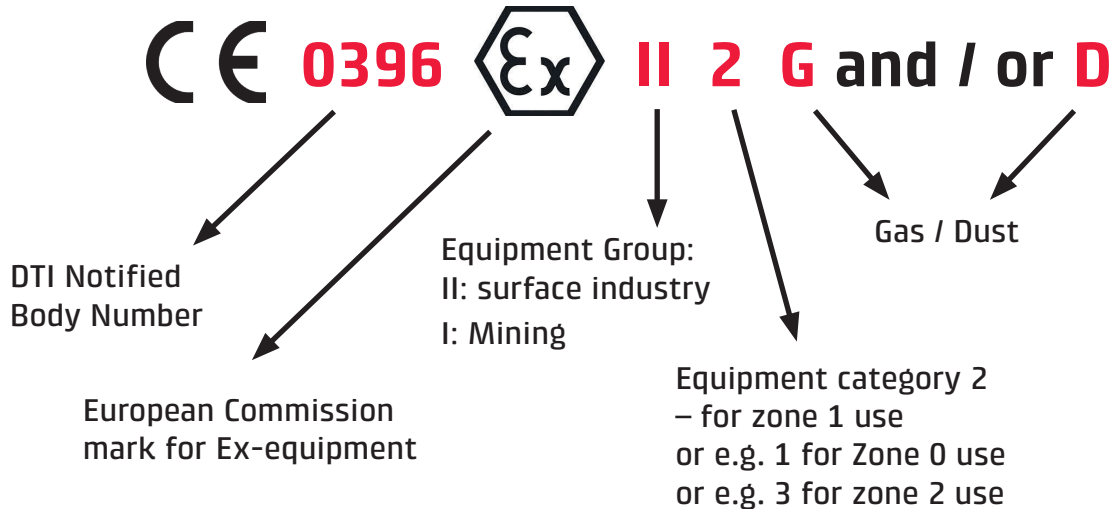
(ZONE 2 OR 22)



NB: Notified Body

MARKING OF EQUIPMENT TO 2014/34/EU

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



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.

ATEX Certification

Danish Technological Institute's department "*Certification & Inspection*" is an independent accredited Notified Body – ExNB for electrical and none-electrical equipment Ex-equipment.

Within the scope of our Notified Body no. "0396" we issue the following certificates in accordance with Directive 2014/34/EU:

- EU Type Examination Certificate – to Annex III (Module B)
- EU Unit Verification Certificate – to Annex IX (Module G)
- EU Product Verification – to Annex V (Module F)
- Internal Production Control – to Annex VIII (Module A)



Concerning the ATEX Quality modules (PQAN), we issue the below listed certificates through “DANCERT” under the ExNB no. “1073”. Dancert is the certification body of the Danish Technological Institute.

- Notice of Conformity to Type – to Annex VI (Module C1)
- Production Quality Assurance Notification – to Annex IV (Module D)
- Product Quality Assurance Notification – to Annex VII (Module E)

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