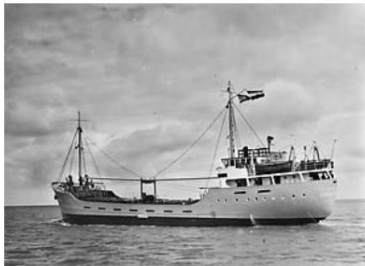




Radio Holland Group B.V.

Background information on Fire Fighters communication requirements

Before GMDSS (1 february 1999)



Ships < 1600 GT (Coasters)

Captain / Officer with
Radio-telephony
certificate



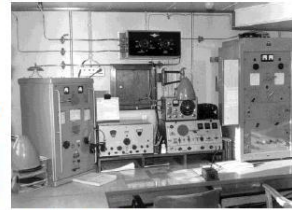
Ships > 1600 GT

Radio-officer
onboard

Radio-telegraphy



Morse-key



Radio-station



Background information on Fire-Fighter communication requirements

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Background information on Fire-Fighter communication requirements

1. General

In many industries the production, processing, transport and storage of combustible substances are accompanied by escaping gases, vapors or spray (mists) which find their way into the environment. Other processes result in combustible dust. Together with the oxygen in the air, the result can be an explosive atmosphere which will explode if ignited.

Serious injury to persons and damage to property can result particularly in the chemical and petrochemical industry, mineral oil and natural gas production, mining, mills (e. g. grain, solid materials) and many other sectors. To guarantee the maximum possible safety in these areas, the legislators of most countries have drawn up requirements in the form of laws, regulations and standards. In the course of globalization, great progress has been made with regard to uniform directives for explosion protection.

This document does not claim to be complete, but must be seen as informative bundle of facts, which will give us a head start and to be able to inform our customers the best we can.

1.1 Documentation

This document and all supporting documents including the "ATEX and IECEx Code" can be found on the Regulations section on SharePoint under the "[Mandatory Carriage Requirements](#)"

Background information on Fire-Fighter communication requirements

2. Regulation

2.1 General

According to SOLAS Chapter II-2, regulation 10.10.2.1 all ships shall carry at least two fire-fighter's outfit.

According to SOLAS Chapter II-2, regulation 10.10.2.2 an additional fire-fighter's outfit is required for passenger vessels depending on the design of the passenger vessel / cruise ship; i.e. length of passenger spaces, number of decks, number of vertical zones and number of passengers.

According to SOLAS Chapter II-2, regulation 10.10.2.3 an additional two fire-fighter's outfits shall be provided on tankers.

The International Code for Fire Safety System (FSS Code), resolution MSC.98(73), Chapter 3, Regulation 2 "Fire-fighter's Outfit" defines and describes the scope of the fire-fighter outfit such as type approved electric safety lamp, rubber boots, rigid helmet, explosion proof electrical safety lamps (for tankers), type approved lifeline, type approved breathing apparatus etc.

The fire-fighter's outfit shall be kept ready for use in an easily accessible location.

Fire-fighter's radios as required by SOLAS Chapter II-2, regulation 10.10.4, is additional to the above fire-fighters outfit and intended for the Fire Party.

Therefore, the total number of these radios to be carried on board will depend upon the number of fire parties detailed on the Muster List rather than the number of fire-fighter outfits.

Each Fire Party must have at least two of these dedicated radios and as fire-fighters may need to use Direct Mode Operation (DMO – communication between two or more radios on the same frequency) during fire-fighting operations or if the Fire Party consist of more crew members than the actual fire fighters, i.e. incident commander, the actual number of fire-fighter radios may vary from vessel to vessel as more than two radios may be required for each Fire Party.

The purpose of these fire-fighter radios is to provide a dedicated means of communication between a team of fire fighters entering the space, and the crew member located outside the space who is assigned to control this team.

2.2 SOLAS

The SOLAS regulation is clear, but also a lot of questions have been raised about the **ATEX** and **IECEx** norm.

To be able to inform our customers correctly, please find in this document some background information which should be helpful.

Background information on Fire-Fighter communication requirements

The **SOLAS** Chapter II-2 Regulation 10-10.4 states:

For ships constructed on or after 1 July 2014, a minimum of two two-way portable radiotelephone apparatus for each fire party for fire-fighter's communication shall be carried on board. Those two-way portable radiotelephone apparatus shall be of an explosion-proof type or intrinsically safe.

Ships constructed before 1 July 2014 shall comply with the requirements of this paragraph not later than **the first survey after 1 July 2018**.

Which means that all SOLAS class vessels must be compliant **prior to their next annual Ship Safety Inspection taking place between 1 July, 2018 and 30 June, 2019**.

2.3 Performance Standard

In the **performance standard** we read:

To date, IMO has not yet set the performance standards for the above fire-fighter radios but, in order for such equipment to meet the explosion proof or intrinsically safe requirements the radio telephone apparatus must be certified in accordance with relevant standards for equipment and protective systems intended for use in potentially explosive atmospheres, and maintained as such, for example: **Directive 2014/34/EU (ATEX)** – with approval rating such as **II 2G Ex ib IIB T4** or **II 2G Ex ib IIC T4**. Temperature rating "T3" may be accepted instead of "T4" but the T4 rating will cover all types of vessels including tanker vessels.

Radios tested and certified according to recognized maritime standards have passed comprehensive testing for the specific marine environment as set forth in the standards i.e. EN60945, EMC test, drop test, IP-grade test, Ex approvals from notified test facilities, to mention a few.

In addition accessories for such radios have passed similar tests and therefore tested and certified to have full functionality with the radio.

The fire-fighter outfit as well as the use of breathing apparatus will leave limited possibility of using a portable radio during the fire-fighting operation.

The IMO Fire Safety Code does not describe the design of the Fire-Fighter Radio in this regard.

From a user point of view the fire-fighter radio should be designed for use with large gloves, possibility of being worn underneath the fire-fighter suit, for smoke divers wearing breathing apparatus, being able to connect to breathing mask and for Incident Commander being able to connect to helmet headset.

The range of tests to document the performance of the fire-fighter radio is based on international standards and therefore recognized by surveyors worldwide.

It is the ship's responsibility to demonstrate that the radios are fit for purpose, i.e. that they are able to work within the environment to be expected in a fire scenario, that their operating range is sufficient and that they are safe.

Background information on Fire-Fighter communication requirements

2.4 Survey Frequency

Now the Fire Fighters outfit requirements are not part of the GMDSS surveys, but fall under the Ships Safety Certificate regulations. The main certificate is responsibility of the Classification Societies and will be renewed every five years, but every year there will be an periodical audit with a window of plus/minus three months. as we do for the GMDSS Radio surveys

2.5 Frequencies

The regulations do not indicate which frequencies are to be used, but recommend the use of UHF (better penetration capability on board steel ships) and are the same for all vessels.

The on-board frequencies therefore are the most logical ones, being:

- **VHF** only inter-ship channels, being CH 15, 17, 77, 2024 (digital only), 2084 (digital only), 2025 (digital only), 2085 (digital only)
(ITU Manual –Appendix 18).
- **UHF** only 6 inter-ship channels, in the range of 457MHz to 467MHz available for maritime use (on board communication), being 457.525, 457.550, 457.575, 467.525, 467.550, 467.575 with 25kHz channel spacing
(ITU-R M.1174-3).

Note:

There is a possibility that for a better coverage of communication, a combination-with repeaters or that Trunked radio is being used.

Background information on Fire-Fighter communication requirements

3. Hazardous Area



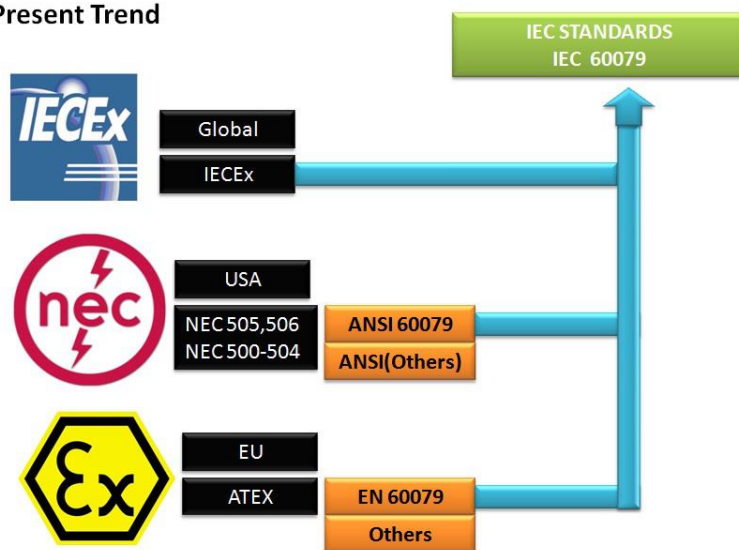
An area on board a vessel or structure is considered to be a hazardous area when it contains three fundamental components:

1. a flammable substance (gas, liquid or solid – hydrogen, gasoline, etc.)
2. an Oxidizer (present in open air)
3. a source of ignition (something obvious like a spark, open flame or excessive heat which can be caused by a spontaneous combustion of certain materials)

A hazardous area has all three of the above mentioned ingredients “available” to initiate an explosion, and therefore requires the use of equipment specifically certified for use in such area. Although the goal of all hazardous area certified equipment is to prevent an explosion, the methods they use vary depending on their manufacturer and intended application.

What equipment is qualified for use in a hazardous area is regulated by many certifying agencies and based on the IEC standards.

Present Trend



Background information on Fire-Fighter communication requirements

4. The Standards

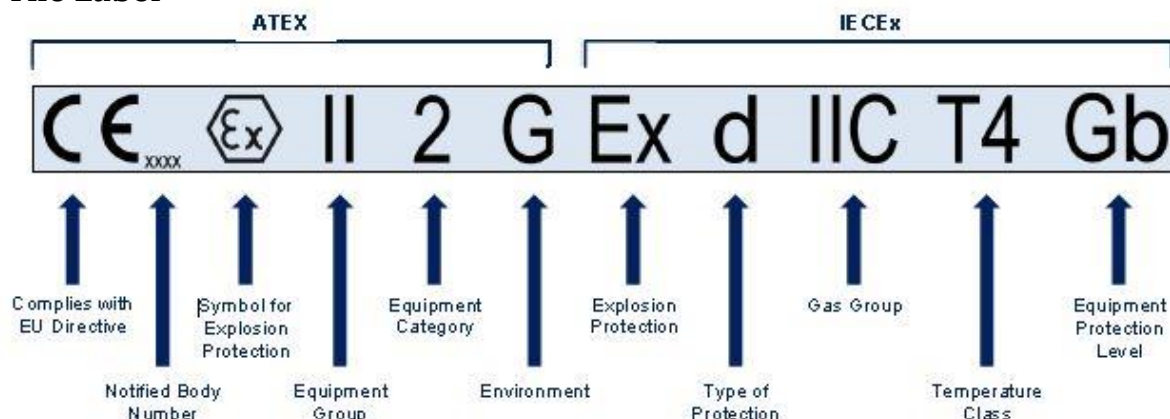
An overview:



Europe Guidelines = CENELEC Standard = ATEX UK: http://www.hse.gov.uk/fireandexplosion/atex.htm Europe: http://ec.europa.eu/enterprise/sectors/mechanical/atex/	China Guidelines = AQSIQ Standard = NEPSI China: http://www.nepsi.org.cn/english/default.aspx
North America & Canada Guidelines = CEC (Canada) & NEC (US) Standards = CSA (C&US), FM (C&US) & UL (C&US) CSA: http://www.csagroup.org/us/en/services/hazardous-locations/north-american-certification UL: http://www.ul.com/global/eng/pages/offerings/services/hazardouslocations/ FM: http://www.fmglobal.com/page.aspx?id=50010106	Japan Guidelines = MHLW Standard = TIIS Japan: http://www.tiis.or.jp/index_e.html
Russia Guidelines = GOST R Standard = GOST R-Ex Russia: http://www.gost.ru/wps/portal/pages.en.Main	Brazil Guidelines = Inmetro Standard = Inmetro Portaria 83:2006 Brazil: http://www.inmetro.gov.br/english/accreditation/index.aspx

Background information on Fire-Fighter communication requirements

4.1 The Label



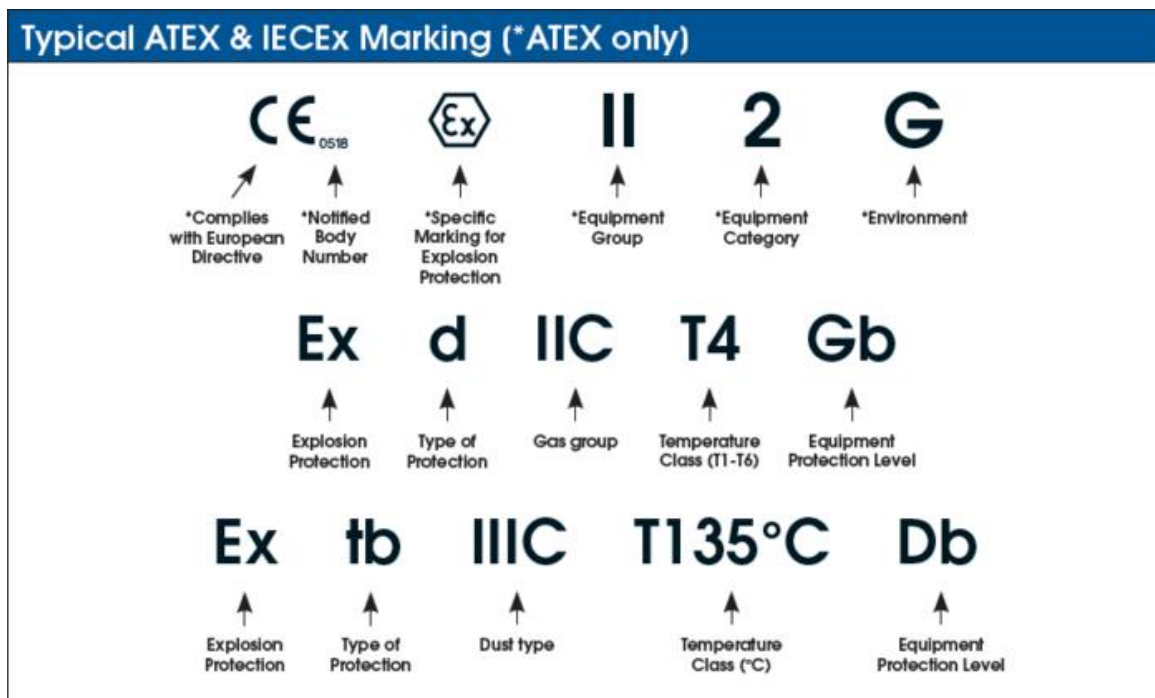
It was obvious that a piece of equipment which is intended to be installed or used in a hazardous area, would need some kind of protection. Flameproof, intrinsically safe or otherwise, everybody understood the need to introduce a certain classification mode, but once again, it appeared to be easier said than done.

Dividing the hazardous areas was the solution, At first they called it Divisions (which they still use in the USA) later on the title "Zones" was introduced. With **Zone 0** as being the area with the greatest risk and **Zone 2** with the lowest risk.

A letter code was developed to determine the suitability and the individual type of protection for equipment which would be used in various hazardous areas. By using a "Label" everybody would instantly know where the equipment could be used and what the limitations are.

In the beginning it was the intention to keep it simple as possible, well they didn't succeed in that. This document is to help you need to understand it a little better.

Note: For detailed explanation we refer to the "[ATEX and IECEx code](#)" available on SharePoint.



Background information on Fire-Fighter communication requirements

4.2 The ATEX standard



The ATEX Europe Directives. (Directive 94/9/EC (ATEX 100A))

Since 1st of July 2003, the electrical equipment used in potentially explosive atmospheres within the European Union must comply with this Directive and carry the ATEX standard.

This Directive lays down "essential requirements" security manufacturers and imposes a classification of devices into groups and categories, while distinguishing gas and dust aspects.

	Device category	Flammable substance	Protection degree	Protections, defaults
Device group I (mines)	M1	Methane Dust	Very High level	2 protections ways or 2 independant defaults
	M2	Methane Dusts	High level	1 protection way Standard functioning
Device group II (surface)	1	Gas, vapors, mists, dusts	Very High level	2 protections ways or 2 independant defaults
	2	Gas, vapors, mists, dusts	High level	1 protection way Common and fréquent disturbance
	3	Gas, vapors, mists, dusts	Standard	Protection level required

Directive 99/92/EC

This Directive requires users a number of measures to ensure the safety of workers, including:

No risk assessment explosions on their website

- the classification of different risk areas and signaling:
- holding a document on the protection against explosions
- the implementation of technical and organizational measures to prevent
- accordance with the criteria of selection of electrical appliances in the table below:

	Zones	Materiel of category
Gas	0 : Permanent presence	-> 1G
	1 : Occasional presence	-> 2G ou 1G
	2 : Rare presence	-> 3G, 2G ou 1G
Dusts	20 : Permanent presence	-> 1D
	21 : Occasional presence	-> 2D ou 1D
	22 : Rare presence	-> 3D, 2D ou 1D

Background information on Fire-Fighter communication requirements

4.2a Classification of gases and dusts

Gases and dusts are classified according to their ignition properties.

For gases and vapors, the gas group (explosion group) is determined according to:

- MESG – maximum experimental safe gap (IEC 60 079-1A)
- MIC – minimum ignition current ratio relative to methane (IEC 60 079-3)

Explosion group	MESG	MIC ratio relative to methane
IIA	>0.9mm	>0.8
IIB	0.5 – 0.9mm	0.45 – 0.8
IIC	<0.5mm	<0.45

The dangerousness of the gases increases from gas group IIA to IIC.

4.2b Gas groups

Gas group	Temperature class					
	T1	T2	T3	T4	T5	T6
I	Methane					
IIA	Acetone	Ethanol	Diesel fuel	Acetaldehyde		
	Methane	Cyclohexane	Aircraft fuel			
	Ethane	n-butane	Fuel oil			
	Propane	n-butyl alcohol	n-hexane			
	Methanol	Propan-2-ol	Heptane			
	Toluene					
	Benzene					
	Acetic acid					
IIB	Coal gas (Town gas)	Ethylene	Ethylene glycol	Ethyl methyl ether		
		Ethylene oxide	Hydrogen sulphide			
		Propan-1-ol	Tetrahydrofuran (THF)			
IIC	Hydrogen	Acetylene				Carbon disulphide

Background information on Fire-Fighter communication requirements

Below Temperature classes are based on the auto-ignition temperature of the material / products, (gasses, vapors, mists and/or dusts).

4.2c Temperature Classes

Temperature class IEC/EN NEC 505-10	Max surface temperature of equipment °C	Ignition temperatures of flammable substance °C	Temperature class NEC 500-3 CEC 18-052
T1	450	>450	T1
T2	300	>300 ≤ 450	T2
	280	>280 ≤ 300	T2A
	260	>260 ≤ 280	T2B
	230	>230 ≤ 260	T2C
	215	>215 ≤ 230	T2D
T3	200	>200 ≤ 300	T3
	180	>180 ≤ 200	T3A
	165	>165 ≤ 180	T3B
	160	>160 ≤ 165	T3C
T4	135	>135 ≤ 200	T4
	120	>120 ≤ 135	T4A
T5	100	>100 ≤ 135	T5
T6	85	>85 ≤ 100	T6

Temperature class relates to all parts of equipment that can come into contact with potentially explosive atmosphere

Method of explosion protection

Method of protection	Ex Marking	Protection principle
Flameproof enclosure	d	Contains explosion & prevents flame propagation
Increased safety	e	No arcs, sparks, or hot surfaces
Non-sparking	n	No arcs, sparks, or hot surfaces
Intrinsic safety	i	Limited energy of spark and surface temperature
Oil immersion	o	Ignition source kept constantly immersed in oil
Pressurized enclosure	p	Protective gas contains ignition source
Sand filling	q	Fine ground filling surrounds the ignition source so that an arc from inside the housing cannot ignite the surrounding combustible atmosphere

Background information on Fire-Fighter communication requirements



4.3 IECEx (International certification system):

The IECEx issues an international certificate of conformity for electrical equipment only for use in explosive atmospheres. Its aim is to facilitate the international flow of electrical equipment intended to be used in potentially explosive atmospheres (in compliance with one or more international standards defining the type of protective against the risk of explosion) and thus avoiding multiple national certifications and at the same time ensuring an appropriate level of safety. The IECEx certification scheme allows the manufacturers of “Ex-proof” equipment to obtain a Certificate of Conformity that would be accepted in Member States in which this certification scheme is recognized.



4.4 UL (America) and CSA (Canada)

The American and Canadian standards are the only ones to have different classifications and locations. ATEX & IECEx work to Groups and Zones whereas the NEC & CEC works to Classes and Divisions, there is no direct comparison between the two. This means that it is imperative that the two standards are not inter-changed within an area.



4.5 INMETRO (Brazil)

The National Institute of Metrology, Quality and Technology (INMETRO) is an accreditation body representing the Brazilian government, and is responsible for assessing compliance requirements for a wide variety of products ranging from electrical goods to household appliances that are manufactured in or imported into Brazil. All electrical and electronic equipment used in explosive environments must be certified by INMETRO.



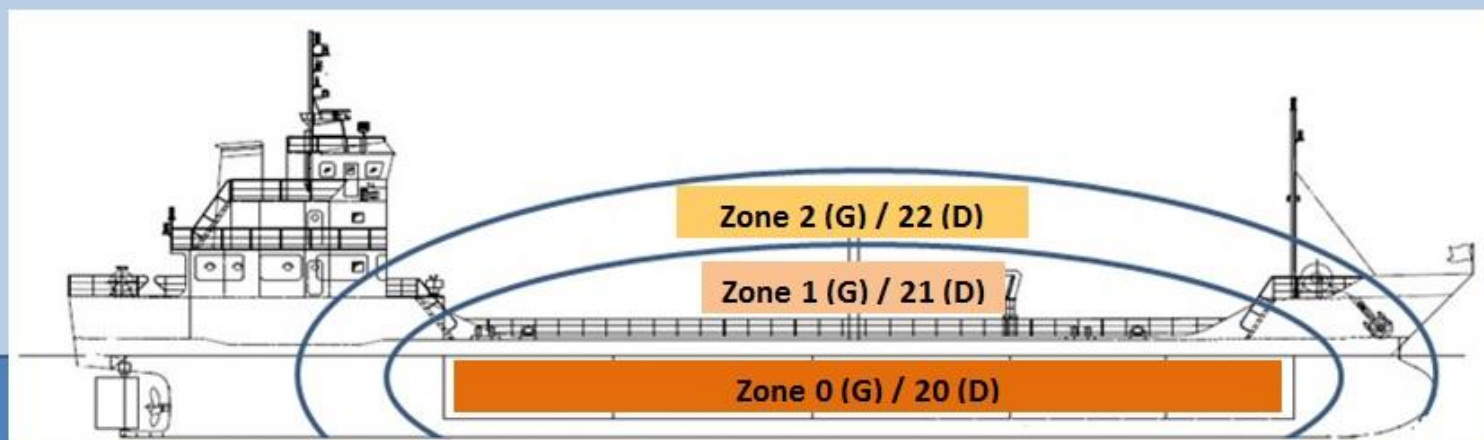
4.6 GOST (Russia & Kazakhstan)

GOST follows similar rules to that of IECEx as far as the breakdown of the zones and other criteria are concerned. However, the requirements for this country mean that separate GOST markings are required on the product. GOST is divided into GOST (R) which is the standard for Russian Federation and GOST (K) that cover Kazakhstan.

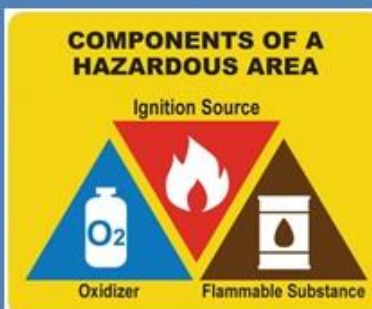
Background information on Fire-Fighter communication requirements

5. A Zone Overview

Safe Area



- **Zone 0 (Gas) / 20 (Dust) = Category 1**
Permanently or frequently hazardous over long periods
- **Zone 1 (Gas) / 21 (Dust) = Category 2**
Occasionally hazardous
- **Zone 2 (Gas) / 22 (Dust) = Category 3**
Rarely or temporarily hazardous
- **Safe Area**



(Gas) means Flammable Gas, Vapor or Mist

(Dust) means Cloud or flammable Dust



A correct indication where the exact boundaries of Zone 1 and 2 starts and/or stops is difficult to determine, as it strongly depends on the situation and above all the concentration of the gasses, vapors, mists or dusts and should therefore be seen as indicative only.

Under normal conditions the living quarters and bridge section should be considered to be a safe area.

- Note:**
1. Charging of batteries and/or changing/replacing of batteries, must always be done in a **safe area** !!
 2. Above is an indication, **on every ship the situation is different** !!

Background information on Fire-Fighter communication requirements

6. The portables

Below is a selection of the available models on the market, with the intention to indicate the use and interpretation of Class labels. When making a choice take good notice of the label (ref item 4.1) and the choice related to the gases/dusts (ref item 4.2a) and temperature classes (ref item 4.2c).

Safe Area

Any MED portable (without Ex norm) and Ex-norm portable can be used in this area.

Zone 2 - An area where an explosive atmosphere is not likely to occur in normal operation = Category 3 and/or

Zone 1 = An area where an explosive atmosphere is likely to occur in normal operation = Category 2

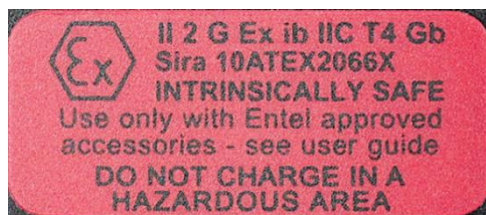
Entel Class **II 2G Ex ib IIA** (Global, mandatory on Europe Flag ships)
HT844 portable VHF (LCD ATIS) ATEX

Entel Class **Ex ib IIA T4** (Global)
HT544 portbale VHF IECEX
HT842 portbale VHF IECEX
HT844 portbale VHF IECEX
HT882 portbale UHF IECEX
HT883 portbale UHF IECEX

Cobham Class **II 2G Ex ib IIB T4** (Global, mandatory on Europe Flag ships)
Sailor 3965 portable UHF ATEX

Cobham Class **II 2 G Ex ib IIC T4** (Global, mandatory on Europe Flag ships)
Sailor SP3530 portable VHF ATEX
Sailor SP3540 portable VHF ATEX GMDSS
Sailor SP3560 portable UHF ATEX

Entel Class **II 2G Ex ib IIC T4 Gb** (Global, mandatory on Europe Flag ships)
HT942 portable VHF ATEX
HT944 portable VHF (LCD ATIS) ATEX
HT982 portable UHF ATEX
HT983 portable UHF ATEX



Example Label

Zone 0 = An area where an explosive atmosphere is present continuously or for long periods = Category 1

No portables are available for this area (as far as we know).

Background information on Fire-Fighter communication requirements

6.1. Available Accessories

Make sure only to **only** use Ex-approved accessories as indicated by the manufacturer, such as:

- Headsets in combination with PTT (Press To Talk) (examples could be of **SAVOX** and Peltor),
- Remote speaker microphones with coiled cord fixed to portable radio
- Carrying cases and belts.

For Example

