

Temporary equipment

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Foreword

The NORSOK standards are developed by the Norwegian petroleum industry to ensure adequate safety, value adding and cost effectiveness for petroleum industry developments and operations. Furthermore, NORSOK standards are as far as possible intended to replace oil company specifications and serve as references in the authorities' regulations.

The NORSOK standards are normally based on recognised international standards, adding the provisions deemed necessary to fill the broad needs of the Norwegian petroleum industry. Where relevant, NORSOK standards will be used to provide the Norwegian industry input to the international standardisation process. Subject to development and publication of international standards, the relevant NORSOK standard will be withdrawn.

The NORSOK standards are developed according to the consensus principle generally applicable for most standards work and according to established procedures defined in NORSOK A-001.

The NORSOK standards are prepared and published with support by The Norwegian Oil Industry Association and Federation of Norwegian Industry, Norwegian Ship owners' Association and the Petroleum Safety Authority Norway.

NORSOK standards are administered and published by Standards Norway.

Annexes B, C, E, F, G, H and I are normative, while Annexes A and D are informative.

Introduction

This revision is a minor adjustment related to Rev 3, June 2004. .

Container type D is deleted (compactor and waste storage)

Container type X (Container with ignition sources) is added

Further U08 (habitat) U09 (waste handling) and U010 (pneumatic hydraulic) are new.

Certain requirements are specified, in particular the requirements for ex-class (chapter 4.5) r "U05-Steam generator" and "U06-Mobile crane".

Norwegian and English edition

This standard is issued both in English and in Norwegian. With any conflicting text or content of these editions, it is the Norwegian version which will apply.

1 Scope

This NORSOK standard defines the minimum technical and safety-related requirements for temporary equipment used on installations on the Norwegian continental shelf.

2 Normative and informative references

The following standards include provisions and guidelines which, through reference in this text, constitute provisions and guidelines of this NORSOK standard. Latest issue of the references shall be used unless otherwise agreed. Other recognized standards may be used provided it can be shown that they meet or exceed the requirements and guidelines of the standards referenced below.

NOTE – The reference to regulations from classification societies only applies to the technical content. Any requirements in these regulations in terms of classification, certification or third-party verification do not form part of this NORSOK standard and can therefore be considered as a separate service.

2.1 Normative references

References to chapter /section in other documents are based on year of revision as listed below. It is however the last revision of respective standard which is valid.

Document references	Year	Title
Regulations:		
Frame regulations	2010	<i>Regulations relating to health, safety and the environment in the petroleum activities, issued by the Norwegian Petroleum Directorate. By royal decree 12th February 2010</i>
Management regulations	2011	<i>Regulations relating to management in the petroleum activities, issued by the Norwegian Petroleum Directorate.</i>
Facilities regulations	2011	<i>Regulations relating to design and outfitting of facilities etc. in the petroleum activities, issued by the Petroleum Safety Authority Norway.</i>
Activities regulations	2011	<i>Regulations relating to conducting petroleum activities issued by the Norwegian Petroleum Directorate.</i>
High Pressure Regulations (Forskrift for høytrykkspyling)	2003	<i>Regulations relating to the Working Environment Act, High Pressure Cleaning (no. 515), issued by the Directorate for Labour Inspection. FOR 1992-02-13 no 1263</i>
Regulations on Pressure Equipment (Forskrift om trykkpåkjent utstyr)	1999	<i>FOR Regulations relating to the Working Environment Act, Regulations for pressurized equipment (no. 192), issued by the Directorate for Labour Inspection. 1999-06-09 no 721</i>
Regulations on Fire Prevention - Measures and Prevention (Forskrift om brannforebyggende tiltak og tilsyn)	2002	<i>Regulations on Fire Prevention and Control, established by the DSB on 2002-06-26 nr 847.</i>
Machinery Regulations (Maskinforskriften)		<i>Regulations to the work environment, equipment (best No. 544) issued by the Directorate of Labour Inspection</i>
FUSEX 1996 (ATEX)	2003	<i>Regulations concerning equipment and protective systems in potentially explosive areas</i>
Fire Protection Act (Lov om brannvern)	2002	<i>Law on protection against fire, explosion and accidents involving hazardous substances and the fire service (fire and explosion protection law. Act 2002-06-14 no.20</i>
EMC	2007	<i>Directive on electromagnetic compatibility (emc) for electronic communications. Act 2007-01-22 no.89</i>
NORSOK		
NORSOK A-001N, rev.5	2008	<i>Utvikling av NORSOK-standarder</i>
NORSOK C-001, rev.3	2006	<i>Living quarters area</i>

Document references	Year	Title
NORSOK C-002, rev 3	2006	<i>Architectural components and equipment</i>
NORSOK D-002, rev 1	1998	<i>System requirements well intervention equipment</i>
NORSOK E-001, rev 5	2007	<i>Electrical systems</i>
NORSOK H-003, rev 1	2010	<i>Heating, ventilation and air conditioning (HVAC) and sanitary systems</i>
NORSOK R-001, rev 3	1997	<i>Mechanical equipment</i>
NORSOK R-002, rev 2	2012	<i>Lifting Equipment</i>
NORSOK R-003, rev 2	2004	<i>Safe use of lifting equipment</i>
NORSOK S-001, rev 4	2008	<i>Technical Safety</i>
NORSOK S-002, rev 4	2004	<i>Working environment</i>
NORSOK S-003, rev 3	2004	<i>Environmental</i>
NORSOK T-001, rev 4	2010	<i>Telecom systems</i>
NORSOK T-100, rev 4	2010	<i>Telecom subsystems</i>
NORSOK Z-DP-002, rev 2	1996	<i>Coding system</i>
IEC/NEK		
IEC 60079 (all parts)		<i>Equipment and Equipment Standards for Explosive Atmospheres</i>
IEC 60092-350	2008	<i>Electrical installations in ships – Part 350: Shipboard power cables – General construction and test requirements</i>
NEK IEC 60533	1999	<i>Electrical and electronic installations in ships with Electromagnetic compatibility</i>
IEC 61508 (all parts)		<i>Functional safety of electrical/electronic/programmable electronic safety-related systems</i>
IEC 61511 (all parts)		<i>Functional safety - Safety instrumented systems for the process industry sector</i>
IEC 61892-2	2005	<i>Mobile and fixed offshore units – Electrical installations – Part 2: System design</i>
IEC 61892-4	2007	<i>Mobile and fixed offshore units – Electrical installations – Part 4: Cables</i>
IEC 61892-6	2007	<i>Mobile and fixed offshore units – Electrical installations – Part 6: Installations</i>
IEC 61892-7	2007	<i>Mobile and fixed offshore units – Electrical installations – Part 7: Hazardous area</i>
NEK EN50272-1	2010	<i>Safety requirements for secondary batteries and battery installations -Part 1: General safety information</i>
NEK EN50272-2	2001	<i>Safety requirements for secondary batteries and battery installations - Part 2: Stationary batteries</i>
NEK TR 50404	2003	<i>Electrostatics - Code of practice for the avoidance of hazards due to static electricity</i>
NS/EN/ISO		
NS-EN 792 (all parts)		<i>Hand-held Non-electric Power Tools</i>
NS-EN 1834-1	2000	<i>Reciprocating internal combustion engines - Safety requirements for design and construction of engines for use in potentially explosive atmospheres – Part 1: Group II engines for use in flammable gas and vapour atmospheres</i>
NS-EN 1838	1999	<i>Lighting applications – Emergency lighting</i>
NS-EN 12079-1	2006	<i>Offshore containers and associated lifting sets - Part 1: Offshore container - Design, manufacture and marking</i>
NS-EN 12079-2	2006	<i>Offshore containers and associated lifting sets - Part 2: Lifting sets - Design, manufacture and marking</i>
NS-EN 12079-3	2006	<i>Offshore containers and associated lifting sets - Part 3: Periodic inspection, examination and testing</i>
NS-EN 13463 (all parts)		<i>Non-electrical equipment for use in potentially explosive atmospheres</i>
NS-EN ISO 16852	2010	<i>Flame arresters - Performance requirements, test methods and limits for use</i>

Document references	Year	Title
NS-EN ISO 13850	2006	<i>Safety of machinery – Emergency stop equipment, functional aspects – Principles for design</i>
NS-EN ISO 28300 6 th edition	2008	<i>Petroleum, petrochemical and natural gas industries - Venting of atmospheric and low-pressure storage tanks</i>
EN 50381	2004	<i>Transportable ventilated rooms with or without an internal source of release (TVR)</i>
NS-EN 3 (all parts)		<i>Fire Material - Portable fire extinguishers</i>
NS 3910	2006	<i>Fire fighting equipment - Maintenance of portable fire extinguishers</i>
NS 4210	1983	<i>Colours used in warnings and warning signs</i>
Other references		
IMDG-code		<i>International Maritime Dangerous Goods Code (IMO)</i>
DNV 2.22	2011	<i>Lifting Appliances</i>
DNV 2.7-1	2006	<i>Offshore containers</i>
DNV 2.7.3	2011	<i>Portable offshore units</i>
SINTEF report No. TR A4596		<i>(Use of single core cable during well intervention operations, available only in Norwegian)</i>
SINTEF report No. TR F4975		<i>Use of electric high power equipment during well intervention with DC current</i>
Electricity authority (Elektrisitetstilsynet)	1993	<i>DBE-9039: Guidelines for grounding in maritime construction</i>
OLF 070, rev 02	2001	<i>APPLICATION OF IEC 61508 AND IEC 61511</i>
OLF 088, rev.3	2011	<i>OLF Guidelines for common models for work permits</i>

2.2 Informative references

None

3 Terms, definitions and abbreviations

For the purposes of this NORSOK standard, the following terms, definitions and abbreviations apply.

3.1 Terms and definitions

3.1.1

temporary equipment

equipment intended for use on installations for a limited time and which requires hook-up and/or is a potential source of ignition

3.1.2

shall

verbal form used to indicate requirements strictly to be followed in order to conform to this NORSOK standard and from which no deviation is permitted, unless accepted by all involved parties

3.1.3

should

verbal form used to indicate that among several possibilities one is recommended as particularly suitable without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required

3.1.4

can

verbal form used for statements of possibility and capability, whether material, physical or causal

3.1.5

could

verbal form used to indicate an allowable course of action within the limits in this NORSOK standard

3.1.6**hot work**

all work operations which make use of or create sources of ignition

NOTE – These sources are normally divided into groups A and B, whereby group B sources of ignition are easier to control.

- Examples of type A sources of ignition include welding, hot tapping of pipes and tanks, use of open flame for heat shrinking, preheating, annealing, use of cutting torch and grinding.
- Examples of type B sources of ignition include heat shrinking by means of electric heat gun, sandblasting, electrical hand tools, megger testing, soldering, use of flash camera, non-Ex-proof electrical equipment and use of chisel or needle gun.

3.1.7**permanently manned**

manned at least 8 h every day for at least 50 % of the unit's (equipment's) time on board on the installation.

NOTE – For containers this is relative to the time on board.

3.1.8**periodically manned**

manned during inspections, maintenance or other work with a planned duration of at least 2 h per day for at least 50 % of the installation or unit's operating time.

3.1.9**normally unmanned**

neither permanently nor periodically manned

3.1.10**the company**

main company on the installation

NOTE – See "Frame regulations", section 44.

3.1.11**Harmonised standard**

Standards which are developed based on EU-directives are named harmonised standards. This procedure of harmonisation is often named the "new method".

3.2 Abbreviations

ABC	fire extinguishers approved for the following fires; wood, cloth, paper, flammable liquids,
gasoline,	grease and electrical equipment up to 1000 V
AC	alternating current
API	American Petroleum Institute
ATEX	Regulations relating to equipment and safety systems for use in hazardous areas
BOP	blowout preventer
CCR	central control room
CE	Communauté Européenne (European Community mark)
DNV	Det Norske Veritas
DVD	Digital videodisc
DSB	Directorate for Civil Protection and Emergency Planning
DC	direct current
EMC	electromagnetic compatibility
EN	European Norm
ESD	emergency shutdown system
EEA	European Economic Area
FKE	Regulations relating to qualifications for electricians
FSH	Regulations relating to safety in connection with work in and operation of high voltage systems
FSL	Regulations relating to safety in connection with work in and operation of low voltage systems
HVAC	heat, ventilation and air conditioning
IE	instrument and telecommunications earth
IEC	International Electrotechnical Commission
IMDG	International Maritime Dangerous Goods
IP	Ingress Protection
ISO	International Organization for Standardisation

IS	intrinsically safe
LEL	lower explosion limit
MER	main earthing reference
NEK	Norwegian Electrotechnical Committee
NC	normally closed
NS	Standards Norway
PAGA	public address system and alarm system
PE	protective earth
PSV	pressure safety valve
ROV	remotely operated vehicle or equipment
SHE	Safety, Health, Environment
SJA	safety job analysis
SINTEF	Foundation for Scientific and Industrial Research at the Norwegian Institute of Technology
TN-S	3-phase system with earthed neutral point
TPU	Regulations relating to pressurised equipment
UPS	uninterruptible power supply

4 Technical requirements

4.1 Introduction

4.1.1 Technical requirements and checklists

Technical requirements in this NORSOK standard

Clause 4 contains the detailed technical requirements for temporary equipment.

Subclause 4.2 describes various types of container that are defined and also includes special requirements that can apply to various types of container.

Subclause 4.3 describes various types of equipment and includes special requirements for this equipment. The equipment can be installed on a skid or in a container. Sub clause 4.4 is divided into further subclauses for different disciplines and contains general discipline requirements.

The technical requirements for a temporary equipment are the sum of the requirements for the relevant container in 4.2, the equipment in 4.3 and discipline area stated in 4.4.

In addition, the general requirements for Ex-protection (see 4.5), marking and tagging/labelling (see 4.6), interface with the installation (see 4.7) and documentation (see 4.8) also apply.

Other technical requirements

In addition to the requirements in this NORSOK standard, authorities' requirements (regulations) and other recognised standards relating to the relevant equipment also apply. Where appropriate, this NORSOK standard therefore refers to other documents for more detailed descriptions of the requirements. See also first and last paragraph of the guidelines to the "Frame regulations", § 24.

Checklists

In connection with the dispatch and receiving control of temporary equipment, checklists as shown in Annex C shall be used. A description of the requirements in connection with the items on the checklist, and the extent to which these requirements apply to a specified piece of equipment is provided in this NORSOK standard. The reference stated in the checklist indicates where the requirement is described.

Note that only some of the most relevant requirements are included on the checklist for verification.

By filling in the checklists, all contents have to be answered. The answer alternatives as: OK, NC, NA or D. OK means compliance with the requirement, NC means not checked. NA means not relevant for this equipment (Not Applicable). D means non compliance with the requirement (Defect). When the supplier/owner of the equipment uses NA in the checklist, it should be explained why the checkpoint is not relevant.

Copies of checklists shall always follow the equipment.

4.1.2 Overview of equipment and requirements with references**Types of container described in this NORSOK standard - References (4.2):**

Type	Description	Subclause
A	Accommodation container	4.2.1
B	Office, coffee bar, laboratories, control-rooms, container etc.	4.2.2
C	Workshop for hot work	4.2.3
D	(Vacant)	4.2.4
E	Workshop for cold work	4.2.5
F	(Vacant)	4.2.6
G	Container for diesel engine	4.2.7
H	(Vacant)	4.2.8
I	Stores for flammable material	4.2.9
J	Stores for non-flammable material	4.2.10
K	(Vacant)	4.2.11
L	Painters' workshop	4.2.12
M	Refrigeration and freezer container	4.2.13
N	Radio and communications room	4.2.14
O	Toilet container	4.2.15
P	Motor control centre	4.2.16
X	Other container with ignition source	4.2.17
Y	Other container with ignition sources pressure regulated	4.2.18
Z	Other container without ignition sources	4.2.19

Types of equipment described in this NORSOK standard - References (4.3):

Type	Description	Subclause
U01	Diesel engine	4.3.1
U02	Aircompressor	4.3.2
U03	Tanks	4.3.3
U04	High pressure cleaning equipment	4.3.4
U05	Steam boiler / generator	4.3.5
U06	Mobile crane	4.3.6
U07	Well service equipment	4.3.7
U08	Habitat for hot work Class A	4.3.8
U09	Equipment for waste handling	4.3.9
U10	Pneumatic / hydraulic pump equipment etc.	4.3.10
U98	Non-Ex-proof equipment on frame	4.3.11
U99	Ex-proof equipment on frame	4.3.12

Discipline requirements described in this NORSOK standard - references (4.4):

Topic	Subclause
Structure	4.4.1
Fire protection and alarms	4.4.2
Gas and explosion protection	4.4.3
Signals to/from central control room and local alarms	4.4.4
Telecommunication	4.4.5
Electrical systems	4.4.6
HVAC	4.4.7
Health, safety and the environment	4.4.8

4.1.3 Temporary equipment used on mobile installations

See chapter XV of the "Facilities regulations" for the integration of the EEA regulations, which states that certain directives do not apply to mobile installations.

For mobile installations, see also section 3 of the "Frame regulations".

4.2 Containers

4.2.1 Type A: Accommodation containers

Description of container:

- a) Cabins and corridors;
- b) Mess and recreation rooms;
- c) Sanitary rooms, changing rooms and laundries;
- d) Galley, bakery and kitchen;
- e) Other rooms used for accommodation purposes.

Special requirements:

- a) Accommodation containers shall be designed in accordance with NORSOK C-001 and NORSOK C-002.
- b) Accommodation containers shall be located in a non-hazardous area. No doors, windows or openings shall face a hazardous area.
- c) For fire class requirements in accommodation containers, see the fire class specification in the regulations (see section 30 of the "Facilities regulations").
- d) Accommodation containers used as cabin (see description of container a) above) shall have fire dampers. Duct penetrations in fire class A building components and which are minimum 750 cm² in cross-section shall be fitted with an approved automatic fire damper.
A fire damper is not necessary if the duct penetration has a cross-section of less than 750 cm², in which case the duct penetration shall be no less than 3 mm gauge steel for a continuous length of 900 mm. This length shall be insulated to the same fire resistance as the adjoining building component.
- e) Accommodation containers shall be fitted with firewater, fire hoses and automatic sprinkler system.
- f) Accommodation container where high pressure cleaning (laundries, galleys etc.) requires higher IP for electric equipment, see IEC61892-2 clause 13.

4.2.2 Type B: Offices, coffee bar, laboratory, control room container for ROV, well service etc.

Examples of manned containers having potential sources of ignition:

- a) laboratories;
- b) offices;
- c) well service containers;
- d) ROV control room containers;
- e) test/calibration container;
- f) container for calibrating PSVs;
- g) coffee bar.

Special requirements:

- a) Offices, laboratories and coffee bars shall be designed in accordance with NORSOK C-001 and NORSOK C-002.
- b) Coffee bars shall always be located in non-hazardous areas.

4.2.3 Type C: Workshop for hot work

Description of container:

Workshops for different types of work operations, including hot work.

Special requirements:

- a) Spot extractors shall be installed if the work causes air pollution.
- b) Type A hot work (see 3.1.6) shall not be carried out in containers located in hazardous areas.

4.2.4 Type D: Vacant

4.2.5 Type E: Workshop for cold work

Description of container:

- a) Container for different types of work operations without the use of ignition sources or ignition potential (independent of manning).
- b) Manned (periodic or permanent) tool shop container for non-flammable material or tools.

4.2.6 Type F: Vacant

4.2.7 Type G: Container for diesel engine

Description of container:

Container with diesel engine, driven equipment (generator, pump, compressor etc.) and auxiliary equipment.

Special requirements:

- a) Requirements for diesel engines, see 4.3.1.
- b) Requirements for air inlets, see 4.4.7.
- c) Diesel engines shall have an emergency stop on the outside of the container, see 4.4.8.
- d) Machinery designed for unmanned operation shall be fitted with an alarm for condition monitoring in a permanently manned control room, see 4.4.4 a).
- e) For containers with diesel engines that do not meet zone 2 requirements (see paragraph below), see 4.3.1.4 for the conditions that shall be satisfied in order for these to be used on board.
- f) A permanent fire extinguishing system with automatic release shall be installed in addition to a manual release located on the outside, see 4.4.2 (room extinguishing system).

Additional requirements for containers with built-in diesel engine approved for zone 2:

- a) General requirements for Ex-rating, see 4.5.
- b) Alternative 1 or 2 below shall be fulfilled:
 - Alternative 1: All equipment in the container shall as a minimum be approved for use in zone 2. Special requirements for the diesel engine, see 4.3.1.4.
 - Alternative 2: The container shall have pressurised mechanical ventilation and gas warning system. The ventilation shall be designed for adequate cooling of the container. The diesel engine shall have a separate air inlet for combustion air. Ignition sources shall be disconnected and the diesel engine shall be stopped when gas is detected or pressurisation in the container is lost.
- c) Engine exhaust temperature shall not exceed 300 °C. The engine or exhaust pipe surface temperature shall not exceed 200 °C (T3). The test journal that documents this shall form part of the documentation.

4.2.8 Type H: Vacant

4.2.9 Type I: Stores for flammable materials

Description of container:

- a) Container for storing flammable material, paint and hazardous products.
- b) Container for storing products in sealed, original wrapping and other products that cannot emit solvent vapours. All opening of paint product wrapping or storage of products that can emit solvent vapours shall be carried out in container type "L", see 4.2.12.

4.2.10 Type J: Stores for non-flammable materials

Description of container:

- a) Container for storing non-flammable material.
- b) Tool container not manned or equipped for work operations.

4.2.11 Type K: Vacant**4.2.12 Type L: Painters' workshop****Description of container:**

Container where open contact with paint and solvents is possible.

Special requirements:

- a) Container shall always be located in a non-hazardous area (due to risk for self-ignition).
- b) Inside the container is classified as a hazardous area. Zone category shall be determined based on the product's emissions of flammable and explosive gases, and the exposure time if emissions occur.
- c) Electrical equipment shall be approved for group II B and temperature rating T3 (200 °C).
- d) Requisitioner shall specify HVAC requirements. The area surrounding a possible ventilation outlet shall be classified as a hazardous area, see IEC 61892-7, Clause 4.
- e) Containers shall have lockable doors with signs warning of toxic and flammable gases.

4.2.13 Type M: Refrigeration and freezer containers**Special requirements:**

Refrigeration and freezer containers shall always be located in a non-hazardous area.

It shall be possible to open the door from inside.

An alarm shall be provided for personnel who may get trapped inside, see 4.4.4.

4.2.14 Type N: Radio and communications**Special requirements:**

Container shall be located in a non-hazardous area

4.2.15 Type O: Toilet container

No special description or requirements.

4.2.16 Type P: Containers for electrical equipment**Description of container:**

Container for electrical panels, switchboards and/or other major electrical equipment.

Special requirements:

Doors shall be lockable, preferably with a padlock.

4.2.17 Type X: Other containers with ignition sources**Description of container:**

Other containers that are fitted with systems or equipment, which are not Ex-proof (potential ignition sources).

Special requirements:

- a) Containers which are not approved for placement in Ex-hazard area, are not according to general regulations for temporary equipment. Therefore it requires special care for such events. This requires as a minimum to include the elements which are described in clause 5.5.1 e)

4.2.18 Type Y: Other container with ignition sources excess pressure ventilated**Description of container:**

Other containers in which all systems and all equipment which are not Ex-proof (potential ignition sources)

Special requirements:

- a) If the container contains flammable substances, the requirements for container type I apply.
- b) The container shall be fitted with ventilation (see 4.4.7) and gas detection, see 4.4.2. See 4.5.2 for details.

4.2.19 Type Z: Other containers without ignition sources

Description of container:

Other containers in which all systems and all equipment are Ex-approved (no ignition sources) and where it is not possible to use tools and equipment that are potential sources of ignition.

Special requirements:

- b) If the container contains flammable substances, the requirements for container type I apply.
- c) If the container is classified inside as hazardous explosive area (due to potential leakage emissions of hydrocarbons or explosive gases) the container should be placed in an explosive hazard area, minimum three metres from non-explosive area (not applicable for container containing paint).

4.3 Other types of temporary equipment

4.3.1 Type U01: Diesel engines

4.3.1.1 General requirements

- a) Requirements for electrical equipment, see 4.4.6.
- b) Requirements for frames and lifting equipment, see 4.4.1.
- c) Noise suppression shall be in accordance with NORSOK S-002, 5.5.
- d) Satisfactory vibration reducing measures shall be implemented.
- e) The exhaust pipe on the engine shall have an approved spark arrester.
- f) Use of threaded or welded connections on the exhaust pipe is preferred. Flanged connections shall be fitted with fireproof gaskets.
- g) In the event of electric start, the battery shall be fitted with a circuit breaker connected to the installation's system for disconnection of ignition source, see 4.4.3. Requirements for batteries, battery circuit breaker and placement, see 4.4.6.4.
- h) Excess diesel shall be routed back to the diesel tank, not to the pump feed chamber. The return area in the tank shall be separated and ventilated to avoid continuous agitation of diesel and pressure build-up in the tank.
- i) A drip tray for collecting any oil or diesel leaks shall be placed under the engine.
- j) All oil and diesel lines shall be made of hydrocarbon-resistant material (reinforced hose or piping).
- k) The cap and dipstick for lube oil shall be secured against coming loose when the engine is running.
- l) Diesel tanks that are located such that the diesel is gravity-fed to the engine shall be fitted with a manual shut-off valve.
- m) Diesel tanks shall be designed, built, maintained and tagged in accordance with the IMDG code.

4.3.1.2 General stop and safety functions

The automatic shut-off mechanisms shall as a minimum satisfy the requirements below, unless there are requirements for emergency shutdown level 'c' in accordance with 4.4.3, see 4.3.1.3.

The following are obligatory:

- a) Gas detector in the air inlet (For alternative to gas detector in combustion air inlet, see 4.3.1.5. For critical operations, see 4.3.1.3.
- b) Local emergency stop, see 4.4.8.
- c) Remote-controlled stop(e.g. the installation's ESD see Clause 4.4.4 b) Emergency stop signals from CCR
- d) Over speed protection.
- e) Engine protection devices shall cover as a minimum
 - lube oil pressure,
 - cooling water temperature,
 - exhaust temperature (only applicable for Ex-proof diesel engines)
- f) Fire detector (requirements for diesel engine located in room or container). For critical operations, see 4.3.1.3.

*Use of diesel engines with an alarm and manual shut off instead of the automatic stop, shall be cleared and approved by the responsible person in the company in connection with the requisition.
This approval shall be added to the checklist from the supplier.*

	a) Gas detection in air inlet	b) Local emergency stop	c) ESD from control room	d) Over speed protection	e) Engine protection devices (see NOTE)	f) Fire protection
1) Stop engine	X	X	X	X	X	X
2) Close dampers in combustion air inlet	X		X	X		X
3) Close diesel supply valve	X		X	X		X
4) Disconnect el. power supply	X		X			X
5) Isolate ignition sources	X		X			X

NOTE – On continually manned units an alarm can replace the automatic stop. If this is the case, it shall be cleared and approved by the responsible person in the company in connection with the requisition. This approval shall be added to the checklist from the supplier.

4.3.1.3 Critical equipment and operations when using diesel engines

When carrying out certain operations with temporary well operations equipment, automatic shutdown can lead to increased risk. Emergency shutdown level 'c' (see 4.4.3) can apply in such circumstances.

Examples of equipment and operations that can be defined as critical are as follows:

- power pack for cable units;
- power pack for coiled tubing;
- power pack for pressure pipe;
- Pump units for special pumping operations (fracturing, well stimulation, sand control, cementing).

Before the machine is shut down a safe well condition is wanted. Compensating measures shall be covered by the procedure for manual shutdown in the event of an alarm or gas leakage signal. This procedure shall be attached to the documentation that accompanies the equipment, see 4.7.2.

For Ex-proof requirements, see table in 4.3.1.4.

Use of critical equipment with manual shutdown shall be cleared and approved by the responsible person in the company in connection with the requisition. This approval shall be added to the checklist from the supplier.

4.3.1.4 Ex-proof requirements for diesel engines

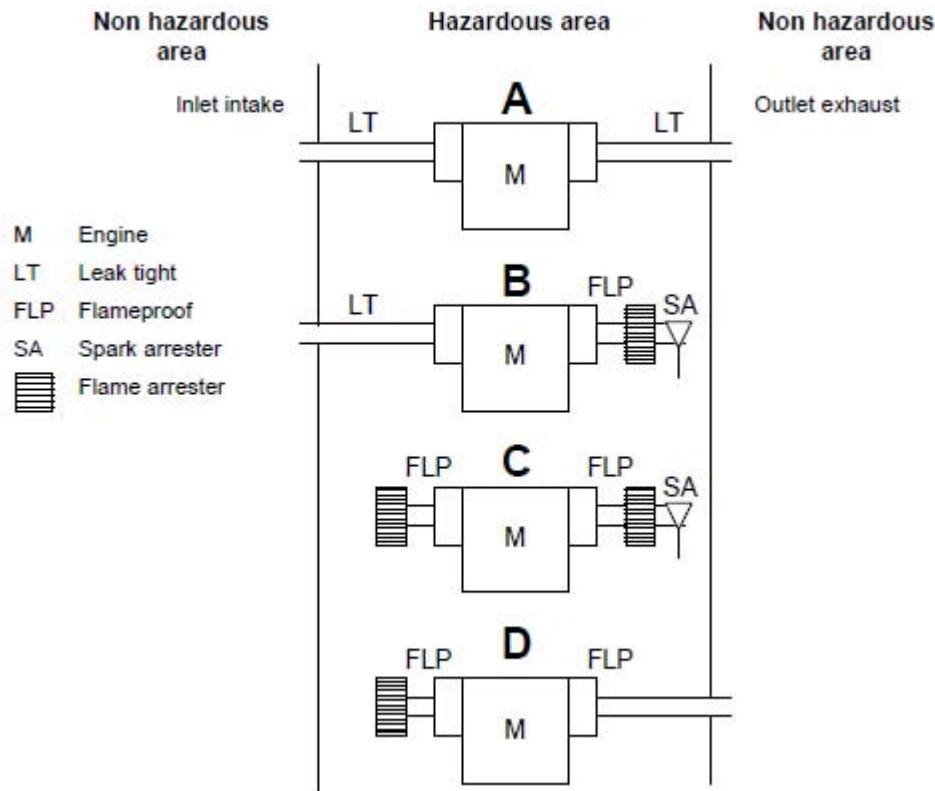
a) Additional requirements for zone 2-approved diesel engines

For detailed requirements for zone 2-approved diesel engines, see EN 1834-1.

The following requirements also apply:

- For diesel engines located in containers special requirements in 4.2.7 apply.
- Electrical systems for diesel engines shall be Ex-proof, see 4.5.1.
- Refer to EN 1834-1, 5.3. The engine's exhaust temperature shall not exceed 300 °C. The engine's surface temperature and the exhaust pipe temperature shall not exceed 200 °C. The test journal that documents this shall form part of the documentation.
- Requirement for flame arresters, see EN 1834-1, 5.6, 5.7 and Figure1. The engine's air inlet and exhaust outlet should be located in an unclassified area.
- Supplier shall provide documentation for maximum temperature for rapid shut-down, see data sheet H. Before using diesel engines, the risk potential from instant shut down shall be evaluated (high temperatures)

Figure: 1 Principle layout for location of engine's air inlet and exhaust outlet



Alternative to the EN 1834-1 solution of Ex-proof, which is approved /certified by a technical control unit (Notified Body), can be accepted.

b) Non-Ex-proof diesel engines

Diesel engines with associated equipment not Ex-proof shall only be used at an adequate distance from hazardous areas, and shall always be connected to the installation's emergency shutdown system for ignition sources.

An "adequate distance" means that any gas leakage shall be detected by the installation's gas detection system before explosive gas can reach the diesel engine.

This assessment shall be carried out and approved by the responsible person in the company in connection with the requisition.

This approval shall be added to the checklist from the supplier.

Dispensations can be made for "cold" installations free from hydrocarbons (e.g. building or removing the installation) as described in the table under 4.3.1.5.

4.3.1.5 Alternative to gas detector in the combustion air inlet

Application of this subclause requires prior approval by company. This approval shall be added to the checklist from the supplier.

Diesel engines not equipped with a gas detector and associated shutdown functions can be used if the requirements below are met.

The table shows these requirements using key words.

	A) Cold installation (e.g. building or removing the installation)	B) Located at an adequate distance from classified areas	C) Located in or near zone 2 classified area
Diesel engine for non-critical equipment	a) No gas detector on the equipment. b) No ignition source shutdown.	a) Gas detectors in adjacent area(s), no gas detector on equipment. b) Automatic ignition source shutdown. c) Automatic closure of air inlet (overspeed protection). d) Location and use approved by responsible person of the company.	a) Gas detectors in adjacent area(s), no gas detector on equipment. b) Automatic ignition source shutdown. c) Automatic closure of air inlet (overspeed protection). d) Ex-approved equipment (approved for zone 2 as a minimum).
Diesel engine for critical equipment	a) No gas detector on the equipment. b) No ignition source shutdown.	a) Gas detectors in adjacent area(s), no gas detector on equipment. b) No automatic ignition source shutdown. Procedure for manual shutdown in the event of detected gas. c) Automatic closure of air inlet (overspeed protection). d) Ex-approved equipment (approved for zone 2 as a minimum).	a) Gas detectors in adjacent area(s), no gas detector on equipment. b) No automatic ignition source shutdown. Procedure for manual shutdown in the event of detected gas. c) Automatic closure of air inlet (overspeed protection). d) Ex-approved equipment (approved for zone 2 as a minimum).

Explanation of terminology used in the table with reference to the letter used:

a. Gas detectors

"Gas detectors in adjacent area(s)" means that the installation is fitted with gas detection equipment in areas where there are potential sources of leakage and/or where gas from these potential sources of leakage will disperse. Any gas leakage shall be detectable before reaching the diesel engine.

b. Ignition source shutdown

"Ignition source shutdown" means that the diesel engine is connected to an ignition source control or shutdown system that shuts down the engine automatically when a low level of gas is detected (usually 10 % LEL) anywhere on the installation. This requirement applies to diesel engines that are used in non-critical activities.

For critical equipment and activities with diesel engines, see 4.3.1.3.

c. Automatic closure of air inlet

Diesel engines shall be fitted with the following safety devices:

- overspeed protection;
- automatic rapid closing valve in combustion air inlet;
- rapid closing valve in fuel inlet.

Should gas reach the combustion air inlet without being detected this arrangement will ensure a rapid shutdown of the engine.

d. Ex-approved equipment

It is recommended that diesel engines are located in non-hazardous areas. If diesel engines are located closed to or in zone 2, the engine and all equipment on the machinery shall be approved for installation in zone 2, see 4.3.1.4.

4.3.2 Type U02: Air compressors

Description of equipment:

Diesel operated or electrically operated compressor unit for the supply of compressed air.

Equipment requirements:

- a) Requirements for diesel engines, see 4.3.1.
- b) Requirements for electric motors, see 4.4.6.1.
- c) General requirements for Ex-rating, see 4.5.1
- d) Requirements for frames and lifting equipment, see 4.4.1.
- e) For requirements to PSV, see 4.3.3
- f) Noise suppression shall comply with NORSOK S-002, 5.5.
- g) Supply air shall be taken from non-hazardous areas. Supply air duct shall be secured against leaks (all-welded or flanged with seals).
- h) Fan belts shall be antistatic.
- i) Drip tray for collecting oil or diesel leaks shall be installed.
- j) The compressor shall be fitted with various stop and safety functions, including
 - gas detector in air inlet, see paragraph below the table,
 - local emergency stop, see 4.4.8,
 - remotely controlled emergency shutdown from control room,
 - various protection devices for the compressor. These shall as a minimum protect against low oil pressure and excessive cooling fluid temperature.

The functions shall as a minimum meet the requirements in the table below.

	Gas detection in air inlet (automatic)	Local emergency stop (manual)	Remote-controlled ESD from control room	Engine protection (automatic)
Compressor shutdown	X	X	X	X
Power disconnection	X		X	
Isolation of ignition sources	X		X	

Gas detector requirements for compressor

If the compressor air inlet is located in a container or other room with mechanical ventilation with a gas detector in the ventilation air inlet, there is no requirement for a gas detector in the compressor air inlet. The compressor shall be shut down when gas is detected on the installation (ignition source shutdown). For compressors with air inlet located in naturally ventilated areas, gas detector is requirement. Dispensations from this requirement can be handled in accordance with the same criteria as described for diesel engines in 4.3.1.5. Air compressors that are part of the start-up system for temporary diesel engines are exempt from the gas detector requirement.

Other references

If specified by the requisitioner, the requirements in NORSOK R-001, 2.3, 5.3 and 5.11, shall be met for larger units.

4.3.3 Type U03: Vessels/tanks

Equipment description:

Tanks which do not have other hook-up than the earthing (bonding) are not considered as temporary equipment according to this standard. Only tanks which require hook-up for electric power or instrumentation, will be considered as temporary equipment.

Equipment requirements:

- a) Vessels/tanks shall be approved, maintained and tagged/labelled in accordance with the IMDG code.
- b) Requirements for frames and lifting equipment, see 4.4.1.
- c) Vessels/tanks shall have earthing boss.
- d) The hook-up interface for shall comply with the requisition.

Requirement to safety valves, PSV:

Pressurised tanks/systems shall have protection for excess pressure.

If abnormal conditions may occur inside or outside an atmospheric tank, the need for a PSV is to be considered (over pressure safety valve protection) in addition to normal ventilation systems.

It is referred to EN ISO28300. If the normal venting system can become blocked, such as a flame trap, and then a vent system or Pressure Safety Valve shall be used.

Safety valves shall be certified and shall be maintained,

4.3.4 Type U04: High pressure cleaning equipment

Equipment description:

Equipment with fluid, fluid and steam or fluid and abrasive/polishing medium under pressure is released into the atmosphere as a jet spray through a pipe or nozzle.

Equipment requirements:

- a) Requirements for frames and lifting equipment, see 4.4.1.
- b) General requirements for Ex-rating, see 4.5.
- c) For requirement of PSV, see 4.3.3
- d) Heated equipment shall be fitted with two safety devices to prevent overheating.
- e) Heating of fluid or steam by electric power is preferred.

The "Regulations for high pressure cleaning" also apply.

4.3.5 Type U05: Steam generator

Description of equipment:

- a) Boiler for the supply of superheated water or steam (above 100 °C) normally heated by electrical heater or diesel burner.
- b) Boiler will normally be placed in a container (type X or Y).

General requirements:

- a) Requirements for frames and lifting equipment, see 4.4.1.
- b) Boilers shall be designed and built to comply with the regulations for pressurized equipment
- c) For requirement of PSV see 4.3.3
- d) The unit shall be fitted with an alarm for low water level. In special hot pipe boilers this can be replaced with a dry-out alarm (excess temperature). Any feed tank if installed shall have an alarm for low water level.
- e) General requirements for Ex-rating, see 4.5.1.

Requirements for boilers with diesel burner:

- a) Use of boilers with diesel burners shall be considered a hot work Class A (due to open flame).
- b) Use of boiler with diesel burner without Ex-proof, shall be cleared and approved by the responsible person in the company in connection with the requisition. This approval shall be added to the checklist from the supplier.
- c) Exhaust pipes shall have flameproof seals between flanged joints. Threaded or welded joints are preferred.
- d) The exhaust temperature (by the outlet) shall not exceed 300 °C. Surface temperature shall not exceed 200 °C. Test readings shall form part of the required documentation. If this requirement cannot be fulfilled, the conditions for dispensation in 4.5.1 shall be fulfilled.
- e) An approved spark arrester shall be fitted in the exhaust pipe. The spark arrester shall satisfy the requirements in EN 1834-1, 5.10 (technical requirements) and 6.4 (test requirements)
- f) Excess diesel shall be routed back to the diesel tank, not to the pump feed chamber. The return area in the tank shall be separated and ventilated to avoid continuous agitation of diesel and pressure build-up in the tank.
- g) Drip tray shall be installed below burner unit to collect any diesel leaks.
- h) All oil and diesel lines/hoses shall be made of hydrocarbon-resistant material (armoured/reinforced hose or pipe).
- i) A permanent fire extinguisher system with automatic release and external manual release shall be installed, see 4.4.2. In addition there shall be at least one fire extinguisher type ABC, minimum 12 kg provided.
- j) The diesel burner shall have a gas detector in the air inlet. When placed in a container it is required mechanical ventilation (reference 4.4.7) and gas detector shall then be placed in the container's air inlet.

For the gas detector system, see the requirements in 4.4.3. As an alternative to gas detector, requirements as described in Clause 4.3.1.5 can be applied for equipment located well away from Ex-hazardous area, see clause 4.5.1. This must be approved by the responsible company representative.

- k) The diesel burner shall have flame guard who automatically closes the diesel supply in case of loss of flame.
- l) The supplier shall provide documentation for maximum temperature for rapid shut-down, see data sheet H. Before using steam boiler/steam generator, the risk potential by instant shut down shall be evaluated (high temperatures). This is also valid for Ex-proof boiler.

Requirements for stop and safety functions:

The automatic shutdown mechanisms shall as a minimum fulfil the requirements below and in the table:

- a) Requirements for gas detector in the air inlet, see paragraph above j).
- b) Requirements for local emergency stop device, see 4.4.8.
- c) Requirements for remote-controlled stop device (e.g. the installation's ESD, see 4.4.3).
- d) Equipment protection devices shall as a minimum include those described in applicable regulations relating to boilers, issued by DSB. Annex 1 clause 2.
- e) Fire detector (requirements for diesel burner located in room or container) see 4.4.2.

	a) Gas detection in air inlet	b) Local emergency stop	c) Remote- controlled ESD from control room	d) Equipment protection	e) Fire detector
Stop diesel burner	X	X	X	X	X
Close diesel supply valve	X	X	X		X
Disconnect el. power supply	X		X		X
Isolate ignition sources	X	X	X		X
Pressure relief of unit	X	X	X		X

4.3.6 Type U06: Mobile cranes

Equipment requirements:

Requirements for diesel engines, see 4.3.1.

Mobile crane are not built according to Z-015, therefore non-compliances have to be identified and compensated.

Below are lists with some requirements and other issues which are recommended to be considered in this context.

Requisitor (operator):

1. The requisitor must specify the equipment outriggers, lifting workload in tonnes and positioning on the platform, see Annex A 2.1

Supplier /at supplier:

1. If the crane is separated with an upper. Lifting section and lower carrier, the lower section has to be de-energized before the crane is used.
2. A local control cabinet must be fitted on the crane to handle alarm and shut –down functions. (See requirements in clause 4.4.2)
3. The crane shall be equipped with portable gas detectors, one of which the crane operator shall have in the operator cabin, connected to the local control cabinet. If power plugs/sockets are used for connections, individually, they shall not be interchangeable with other plugs or sockets.
4. A shut down valve shall be controlled by the gas detector equipment and give automatic shutdown of the combustion air for the engine with measurements of gas over 10% LEL:

5. The crane shall be delivered with rubber cable and plug (single phase. -230V, 50/60Hz) suitable for the sockets on the installation. At loss of external power, the mobile crane shall be shut down (see 4.4.4 b. Signal from CCR to container or equipment).
6. The crane is manned under operation. Therefore crane condition alarms do not need to be relayed to the CCR. See 4.4.4 a).
7. Local emergency stops shall be fitted on the crane (see 4.4.8).
8. The mobile cranes shall be checked and tested at the supplier's facility. In particular the shutdown functions have to be tested. All limit switches have to be function tested. The crane operator has to be familiar with the shutdown procedures and the alarms for the crane. As long as the crane is in operation, it will be manned by a crane operator, and this should be taken into consideration when shut downs are tested. E.g. high oil pressure and high cooling water temperature, the crane operator will shut down the crane.
9. Normally the crane will not have drip tray (see 4.3.1.1 i)). Therefore leakage checks must be carried out at the supplier's facility prior to delivery.
10. Crane cabins normally do not comply with the offshore HSE requirements.
 - a) The cabin heater with diesel burner is not acceptable.
 - b) Ventilation and fresh air may be achieved by opening a window.

At coastal base:

1. The mobile cranes are in general not certified with lifting arrangement for offshore operation. Therefore mobile crane has to be considered as cargo / load. The lift may vary from a single 25 ton lift in an approved lifting basket, to 100 tons made up of several lifts in several approved lifting baskets or frames. In such events, it should be referred to an approved SJA (Save job Analysis) under point 1.3 mechanical condition in the checklist, see Annex C. The SJA must be carried out and the user instructions must be available before the crane is lifted onto the platform.
2. The diesel tanks shall be empty during transport to the unit.

On board the unit:

1. Lack of space in the engine bay means that a spark arrestor will not have been fitted to the diesel engine. This is compensated for by positioning the crane in safe zone or by taking the exhaust to a safe area, see 4.3.1.4.
2. The shutdown system of the crane shall always be tested prior to usage on the installation.
3. The lack of a full alarm system (PA) on the crane, has to be compensated by the crane operator using "headset" in direct contact with the CCR.
4. The crane operator should be equipped with an Ex-flashlight and should wear it as long as he is working at and in the crane. This may be borrowed on the installation.
5. To ensure that the crane is de-energised when the crane operator leaves the crane, the emergency stop shall be activated.
6. Loads in the crane hook when the shut-down system is activated shall be lowered or left to hang on the brakes according the agreed procedure. This shall be clarified in the risk analysis.
7. The crane shall close down on the platform's lowest level of ignition source disconnection (see 4.4.3 and 4.4.4). This is carried out by supplying the crane with single phase – 230V, 50/60 Hz plug (Rubber cable) which connects to the socket on the platform and guided by the platform's shut down system. At loss of power, the mobile crane is shutdown.
8. The crane operator shall have the necessary familiarity with the crane including the documentation which accompanies the crane.
9. The diesel tank shall be empty during return transport from the platform.