

Safe use of lifting and transport equipment in onshore petroleum plants

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Foreword	3
1 Scope	4
2 Normative og informative referanser	4
2.1 Normative references	4
2.2 Informative references	4
3 Terms, definitions and abbreviations	4
3.1 Terms and definitions	5
3.2 Abbreviations	8
4 Safe use of lifting equipment	9
4.1 General	9
4.2 Overall requirements	9
4.3 Management	9
4.4 Risk assessment	9
4.5 Planning	10
4.6 Limitations	10
4.7 User check	10
4.8 Communication	10
4.9 Safe execution	11
4.10 Equipment owned by contractors	14
4.11 Completion and evaluation	14
5 Additional requirements for the lifting of personnel	14
5.1 General	14
5.2 General requirements	14
5.3 Suspended work platform and elevating work platform	15
6 Additional requirements for different lifting appliances	15
6.1 Mobile crane	15
6.2 Tower crane	16
6.3 Portal and jib cranes	16
6.4 Overhead crane	16
6.5 Lorry mounted crane	17
6.6 Cargo winch (tugger)	17
6.7 Lifting and stacking truck	18
6.8 Simple lifting appliance	18
6.9 Bulk handling machine and tractor	18
7 Additional requirements for different types of lifting gear	18
7.1 General	18
7.2 Storage of loose lifting equipment	18
7.3 Slings	19
7.4 Chain	19
7.5 Shackles	19
7.6 Eye bolts and eye nuts	19
7.7 Wire rope clamps	19
7.8 Beam clamps and trolleys	20
7.9 Turnbuckles	20
7.10 Lifting nipples and lifting caps	20
7.11 Single and multi-sheave block	20
7.12 Load carriers	20
7.13 Load carriers for gas cylinders	21
7.14 Big bags	21
7.15 Claws, clamps, vacuum lifters and magnet yokes	21
7.16 Wire pulling tackle	21
8 Permanent attachment points and temporarily assembled lifting appliances	21
8.1 Permanent attachment points for lifting appliance	21
8.2 Lifting points on lifted component	22
8.3 Attachment point for pulling	22
8.4 Attachment points built with scaffolding material	22
8.5 Loader arms, movable gangways etc.	22

8.6	Temporarily set-up lifting appliance	22
9	Requirements for transport operations	24
9.1	General requirements	24
9.2	Transport in the plant	24
9.3	Securing of loads	24
9.4	Width of load and vehicle	24
9.5	Length of vehicle and load	24
9.6	Transport of chemicals	24
9.7	Completion and evaluation	25
Annex A (Normative) Roles and responsibility		26
Annex B (Normative) Training requirements		29
Annex C (Normative) Requirements to local procedures		37
Annex D (Normative) Transport in the plant		38
Annex E (Normative) Documentation and marking		39
Annex F (Normative) Hand signals		40
Annex G (Normative) Maintenance		42
Annex H (Normative) Enterprise of competence		43
Annex I (Normative) Risk mapping		48
Annex J (Informative) Examples of lifting equipment		50
Annex K (Informative) Human factors		51
Annex L (Informative) Tandem lift		53

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 recognized international standards, adding the provisions deemed necessary to fill the broad needs of the Norwegian industry. Where relevant, NORSOK standards will be used to provide the Norwegian industry input into the international standardization 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 from The Norwegian Oil Industry Association (OLF), The Federation of Norwegian Industry, the Norwegian Shipowners' Association and The Petroleum Safety Authority Norway. NORSOK standards are administered and published by Standards Norway.

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

NORSOK standards are administered and published by Standards Norway.

Introduction

This NORSOK standard shall help to establish, maintain and further develop a high level of safety and working environment in the planning and execution of lifting and transport operations.

During the preparation of this NORSOK standard, consideration was given to Norwegian regulations, European Standard and International Standard.

The Petroleum Safety Authority Norway (PSA) carries out supervision regarding the regulations given in, or with a basis in, the regulations relating to health, safety and environment. Safety and working environment for petroleum facilities on land are regulated through "Temporary regulations relating to HSE for certain petroleum facilities on land and connected pipeline systems".

For the area of jurisdiction of this regulation, the PSA is the supervisory authority for lifting and transport operations. This includes "Regulations for use of equipment at work" and "Regulations for machinery" issued by The Norwegian Labour Inspection Authority (DAT), and "Regulations for the transport of dangerous goods on roads and railways" issued by the Directorate for Civil Protection and Emergency Planning (DSB) with amendments.

1 Scope

This NORSOK standard embraces the safe use of lifting and transport equipment used in connection with lifting operations in the petroleum activities on land. It does not include the use of personnel lifts and fall protection equipment.

NOTE Examples of lifting equipment covered by this NORSOK standard can be found in Annex J.

2 Normative og informative referanser

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 the requirements of the referenced standards.

2.1 Normative references

ISO 4306-1,	<i>Cranes – Vocabulary – Part 1: General</i>
ISO 9926-1,	<i>Cranes – Training of drivers – Part 1: General</i>
ISO 9927-1,	<i>Cranes – Inspections – Part 1: General</i>
ISO 12482-1,	<i>Cranes – Condition monitoring – Part 1: General</i>
ISO 13284,	<i>Fork-lift trucks – Fork-arm extensions and telescopic fork-arms – Technical characteristics and strength requirements</i>
NS-EN 13000,	<i>Cranes – Mobile cranes</i>
NS-EN ISO/IEC 17020,	<i>General criteria for the operation of various types of bodies performing inspection (ISO/IEC 17020:1998)</i>
FOR-2002-07-16-1139,	<i>Regulations for classification, marking etc. of dangerous chemicals</i>
PSA regulation 1595,	<i>Temporary regulations relating to HSE for certain petroleum facilities on land and connected pipeline systems</i>
DAT regulation 608,	<i>Regulations for use of equipment at work</i>
DAT regulation 820,	<i>Regulations for machinery</i>
DSB regulation 1331,	<i>Regulations for the transport of dangerous goods on roads and railways</i>
ADR rules,	<i>European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)</i>
	See <i>Regulations for the transport of dangerous goods on roads and railways</i>
	Available online at the DSB web-page:
	http://www.dsb.no/Article.asp?ArticleID=2375&Framework=normalt&oppslag=1
DNV Rules for Marine Operations,	<i>Rules for Planning and Execution of Marine Operations, Part 2, Ch.1 Load Transfer Operations</i>
OMHEC Guidance Documents,	See web-page http://www.omhec.org/default.aspx?aid=5
Requirements for certification established by "Coordinating panel for cranes, fork lift trucks and bulk handling machinery"	Available online as a factsheet on the DAT web-page:
	http://www.arbeidstilsynet.no/c26976/faktaside/vis.html?tid=28244

2.2 Informative references

None

3 Terms, definitions and abbreviations

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

3.1 Terms and definitions

3.1.1

plant

facility for processing hydrocarbons, and gas power plants

NOTE Includes all areas and systems that are within the plant area, including building projects.

3.1.2

blind lift

lifting operation where the lifting appliance operator does not have a direct view of the load or landing area

NOTE Use of closed circuit television for monitoring the work area is not considered to be direct view.

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

documented training

training whereby it can be documented that the person who will use the lifting or transport equipment has received practical and theoretical training that provides knowledge about its structure, operation, applications, limitations and scope of use, as well as maintenance and inspection in accordance with the requirements set for safe use and operation stipulated in regulations and instructions for use. See "Regulation for use of equipment at work", § 47 and § 48

3.1.5

simple lifting appliances

lifting appliances constructed and placed so that use is not considered to involve a hazard to life or health. See 6.8

NOTE E.g. overhead cranes, winches, chain hoists, monorail cranes, etc.

3.1.6

principal competent person

person who shall have necessary qualifications within the disciplines and inspection duties to be carried out, and be approved by the certifying authority

NOTE The competence and approval of an *Enterprise of Competence* is tied to the principal competent person. If inspections are carried out by other than the principal competent person, then he/she is responsible for ensuring that the inspector(s) has/have the necessary competence and experience.

3.1.7

dangerous goods

goods that are classified and marked in accordance with the ADR rules

3.1.8

fixed attachment point

pad eyes, winch foundations, movable crane foundations, lifting beams and beams for temporary attachment of beam clamps

3.1.9

pre-use and post-use check

visual and functional assessment of the lifting equipment's technical condition before and after use without disassembly

3.1.10

suspended work platform

mechanically operated work platform that can move freely

NOTE E.g. suspended on rope.

3.1.11

snatch block

lifting equipment consisting of at least one sheave in a frame with an attachment point for rope, wire sling or chain that can be attached to a fixed point or to a movable point on the load.

3.1.12

can

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

3.1.13

elevating work platform

mechanically operated work platform that moves vertically in guides

3.1.14

controller

person in enterprise of competence who has sufficient theoretical knowledge, practical experience and understanding to carry out control of lifting equipment in a satisfactory manner

NOTE See requirements developed by "Coordinating panel for cranes, fork lift trucks and bulk handling machinery". Available as factsheet on the DAT web pages.

3.1.15

crane

lifting appliance whereby the load can be moved horizontally in one or more directions, in addition to the vertical movement

3.1.16

critical lifting operations

operations requiring a work permit and special safety measures

NOTE These operations include, but are not limited to

- lift over critical areas, and process equipment,
- personnel transport with the lifting appliance (unless management has established other approval arrangements),
- coordinated lift where the weight exceeds the maximum lifting capacity of one of the lifting appliances,
- overload testing of a lifting appliance with SWL over 10 tonnes,
- lift of special loads such as structures, etc,
- utilization of more than 75% of the lifting capacity of a mobile crane or truck mounted crane.

3.1.17

critical and special transport operations

transport operations requiring a work permit and special safety measures

NOTE These operations include, but are not limited to

- transport of long or wide objects,
- transport/moving of heavy objects,
- transport of dangerous goods,
- transport of objects that require special safety measures (for instance high or offset centre of gravity, transport over uneven terrain, etc.).

3.1.18

load carrier

all types of containers (except standard ISO containers), gas cylinder racks, wheelbarrows etc. that are equipped with lifting lugs for handling by a crane

NOTE Containers that can only be handled by a fork lift truck (such as ISO containers) are not defined as a load carrier. For description of attachment points on units to be lifted, see 8.2.

3.1.19

lifting and stacking truck

forklift truck and similar mobile motorized work equipment for combined lifting, moving and stacking

3.1.20**lifting components**

parts of the structure of, or used as part of, a lifting gear

NOTE E.g. hooks, shackles, rings, eye bolts, etc.

3.1.21**lifting operation**

all administrative and operational activities before, during and after a load is moved and until the lifting equipment is ready for a new load

3.1.22**lifting appliance**

combined unit that is used to lift loads, with or without horizontal movement

NOTE Examples of lifting appliances are shown in Annex J.

3.1.23**lifting gear**

components or equipment used between the lifting appliance and the load or on the load to grip it, but which is not an integrated part of the lifting appliance

NOTE Examples of lifting gear are shown in Annex J.

3.1.24**lifting equipment**

common term for lifting gear, lifting appliances and lifting components, used together or individually

3.1.25**bulk handling machinery**

motorized machine constructed for lifting or transporting bulk loads such as soil, sand, stone etc.

NOTE Examples of bulk handling machines are shovel loader, road scraper, digger, bulldozer, dump truck and excavator.

3.1.26**material handling plan**

plan for moving load in the plant to ensure a safe and efficient operation

NOTE The material handling plan takes into account, among other things

- the need for type and number of lifting and transport equipment,
- the need for loading and unloading areas,
- preparing for the use of lifting and stacking trucks, trolleys etc.,
- access to areas and workplaces for operation and maintenance.

3.1.27**personnel lifter**

machinery with a work platform or basket constructed and approved in accordance with "Regulations for Machinery" to lift or transport personnel, and which is controlled from the platform or basket

3.1.28**rigger**

person who is competent to assemble, control and issues tags for temporarily assembled lifting appliance

3.1.29**competent control**

control carried out by an enterprise of competence in order to verify that machinery satisfies relevant requirements and is designed, embedded, installed, set up, tested, documented and maintained in such a way that use of the machinery is fully justified

NOTE See Annex H.

3.1.30**declaration of conformity**

document where the producer, or his representative, declares that the marketed machine or safety component is in accordance with laws, regulations and standards

3.1.31**certificate**

form based on ILO's recommendation (issued by the enterprise of competence/competent person) confirming that the lifting equipment meets statutory requirements and is designed, embedded, installed, set up, tested, documented and maintained in such a way that use of the lifting equipment is fully justified.

NOTE The certificate shall state which set of rules the certificate is based on.

3.1.32**enterprise of competence**

entity in the operator companies' organization, or in other companies or institutions, that together have sufficient theoretical knowledge and practical experience to understand calculations for lifting equipment, its design and function, and to carry out necessary examinations and tests in order to issue certificates

NOTE See Annex H.

3.1.33**examiner**

expert within the area of competence who evaluates the examination result from a candidate

3.1.34**certified safety training**

training provided by certified training enterprise in accordance with the requirements in section 49 and section 50 of DAT Regulation no. 608 *Regulations for use of equipment at work*

3.1.35**safe working load****SWL**

maximum load the lifting equipment is certified to withstand under normal use

NOTE 1 For lifting gear with several legs, this is marked for a working angle of 30 degrees.

NOTE 2 SWL is normally used by ILO and shall apply on all floating and other mobile installations and ships that are not covered by EU regulations.

3.1.36**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

NOTE Verbal form is used in connection with requirements which shall be fulfilled to be in accordance with this NORSOK standard. If other solutions are necessary, this shall be treated as a nonconformance and dealt with as a deviation according to company requirements. The alternative solution, together with any compensating measures, shall provide an equivalent level of safety.

3.1.37**working load limit****WLL**

maximum load that a sling or a lifting component is certified to withstand under normal use and in a given configuration

NOTE For lifting gear with several legs, this is marked for a working angle of 45 degrees.

3.2 Abbreviations

ADR	European Agreement Concerning the International Carriage of Dangerous Goods by Road
CE	Conformité Européenne (CE marking confirming compliance with the basic requirements in EU directives)
CETOP	European Fluid Power Committee
HAZOP	hazard and operability study

ILO	International Labour Organisation
ISO	International Organisation for Standardization
NDT	non destructive testing
NS-EN	European Standard that is established as a Norwegian Standard
OMHEC	Offshore Mechanical Handling Equipment Committee
OTF	Operational and Technical specialist working group, Cranes and Lifting (Working group within <i>Working together for Safety SfS</i>)
SJA	safe job analysis
SWL	safe working load
WLL	working load limit

4 Safe use of lifting equipment

4.1 General

Clause 4 describes general requirements for a lifting operation and how the persons involved shall carry it out. This description applies to all types of lifting equipment used. Subsequent sections state additional requirements that apply for different types of lifting equipment.

4.2 Overall requirements

All use, maintenance, storage, checks, inspection and examination of lifting equipment shall comply with the applicable regulations, standards, manufacturer's instructions for use and the requirements in this NORSOK standard.

The lifting equipment shall not be used for other purposes than those stated without the consent of the manufacturer and the enterprise of competence.

It is not allowed to operate the lifting equipment with any of the safety devices disconnected, unless the operating instructions allows this.

Lifting equipment shall only be used by personnel who have and can document competence as described in Annex B.

Responsibilities of the company and personnel who are involved in lifting operations are described in Annex A.

Load transfer between ship and quay shall be planned and calculated in accordance with DNV's rules for marine load transfer operations.

4.3 Management

The operational responsible person shall manage all of the activities with lifting appliances within his area of responsibility.

Lifting appliance operator is in charge of the individual lifting operation.

When considered to be safer, a person other than the lifting appliance operator can be designated to be in charge of the lifting operation.

If a signaller is involved in the lifting operation, he shall be responsible for directing the load.

4.4 Risk assessment

All personnel involved shall assess the need for a pre-job talk, SJA or use of other risk analysis methods as described in Annex I.

If, during the execution of a lifting operation, there is a change in operational conditions or in the assumptions on which the risk mapping was based, the operation shall cease and a new risk assessment shall be carried out.

4.5 Planning

Each lifting operation shall be planned in order to ensure safe execution and that all predictable risks are taken into consideration. The planning shall be carried out by personnel who have the relevant competence.

For repeated or routine operations, such planning is only necessary the first time, provided that an operating procedure is in place or documented in another way. Periodic revisions shall be carried out to ensure that no critical factors have changed.

The planning of lifting operations shall, as a minimum, ensure that

- all personnel involved are familiar with the task, i.e. what is to be lifted, weight of the load, what lifting equipment to use, the travel path, and the roles of the persons involved in the lifting operation,
- the shift going off duty shall inform the shift coming on duty about ongoing and planned work that may have a significance for the continuation of the lifting operation (shift going off duty shall also give information about any incidents),
- sufficient personnel are present at all phases of the lifting operation,
- the travel path is clarified and any obstacles are removed before lifting commences,
- barriers are in place to prevent personnel from walking or standing under suspended load,
- method of communication is clarified,
- the lifting operation can be executed safely in relation to simultaneous operations,
- lifting appliances and lifting gear are suitable and will be used in accordance with the manufacturer's instructions for use,
- the landing area can accommodate the load in terms of size and weight,
- cranes are not positioned on culvert, manhole cover or places where the crane can cause damage to equipment under ground,
- use of tag line is considered,
- personnel involved have sufficient competence and knowledge of the regulations and standards that govern the operation that is to be executed,
- work permit is obtained for critical lifting operations.

4.6 Limitations

The lifting appliance operator shall map and take into consideration limitations that can affect the lifting operation, including the capacity of the lifting equipment, weather conditions, landing areas, blind zones and other limitations as a result of the travel path.

In general, the wind limitations of the crane shall be adhered to. The weight, area and shape of the load, and the position of the crane shall be considered when setting wind limitations during the planning/SJA of the lift.

For outdoor lifts, the wind force in the operating area of the crane shall not exceed 15 m/s.

4.7 User check

User of lifting equipment shall check the lifting equipment and make sure that it is in a safe condition before and after use.

The pre-use and post-use checks should include the following:

- visual check of the lifting equipment;
- function test of the equipment in accordance with the manufacturer's recommendations;
- function test of the emergency stop device;
- report any faults or defects to the technical responsible person.

Daily check routines of the lifting equipment can cover this user check requirement.

Lifting appliances shall not be used if safety systems or parts of safety systems are not functioning or have been isolated.

4.8 Communication

At all times there shall be adequate communication between all personnel who are involved in the lifting operation. If radio communication equipment is to be used, then this shall be suitable for the particular lifting

operation and the routines in the plant. The operator of the lifting appliance shall obey any stop signal, even if this comes from other persons on the same radio channel.

Radio check shall be carried out prior to the start of the lifting operation. When directing the load, instructions shall be clear and unambiguous.

The lifting appliance operator can repeat the signaller's instructions (confirmatory communication) to avoid any misunderstandings during lifting operations.

When directing the crane in blind zones, transporting personnel and other lifting operations where radio communication is of prime importance, confirmatory communication shall be used.

In order to help the lifting appliance operator, the desired crane movement can be stated in metres. (For instance in assembly operations)

Where appropriate, a communication method can be chosen whereby the signaller gives a continuous signal to continue the movement. The lifting appliance operator shall stop immediately if he does not receive the signal.

If the radio is blocked or contact is lost, the lifting operation shall be stopped.

The method of communication to be used shall be agreed as part of the pre-job talk or SJA.

Unnecessary use of radios shall be avoided.

If any noise or activity is distracting the lifting appliance operator or other personnel involved in the lifting operation, then the lift shall be stopped.

Unless otherwise agreed, communication shall be in Norwegian. All personnel who are involved shall be competent in the language chosen.

When directing the crane, the following instructions shall be used:

Instruction (Norwegian)	Instruction (English)	Action
Hiv	Pick up	lift the load
Lår	Lower	lower the load
Topp bom	Boom up	raise the boom
Legg bom	Boom down	lower the boom
Sving høyre	Slew right	slew to the right (from crane operator's position)
Sving venstre	Slew left	slew to the left (from crane operator's position)
Stans	Stop	stop the movement immediately
Pent/fint/rolig	Gently/slowly	slow movement
Slakk av	Slack off	release tension in the wire so that the hook can be released
Fri krok	Hook free	lift up released hook
Teleskop ut	Extend boom	extend telescopic boom
Teleskop inn	Retract boom	retract telescopic boom

If communicating by other means than radio, the following shall be considered:

- involved personnel close to each other;
- the influence of noise on the communication;
- visual contact between involved personnel during the whole lifting operation.

If visual signals are used, the hand signals shown in Annex E shall be used.

Lifting appliance operator shall at all times be fully attentive to the operation.

4.9 Safe execution

4.9.1 Fundamental safety requirements

The load and any load carrier shall be properly secured and prepared before the lifting operation commences.

For transport of bulk loose material, a load carrier shall be used that is designed such that material cannot fall out during loading or unloading operations. Liquid products shall be transported in sealed load carriers. For internal transport, load carriers should be used where practical.

Necessary barriers shall be established before the lifting operation starts, to prevent personnel from coming under a hanging load.

Loads shall not be transported over personnel.

Personnel shall not walk under suspended load.

All personnel who are involved in the lifting operation shall ensure that they have an unrestricted escape route in all phases of the operation.

Loads shall be attached to the lifting appliance and handled in such a way that the load remains stable throughout the entire lifting operation, and after being released.

The lifting operation shall cease immediately if safety is jeopardized, when instructions are unclear, or in the event of loss of communication.

Lifting appliance operator shall only obey instructions from the designated signaller, but shall obey the emergency stop signal at all times, regardless of who gives this signal.

Lifting appliance operator shall not leave the operator's cabin or station with load hanging on the hook.

In case of an emergency evacuation, the load shall if possible be made safe before evacuating. For critical lifting operations, the possibility of an evacuation shall be part of the planning and SJA.

If a lifting appliance is used as a suspension point for a snatch block or similar, then the suspension point shall be made safe.

If a block and tackle/chain hoist is used between the hook on the lifting appliance and the load in order to maneuver the load in connection with assembly or disassembly work, care shall be taken to ensure that the block and tackle/chain hoist does not become load bearing when the lifting appliance is in motion.

Operations with lifting appliances shall be stopped when the weight of the load is unknown, or if the load has become stuck, for instance has frozen to the ground. The signaller and slinger shall pay particular attention to the load being free before lifting commences.

To prevent overloading of lifting equipment, when it is used in disassembly operations, it should be checked that the load shown on the load indicator is in accordance with the given or assumed weight of the load.

If the crane has two independent lifting systems, then loose lifting gear should be removed from the hook not in use.

4.9.2 Manning for crane operations

All participants in a lifting operation shall, at all times, know who the signaller is.

During lifting operations, there shall always be two signallers/slingers available in the plant. The operator of the lifting appliance can evaluate if a safe operation can be carried out without the direct involvement of the signaller/slinger. The one who is not involved, shall be in his working clothes and be able to be contacted over radio.

There shall be at least two signallers/slingers directly involved in operations where any of these applies:

- blind lifts;
- narrow landing conditions;
- use of tag line;
- complex lifts like tandem lifts and construction lifts.

The signaller and slinger shall stand in a safe area at all times when the crane and/or lifting wire is moving.

During lifting operations there shall always be at least two persons in the area, in the event it should become necessary to raise an alarm.

If the lifting appliance operator has a good visual overview of the area (not by means of a camera), the signaller can carry out the slinger's duties. In such circumstances, the signaller can, with clearance from the lifting appliance operator, handle/maneuver the load when it is under control, and manually guide the empty hook to and from the load or load carrier.

Participants in lifting operations and their roles can be made known through the wearing of special clothing, such as a reflective vest, hardhat or similar.

4.9.3 Blind lifts

In connection with blind lifts, there shall always be at least two persons (signaller and slinger) who have visual contact with the load and each other, and have radio contact with the lifting appliance operator. Any closed circuit television that monitors the work area is considered to be an aid, and not a replacement for either of these persons.

If a load has to be pushed or pulled into position manually, a signaller shall be present by the load or as close to the load such that he can direct the lifting appliance safely and thereby address the safety of other involved persons.

Where possible, the signaller should place himself in a position where he can give the stop signal manually in the event of radio failure.

4.9.4 Lifting operations through hatches and in shafts

For lifting operations through hatches and in shafts, the requirements for blind lifts apply, see 4.9.3.

Lifting through several levels shall be covered by local procedures, possibly through an SJA. In particular, the risk of the load or load carrier snagging on hatch frames should be assessed.

4.9.5 Use of tag line

Lifting appliance operator shall assess and approve the use of tag line.

The end of the rope shall be secured against fraying, but knots shall not be used at the free end of the rope. Tag line should be used to keep control of a load, not to gain control over a load.

If several tag lines are necessary, personnel who are not slingers can be involved in the operation. SJA shall then be carried out, and the personnel shall have undergone the necessary training related to the use of tag lines.

4.9.6 Transport of scaffolding material and boards

Where practically possible, scaffolding material and boards should be transported in suitable load carriers.

During lifting to and from a lorry, the scaffolding material and planks should be transported in load carriers.

When moving scaffolding material and boards whereby load carrier cannot be used, nylon ratchet straps shall be used to prevent slipping. The slings shall be wrapped round twice and choked around the load. The slings should be choked in the same direction.

4.9.7 Radioactive sources, trace elements and explosives

Radioactive sources, trace elements and explosives shall be placed and handled in accordance with the material safety data sheets, marking on the load carrier and local procedures. See the ADR rules.

Receiving of containers for radioactive sources, trace elements or explosives shall be dealt with by the designated person in the plant.

4.9.8 Tandem lifts

Tandem lifts should be avoided, but when they are required they shall be calculated and SJA shall be carried out.

Tandem lifts always demand good planning and supervision of the work. The operational responsible person must therefore make sure that all predictable risks are taken into account in advance, amongst others, determination of weight and centre of gravity
For tandem lifts, the allowable load is limited to 75% of the load diagram for the crane. Consideration shall be given to the shape of the load, and influence from wind during the lift.

Enterprise of competence shall be involved in tandem lifts where the total load may exceed the lifting capacity of one of the lifting appliances being used. See Annex L.

4.10 Equipment owned by contractors

The company is responsible for ensuring that a contractor, who becomes involved in lifting and transport operations, is aware of and abides by the requirements in this NORSOK standard.

The company shall ensure that there is sufficient competence in the organization to carry out quality assurance of the contractor's equipment, competence and execution of lifting and transport operations.

Documentation for competent control of equipment owned by a contractor shall be available in a satisfactory manner at the place of use, either in an electronic system or on paper.

The responsibility of the company can be taken care of by regular verifications and inspections of the contractors lifting and transport equipment and lifting and transport operations in the plant.

4.11 Completion and evaluation

Any undesirable incidents taking place during the lifting operation shall be reported.

After the operation is completed, the persons involved shall assess whether experience transfer or improvements to operational procedures are necessary.

After the lifting operation is completed, any barriers shall be removed and the area tidied.

5 Additional requirements for the lifting of personnel

5.1 General

Machines used for lifting personnel shall be designed and approved according to "Regulations for Machinery".

For all planned use of personnel lifting, using equipment approved for the purpose, a general procedure for use of the equipment shall be available, or a SJA shall be performed for the particular operation.

If the use of a lifting appliance not approved for this use is considered to be the safest alternative, then the rules for exceptional lifts in "Regulations for use of equipment at work" shall be applied as a minimum. The safety evaluation shall be documented. Competent control of the equipment shall have been carried out no more than a month before the actual lift. This applies until 1. January 2010.

5.2 General requirements

An ongoing assessment shall take place to determine whether routine work can be carried out more safely through establishing permanent access or by identifying other methods of performing the work tasks. This assessment shall be implemented in consultation with the safety delegate service and the operational responsible person.

All lifting of personnel with lifting appliance shall be voluntarily.

During operations involving the lifting of personnel over the sea, life-vest shall be worn, and rescue stand-by shall be established.

The operator of the lifting appliance shall assess whether the operational conditions (weather, visibility, movement) permit a safe execution of the operation.

Personnel lifts shall be carried out within the wind limitations of the lifting appliance. The maximum wind speed for lifts outdoors is 10 m/s. The area shall be well lit, and weather conditions must allow work from a work basket.

When lifting personnel, other lifting and transport operations close by or over the work area for the personnel lift shall be avoided.

A minimum of two persons shall always be involved in personnel lifts. The person in the basket shall have radio communication available, and procedure for evacuation shall be established.

The area under the work platform shall be cordoned off.

Fall protection equipment shall be used when working from a work basket. Tools and equipment shall be secured against falling down.

Before the personnel lifting appliance is used, all escape methods shall be described and given a function test. Everyone involved shall be aware of all the methods available and have been given training in how to operate these.

5.3 Suspended work platform and elevating work platform

Requirements with respect to competence, use and control of suspended work platforms and elevation work platforms are based on "Regulations for use of equipment at work".

The suspension points for suspended work platforms and elevating work platforms are subject to certification by the Enterprise of Competence.

Necessary considerations shall be given to weather conditions when using suspended work platforms and elevating work platforms.

6 Additional requirements for different lifting appliances

6.1 Mobile crane

The local rules for use of vehicles in the plant shall apply.

When changing location, the mobile crane shall be made safe and correctly configured for travelling. See also chapter 9.

Mobile cranes shall only be used for lifting. Pulling or pushing a load is not allowed.

If the mobile crane is to be fitted with special equipment such as vacuum lifter, magnet yoke or grab, then the operator of the mobile crane shall have documented competence for operating this equipment.

Positioning of the mobile crane shall be in accordance with the manufacturer's instructions and the local routines in the plant.

Mobile lifting appliances shall not be placed on drainage channels, manhole covers or unstable ground such as infill edges etc.

The outrigger feet of a mobile crane shall during lifting be placed on pads suitable for the condition of the ground and the lift to be carried out.

Only the crane driver can allow access to the mobile crane. If entered by other personnel, the crane shall be secured against unintentional use.

A wind anemometer should be fitted to the boom tip.

When risk of lightning, the mobile crane operations shall be stopped.

When re-reeving a mobile crane, the procedures for working aloft shall apply.

Mobile cranes produced after September 2004 shall be equipped with safety systems as defined in NS-EN 13000. However, the requirements in NS-EN 13000 for external sound and light alarms in the case of overload shall apply to all mobile cranes.

6.2 Tower crane

Before placing a tower crane near or in a process plant in operation, a risk assessment shall be carried out with respect to assembly, use and dismantling.

Before use the crane shall be evaluated with respect to the fire and gas philosophy of the plant.

A work description shall be available before assembly and dismantling takes place.

The foundation and assembly shall be carried out according to the manufacturer's instructions, and a certificate shall be issued by the Enterprise of Competence.

A tower crane shall have an external earth connection.

Relevant personnel safety equipment shall be used during work on the crane construction, and the workers shall have training in its use.

Safe access shall be provided for operation and maintenance. For access to operator cabins higher than 25 m above ground, a lift shall as a rule be provided.

During thunder and lightning the tower crane operations shall be stopped.

If several cranes operate in the same area, (either at the same or different heights) where the boom radiuses overlap, then operational procedures shall be established. Limiting zones should be considered.

The slewing function on tower cranes shall free-wheel when the crane is not in use or in limiting wind conditions.

If moving along rail tracks the operator should have full view of the travel path and be sure it is free from obstacles. If a full free view is not possible, then the operator of the lifting appliance shall use a signaller with radio communication on the ground.

Tandem lifts using a tower crane and a ship-mounted crane is not allowed.

If the tower crane is to be fitted with special equipment such as vacuum lifter, magnet yoke or grab, then the operator of the mobile crane shall have documented competence for operating this equipment.

The Civil Aviation Authority of Norway shall be notified of tower cranes positioned closer than 5 km to an airport. Marking of the crane may be necessary, depending on the position and height. Cranes taller than 60 m shall have marking lights fitted to the top.

When leaving the crane, the main switch shall be off and locked. Cranes travelling along rails shall be secured to the rails with clamps.

During transport of self-erecting tower cranes, the slewing function shall be secured mechanically before transport.

6.3 Portal and jib cranes

During thunder and lightning the operation of outdoor portal or jib cranes shall be stopped.

If travelling along rail tracks the operator should have full view of the travel path and be sure it is free from obstacles. If a full free view is not possible, then the operator of the lifting appliance shall use a signaller with radio communication on the ground. This can be the slinger or signaller.

If the crane is to be fitted with special equipment such as vacuum lifter, magnet yoke or grab, then the operator of the crane shall have documented competence for operating this equipment.

6.4 Overhead crane

If the overhead crane is located in an area with a good overview, and there is no blind lifts involved, the lifting appliance operator can carry out the lifting operation alone by taking care of the slinger and signaller's tasks.

Operator of an overhead crane that is radio controlled shall have visual contact with the crane and load. If this is not possible, the guidelines in 4.9.3 shall be followed.