DROPPED OBJECTS AWARENESS AND PREVENTION

Reliable Securing

DROPPED OBJECTS

STILL HARMING
STILL KILLING

DROPS

We thank Statoil for their kind assistance
in the publication of this document.

Preface

In our ongoing efforts to prevent dropped objects, investigations have shown that our greatest challenges relate to behaviour, work processes and inadequate securing of equipment. As part of our improvement work, we have published this handbook, which collates relevant requirements for securing both fixed and freestanding equipment. Developed by Statoil after much research and consultation, the handbook is an excellent guide to Best Securing Practice. DROPS highly recommend these guidelines as a point of reference to all on a global basis. The handbook has been compiled in close collaboration between Statoil, equipment suppliers and users. The objective has been to improve safety by providing good illustrations of the most important factors in the prevention of falling objects.We thank Statoil for allowing us to publish the handbook to the benefit of all involved in our ongoing fight against dropped objects.

The DROPS Workgroup

December 2006

DROPS

DROPPED OBJECTS PREVENTION SCHEME

Abbreviations/terms

- **HSE** – Health, safety and the environment
- **CCTV** – Closed-circuit television
- **Documented training** – training whereby persons using the equipment have received documented practical training and theoretical tuition that has provided them with knowledge of structure/composition, operation, properties and areas of use, as well as maintenance and control, in compliance with the safe use and operating requirements in the applicable regulations and instructions for use.
- **Competent person** – This person must be able to document practical and theoretical knowledge in the discipline area, for example in the form of an examination certificate or a certificate of competence.

Contents

Purpose of the handbook 6
DROPS Calculator 8
Galvanic corrosion 10
Bolted connections 12
- Locking of screw/bolted connection 14

Correct use of lock pins 22
Securing devices (wires, chains and connectors) 24
Securing of personnel 26
Derrick evacuation equipment 28
Securing of tools in use 30
- Hand tools < 5 kg 30
- Tools 5-25 kg 32
- Securing other portable equipment 34
- Tool cabinets for work at height 36

Securing of permanently fixed equipment 38
Walkways 38
- Grating 38
- Railings 40
- Toe boards 42
- Swing gates 44
- Ladders 46

Electrical/Instruments 48
- Floodlights 48
- Light fittings 50
- Navigation lights 52
- CCTV camera 54
- Crane boom camera 56
- Loudspeakers 58
- Junction boxes and cabinets 60
- Cable ducts 62
Structures 64
- Wind walls 64
- Signs 66
Other equipment 68
- Valve wheels and valve handles 68
- Snatch blocks 70
- Umbilical roller sheaves 72
- Hanging hoses 74
- Load carriers 76
Temporary storage places 78
Unnecessary equipment at height 80

Notes 82

Purpose of the handbook

This document is intended to help eliminate the risk of falling objects. It applies both to equipment that we are going to procure and to equipment already in use on our own and hired installations. In many cases, the functional recommendations that are stipulated for the equipment in this document will set a new standard for our activities. We recognise that it may be impractical to adhere to all the recommendations, but the booklet sets a standard we must aspire to. Also, the handbook is a guide only – it does not supersede the requirements of existing legislation and/or corporate standards. The definition of barriers that will prevent objects falling and that can also be used in the procurement, use and maintenance of equipment for work at height has been an important goal. When procuring new equipment, we should endeavour to use integrated barriers. In order to minimise the danger of collision, we should always evaluate the risk associated with the chosen location when installing equipment.

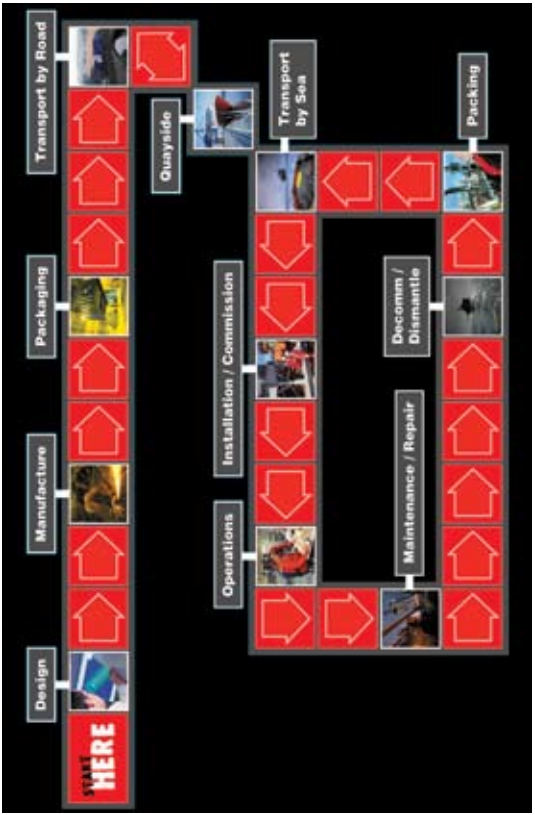
The functional recommendations set out in this handbook should be complied with through the full value chain:

- **design**
- **procurement**
- **installation**
- **operation**
- **maintenance**

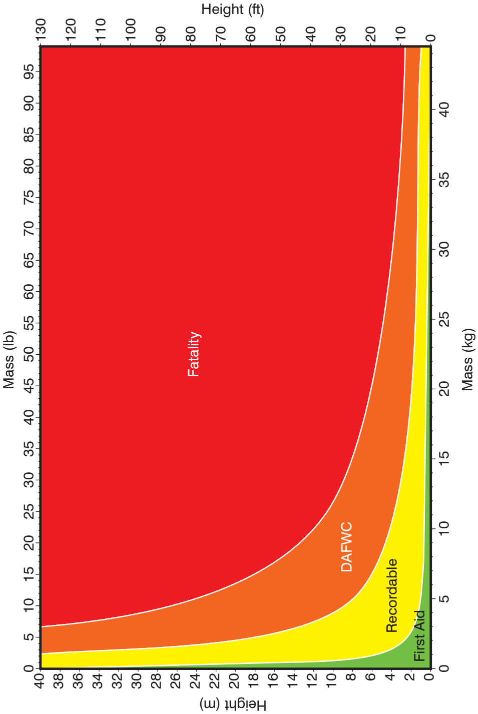
By mere compliance with these recommendations you will help achieve the goal of zero falling objects.

Who is responsible? – Everyone in the value chain.

DROPS responsibilities through the value chain



DROPS Calculator

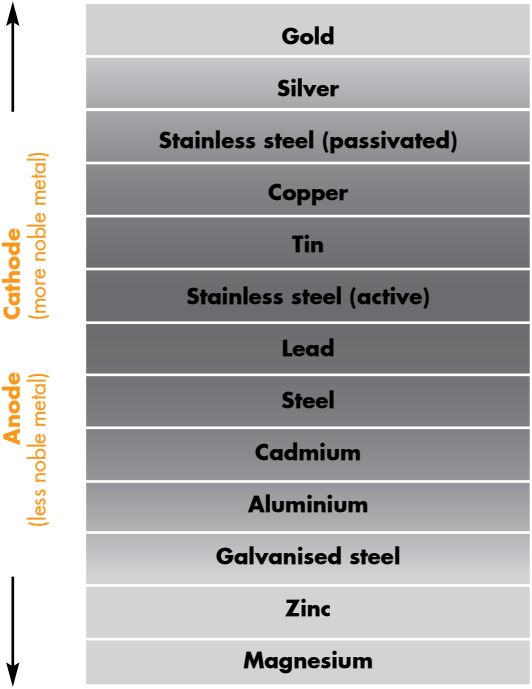


The DROPS Calculator (shown opposite) provides a common benchmark in the classification of the potential consequences of a dropped object.

One of a number of similar tools, the DROPS Calculator is endorsed by the DROPS Workgroup and recognised by the HSE. While other 'calculators' exist, they all follow the same principle – plotting the mass of a dropped object against the distance it falls to determine its possible consequences.

It is important to note that this calculator (and all others) are guides only and in reality even a very light object falling from significant height can prove fatal.

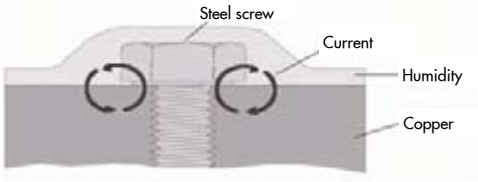
Galvanic corrosion



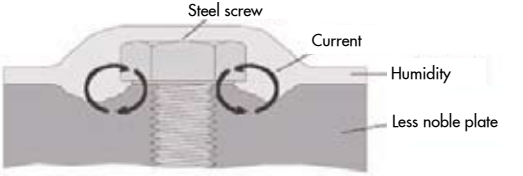
As a basic rule, only metal of the same or almost the same nobility should be combined in a corrosive environment.

Galvanic corrosion occurs when two dissimilar metals with different voltage potentials are in contact with each other in the presence of an electrolyte (damp film or seawater/ fresh water). When this happens, the less noble metal becomes the anode and the more noble metal the cathode.

If a steel screw is fixed into a copper plate, the screw will be the anode since copper is the nobler metal. The screw will rust rapidly as the difference in potential is great.



If the same steel screw is fixed into a less noble plate, eg a zinc plate, the screw will be the cathode and will not rust. The zinc plate will corrode, as it is less noble than the screw.



Bolted connections

At present, bolts are being produced to 85 different industrial standards and the requirements for bolted connections vary for the different sectors depending on the given design, operational and maintenance requirements.

Achieving a stable bolted connection will therefore require a qualified evaluation of the following factors:

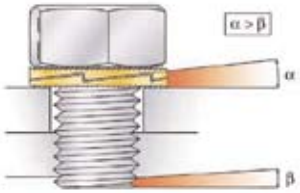
- **Load design**
- **Choice of materials with a view to mechanical properties and corrosion resistance**
- **Where appropriate, use of lubricant**
- **Pre-tensioning and use of the correct torque equipment**
- **Need for locking bolts to secure against loss of torque/pre-tension**

Eighty-five per cent of all damage to bolts etc is due to fatigue. This is primarily a result of:

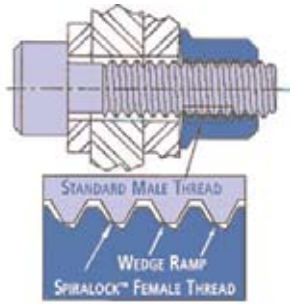
- **dynamic load with inadequate pre-tensioning**
- **overload resulting in reduced pre-tensioning**

Locking of screw/ bolted connections

Nord-lock bolt



Spiralock nut



The following methods are recommended for locking bolted connections. NOTE: Lock nuts are not recommended for locking screw/bolted connections.

NORD-LOCK BOLT SECURING SYSTEM

www.petrobolt.com

When correctly mounted, the Nord-Lock Bolt securing system provides a guaranteed secure screw/bolt lock. It works by means of wedge-locking, ensuring that the squeeze force is maintained in the screw/bolted connection.

Areas of use:

Particularly suitable for connections exposed to vibrations, eg grating, loudspeakers, guide rails etc.

SAFE-LOCK (SPIRALOCK)

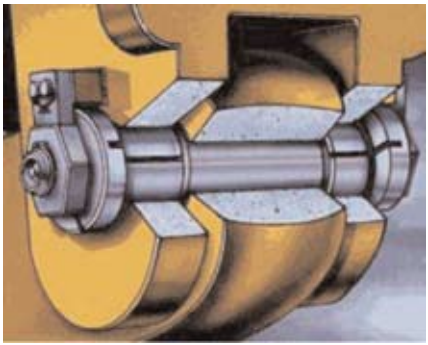
www.spiralock.com

Safe-lock is an all-metal lock nut. The nut has a specially designed threaded profile that locks when tightened and distributes the tension over the whole length of the thread. This provides better load distribution, which in turn helps to improve the locking of the screw connection.

Areas of use:

Used for fastening cable support systems.

Castle nut w/split pin



Bondura bolt

CASTLE NUT W/SPLIT PIN

Castle nuts provide a visual and reliable method for locking bolted connections. The nut has radial slots and is locked by non-corrosive split pins that are inserted through a hole in the bolt.

Generally used for bolted connections exposed to shear forces rather than tensile stresses.

Areas of use:

Critical connections or components that are disconnected frequently.

BONDURA BOLT

www.boltnorge.no

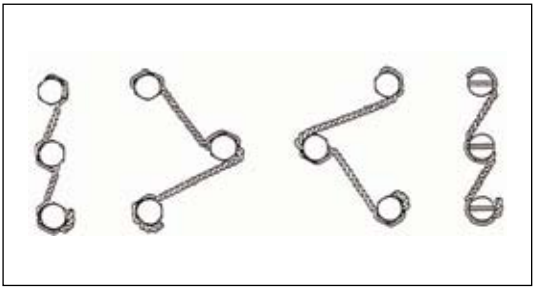
BONDURA® has a unique design which uses expanding taper sleeves at both ends of the bolt to eliminate play.

The bolt also prevents play from re-occurring. Standard screws are used to push in the bolt tapers, and the bolt is fixed directly to the machine component using locking screws. This prevents the bolt from coming loose, falling out or turning in the hole. The bolt can be retightened as the equipment is exposed to wear.

Areas of use:

Clevis bolts, Dolly, top drive, pipe rack cranes and other pipe-handling equipment.

Palnut lock washers



Safety-wiring

PALNUT

Palnut lock washers have been on the market for several decades as an alternative to locking of bolted connections. According to the product information, Palnut lock washers can be used alone or over nuts. In the offshore context they are normally used for locking over nuts.

Areas of use:

Used on through-bolts on fixed immobile equipment and on mobile pipe-handling and drill-handling equipment.

SAFETY-WIRING

Safety-wiring of bolts is a locking method adopted from the aviation industry. In brief, the method involves threading a wire through a hole in the bolt to lock it against being rotated loose. The wire is twisted before being threaded and is locked to the next bolt. The wire can be used to lock a maximum of three bolts, as shown in the illustration.

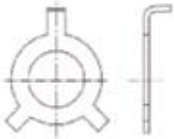
Areas of use:

Used extensively for locking external bolted connections on drill and pipe-handling equipment used in particular where there are no through-bolts and/or there is a need for simple visual control of the locking.

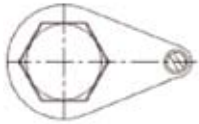
Nylock lock nut

All-metal lock nut

All-metal lock nut



Tab washer



Tab plate

Nylock lock nut

Nylock lock nuts are used extensively in the industry. This type of nut is approved for dimensions up to and including 10mm. Standard Din 985 nylock nuts have a temperature rating from -70°C to +120°C.

All metal lock nuts

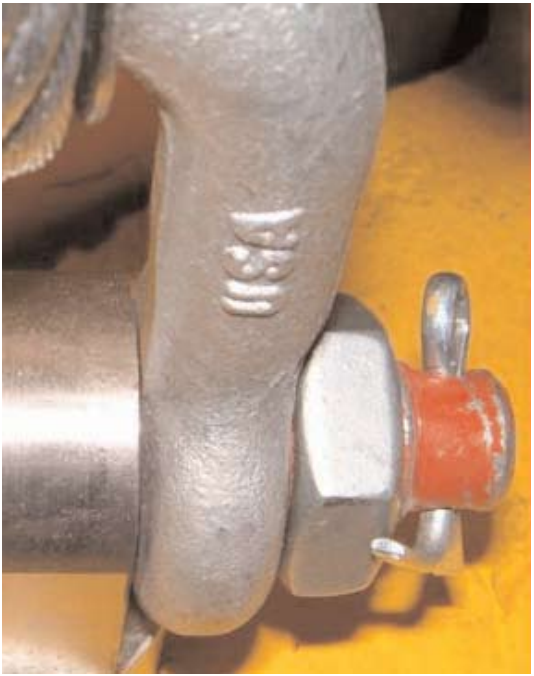
All-metal lock nuts are recommended for use on all bolt dimensions. This type of nut locks through the threaded section or top of the nut being deformed, the top of the nut being split or the nut having a toothed ring under the collar. This provides greater friction between the bolt/underlay and nut, providing a secure connection. There are many varieties and suppliers on the market. These nuts have an almost unlimited area of use.

Tab washer/tab plate

Tab washers can be used on all dimensions and in any place designed for the use of tab washers. There are several types with different areas of use for locking either nuts or bolts. It is important to use the right type for each purpose.

Tab plates can be used on all dimensions. They are used typically on machinery where it is important to prevent the bolt from rotating.

Correct use of lock pins



Pins used in shackles are often of a non-approved type, which can have serious consequences if they are knocked out of place.

FUNCTIONAL RECOMMENDATIONS

- **When hoisting persons and loads, you must always use shackles with double locking, eg nut + split pin or screwed connection with split pin.**

  Split pins such as tractor pins or hairpins must not be used.
- **For static loads, you must always use shackles with double locking as described above.**
- **Split pins should preferably be made of non-corrosive material.**
- **Approved securing pins as described above must be inspected regularly and replaced when they no longer function as intended.**

Securing devices
(wires, chains and connectors)

Wherever possible we want equipment that is mounted at height to have integrated secondary barriers. Where this is not possible, or where such barriers might involve a risk of collision, the equipment must have secondary barriers in the form of wires or chains and connectors that are securely attached to the structure.

FUNCTIONAL RECOMMENDATIONS

- **Securing devices must be designed in accordance with the equipment supplier's calculations.**
- **Wires must be locked in accordance with the manufacturer's instructions.**
- **The chain or securing wire must be as short as possible and fastened as tightly as possible over the object to be secured. This will minimise the length of fall and thereby also the fall energy.**
- **Securing devices must be installed, maintained and inspected in accordance with the information provided in the user manual or instructions.**

Securing of personnel

In work at height for which anti-fall equipment is mandatory, the necessary expertise is required to ensure safe working conditions.

FUNCTIONAL RECOMMENDATIONS

- **Anyone using personal protective equipment against falls from heights must have documented training.**
  - **The training must also cover rescue methods.**
- **The necessary rescue equipment must always be available at the work place.**
- **The equipment must have CE approval and comply with an accepted standard.**
- **The equipment must be checked at least every 6 months by a competent person (LOLER).**
- **The control or validity date must be shown on the equipment.**
- **The choice of equipment must be made after evaluating the geometry of the work place.**

Reference: The Working at Height Regulations
LOLER Regulations

Derrick evacuation equipment

(Example only)

Far too many defects have come to light in evacuation equipment. In many cases there is deficient certification, control and labelling of harnesses and blocks (brakes).

FUNCTIONAL RECOMMENDATIONS

- **Riding belts and blocks must be certified, controlled/inspected and labelled in line with other anti-fall equipment.**
- **The guide line, its attachment points and connectors are also defined as antifall equipment and must be certified, controlled/inspected and labelled accordingly.**
- **Riding belts must be connected to guide lines and blocks and stored so as to protect them from wear and tear/damage from external factors.**
- **It must be possible to use the equipment for the safe performance of entering and evacuation operations.**

Securing of tools in use

(Example only)

There is a significant risk of falling objects when using tools at height and a large number of reported incidents involve falling objects. The consequences of subsequent falling of lost or forgotten tools are obvious, and such incidents can be prevented by easy methods and compliance with simple guidelines.

FUNCTIONAL RECOMMENDATIONS

- **All tools used at height must be secured against falling.**
- **Wires and connectors must be used between the tools and belt.**
- **There must be a weak link between the snap hook on the belt and the wire.**
- **If there is a need for more tools, a tool bag must be used and the tools must be temporarily secured inside the tool bag.**
- **In the case of some limited areas, eg derrick, flare boom, cranes etc the handing out and returning of tools used at height must be logged to make sure that none have been left behind.**

Internal securing loops

Safety wires and connectors

Securing tools

Securing tools in use
(Tools 5-25kg)

Methods for securing heavy tools and hand-held machines for use at height have not been adequately defined. In view of the major potential for serious damage if such tools or machines fall, it is important to have clear guidelines.

FUNCTIONAL RECOMMENDATIONS

- **All heavy tools and hand-held machines used at height must be secured against falling when in use and while being transported.**
- **Certified tool bags must be used for hoisting heavy tools. Free-fall tests must be documentable.**
- **Securing devices must be dimensioned in accordance with verifiable calculations and documented free-fall tests.**
- **Securing points for tools and machines must be in place above the work place and the securing device must be as taut as possible.**
- **The fall length must not exceed the length of the securing device.**

Securing of other portable equipment

(Example only)

Several reported incidents relating to falling objects relate to the use of radios, pagers, gas detectors and other portable equipment.

FUNCTIONAL RECOMMENDATIONS

- **All portable equipment used at height must be secured against falling.**
- **Carrying pouches must always be used for radios and any other portable equipment with no dedicated attachment point.**
  - **The locks on the pouches must have a double securing mechanism to guard against unintentional opening.**
- **Belt clips which allow the radio to become detached when turned 180° must not be used.**

Tool cabinets for work at height

Tool cabinets for work at height are now readily available and employed on many facilities. Unfortunately a number of irregularities have been registered with respect to the way in which the tools are secured and the registration of tools in use and returned tools.

FUNCTIONAL RECOMMENDATIONS

- **All tools stored in high cabinets must be adequately secured for use at height and they must have documented attachment points.**
- **In addition to the necessary tools, cabinets must be equipped with:**
  - **a sufficient number of correctly dimensioned safety wires with approved swage locks**
  - **a sufficient number of connectors/snap hooks with locking**
  - **special belts for fastening tools and bag**
  - **weak links for the fastening between the belt and safety wire**
  - **a sufficient number of tool bags with internal fastening devices.**
- **Each cabinet must have a list of contents and be kept locked, and one person must be responsible for the cabinet.**
- **The responsible person must register all tools taken from and returned to the cabinet.**

Grating

At present there are a number of different ways of fastening grating to underlying structures or frames. As a result of vibration and defective locking of fastenings, there is too much loose grating and too many fastening clips of various kinds are loose or missing.

FUNCTIONAL RECOMMENDATIONS

- **Grating must be adequately fixed to underlying structures with fastenings that do not loosen with vibration.**
- **Through or threaded connections are recommended for fastening.**
- **Fastening clips must consist of as few parts as possible.**
- **Openings in the grating must not exceed 20mm.**
- **If grating is cut out and reinstalled by welding, the contact surfaces must be cleaned and/or polished to remove galvanisation and to ensure clean steel surfaces and adequate adhesion.**
- **If large areas are cut away, a special frame must be installed and the necessary underlay calculated.**

Railings

Major defects have been discovered on railings, in particular collapsible and movable railings. We have found recurring instances of railings that are inadequately inserted into the fastenings as a result of external impacts, causing disparity in the size of the holes for inserting the securing pins.

FUNCTIONAL RECOMMENDATIONS

- **Railings must have no deformations or cracks.**
- **It must always be possible to insert movable railings into the fastening and insert a securing through-bolt without hindrance.**
- **The safety bolt must be adequately locked using a securing pin or snap hook (with grommet).**
- **Both the safety bolt and locking must be secured in the immediate vicinity of the attachment.**
- **All connections between elements in the railing must be secured with through-bolts and lock nuts.**
- **Use of setscrews is not acceptable in permanent joints between railings.**
- **Railings and attachment points for collapsible and movable railings must be inspected on a regular basis to maintain adequate securing and functionality.**

Toe boards

In many cases toe boards have either been lacking completely or the gap between the toe board and the deck has been big enough to allow objects to pass.

FUNCTIONAL RECOMMENDATIONS

- **Decks, gangways and platforms must have toe boards at least 100mm high.**
- **On stairways, every step must have a toeboard at least 50mm high.**
- **Similarly, all landings in stairways must have toe boards at least 100mm high.**
- **The gap between the deck or grating and toe board must not exceed 10mm.**
- **When removing railings temporarily, the checklist must include reinstallation of toe boards in accordance with the applicable rules and regulations.**

Swing gates

Many swing gates have been found to have hinges with neither the necessary quality of material nor the design strength to serve their intended function over time.

FUNCTIONAL RECOMMENDATIONS

- **Wherever possible, the hinges must form an integral part of the gate – ie they should be welded on.**
- **Gates must be secured against becoming disengaged.**
- **Gates must be designed to automatically return to and remain in the closed position.**
- **On floating rigs, the use of locking fingers should be considered so that the gate can be locked in the closed position.**
- **Toe boards must be integrated in gates.**
- **Swing gates must be inspected on a regular basis to ensure adequate functionality.**

Ladders

Many cases have been found of damage to ladders and safety cages as a result of collisions with mobile equipment. In addition, cracks have been found in safety cages, especially in derricks.

FUNCTIONAL RECOMMENDATIONS

- **Ladders of more than 10m must incorporate a landing platform every 6m or be equipped with a fixed anti-fall device.**
- **Safety cages must be installed on ladders of more than 3m.**
- **The safety cage must start 2.2-3m above the deck/floor.**
  - **Try to minimise the distance between the upper part of the railing and thelower part of the cage.**
- **The safety cage must continue to a minimum of 1.1m above the top level.**
- **The diameter of the safety cage must be at least 70-80cm.**
- **Ladders and safety cages must be inspected on a regular basis to discover any cracks.**
- **Any damage and deformation must be reported and corrected.**

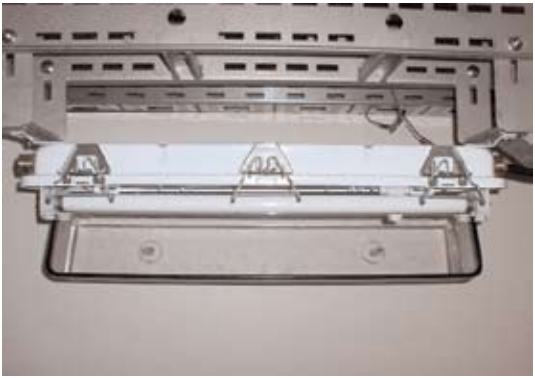
Floodlights

Many floodlights installed at height are not adequately secured against falling or colliding with mobile equipment.

FUNCTIONAL RECOMMENDATIONS

- **Lanterns must be equipped with two independent barriers. The attachment points must be integrated, eg eye bolts threaded into a frame or fastened to the cooling ribs.**
- **Brackets must have holes for fastening safety wires.**
- **Hatches for exchanging light bulbs must be hinged or secured with wire to the floodlight housing.**
- **Calculations must have been made and be available for attachment points and securing devices, relating to the relevant fall energies.**
- **User manuals/instructions must provide guidelines for the correct mounting of securing devices.**
- **User manuals/instructions must also provide guidelines for necessary maintenance and inspection of securing devices.**

Light fittings



Several types of light fittings found on our facilities are inadequately secured against falling. There have been several serious incidents in which both the cover and the casing of the fixture have worked loose and fallen down.

FUNCTIONAL RECOMMENDATIONS

- **The attachment brackets at both ends of the fixture must have holes for fastening the safety wires.**
- **If the electricity is fed in at both ends, the earth wire must be fastened so it can act as a second barrier. If the electricity enters at one end only, the opposite end must be secured with a safety wire.**
- **The cover must have fixed hinges and it must be possible to move these to the opposite side.**
- **The component rail must be hinged and must allow for adequate securing in the closed position.**
- **Emergency lights must be equipped with battery units with their own safety wires or secondary securing.**
- **Calculations must have been made and be available for attachment points and securing devices, relating to the relevant fall energies.**
- **User manuals/instructions must provide guidelines for the correct mounting of securing devices.**
- **User manuals/instructions must also provide guidelines for necessary maintenance and inspection of securing devices.**

Navigation lights

Several types of navigation light used on our facilities are inadequately secured against falling.

FUNCTIONAL RECOMMENDATIONS

- **Navigation lights for sliding into grooves to attach them to the structure are not recommended.**
- **Attachment brackets must have holes for fastening safety wires.**
- **Covers must have internal safety wires.**
- **Hatch covers for electrical connections must not be completely removable.**
- **Calculations must have been made and be available for attachment points and securing devices, relating to the relevant fall energies.**
- **User manuals/instructions must provide guidelines for the correct mounting of securing devices.**
- **User manuals/instructions must also provide guidelines for necessary maintenance and inspection of securing devices.**

CCTV camera

Many CCTV cameras are inadequately secured. There have been several cases in which both the camera and the control unit have come loose from the brackets and fallen on to the deck. The total weight may be as much as 50-60 kg and there is a significant risk of serious injury/damage.

FUNCTIONAL RECOMMENDATIONS

- **CCTV cameras must have two independent barriers, both on thecamera casing and on the motorised pan-tilt-zoom unit.**
- **The attachment point must form an integrated part of the camera casing; a screwed-in eyebolts may special welded attachment point or be used. Alternatively, special clamps can be used as the attachment point.**
- **Both the camera casing and the motorised pan-tilt-zoom unit must be adequately secured to a structure.**
- **Calculations must have been made and be available for attachment points and securing devices, relating to the relevant fall energies.**
- **User manuals/instructions must provide guidelines for the correct mounting of securing devices.**
- **User manuals/instructions must also provide guidelines for necessary maintenance and inspection of securing devices.**

Crane boom camera

There have been several cases where a crane camera has been hit by the crane during lifting operations. Since bolts through the attachment bracket would be unable to withstand the forces generated by a collision of this kind, it is vital to equip crane cameras with two anti-fall barriers.

FUNCTIONAL RECOMMENDATIONS

- **Crane cameras must have two independent barriers. Where possible, the attachment point for the safety wire should be an integrated part of the camera casing: welded attachment point or eyebolts fastened to end pieces.**

  Alternatively, special clasps can be fitted round the camera casing.
- **The safety wire must run from the camera casing through the bracket that is holding the camera and then through the attachment bracket before being attached securely to the structure of the crane boom.**
- **Calculations must have been made and be available for attachment points and securing devices, relating to the relevant fall energies.**
- **User manuals/instructions must provide guidelines for the correct mounting of securing devices.**
- **User manuals/instructions must also provide guidelines for necessary maintenance and inspection of securing devices.**

Loudspeakers

There have been several cases where we have discovered loose screw connections between loudspeakers and attachment braces/brackets.

FUNCTIONAL RECOMMENDATIONS

- **Loudspeakers must be fastened to the brackets in a manner that permits adequate locking of attachment bolts.**
- **Loudspeakers must be placed where they are not at risk of being hit by mobile equipment.**
- **If there is a risk of being hit by mobile equipment, loudspeakers must either be protected by reinforced braces or equipped with a safety wire.**
- **Calculations must have been made and be available for attachment points and securing devices, relating to the relevant fall energies.**
- **User manuals/instructions must provide guidelines for the correct mounting of securing devices.**
- **User manuals/instructions must also provide guidelines for necessary maintenance and inspection of securing devices.**

Junction boxes and cabinets

Several risk factors have been discovered relating to the incorrect location of junction boxes and cabinets, to defective suspension/fastening and to inadequate securing of hatches, doors and covers.

FUNCTIONAL RECOMMENDATIONS

- **Junction boxes and cabinets must be located where they do not obstruct passage ways, evacuation routes or mobile equipment.**
- **The type and design of suspension/ fastening must take account of calculated loads and known potential external stress factors.**
- **Hinged hatches/doors must be secured against unintentional disengagement and the locking device must have two barriers against opening.**
- **Large detachable hatches on machinery at height, and inspection hatches must be secured by a wire/chain.**
- **Covers must be secured by screws that are secured/locked to prevent unscrewing or by the cover being secured with an internal wire or chain.**
- **The securing device must be designed to support the relevant loads.**

Cable ducts

Many instances have been discovered of loose nuts and bolts in the joints and fastenings of cable ducts (electro-steel), probably as a result of vibration and/or faulty installation.

FUNCTIONAL RECOMMENDATIONS

- **Only bolted connections that have been approved by the supplier of the cable support system may be used for fastening and joining.**
- **Pipe clips must have an adequate screw connection for functional locking.**
- **When attaching the cable support system to a structure, the risk of galvanic corrosion must be assessed and insulation considered where appropriate.**
- **Calculations must be available for the attachment point and necessary tightening torque.**
- **The user manual/instructions must also provide guidelines for correct installation, both in the joints and the attachment.**
- **In addition, the user manual/instructions must provide guidelines for necessary maintenance/retightening and inspection of both electro-steel and bolt and screw connections.**

Wind walls

Many cases of damage and loose panels have been found in wind walls. This is presumably due both to faulty installation and to external factors (collisions with mobile equipment and exposure to wind and weather).

FUNCTIONAL RECOMMENDATIONS

- **The type and method of attachment should be chosen in accordance with the manufacturer's instructions. The preferred solution is through-bolts with lock nuts.**
- **Wind-wall panels must be fastened to a separate support/structure and never to the main structure.**
- **Wind wall panels must always be reinforced by horizontal steel beams in accordance with the design loads.**
- **Areas that are exposed to collision risk must have stronger corner mountings secured by through-bolts and lock nuts.**
- **The manufacturer must provide guidelines for installation, necessary maintenance and inspection of wind-wall panels and attachment.**

Signs

Methods for attaching and hanging up signs have in many cases proved unsatisfactory.

FUNCTIONAL RECOMMENDATIONS

Ideally, signage should be painted directly upon structure. Where this is not possible:

- **Signs must be securely attached so as to ensure that they do not accidentally come loose and fall down.**
- **Brackets and frames for signs must always be securely attached.**
- **Where the underlying material permits, sign frames should be attached using through-bolts.**
- **Identification labels that are painted or stuck on are recommended for identification of pipe systems. If the temperature precludes this, identification labels should be attached with steel tape.**

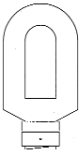
Valve wheels and handles

Many cases have been discovered where valve wheels and valve handles for manual stop valves are not adequately secured.

FUNCTIONAL RECOMMENDATIONS

- **Valve wheels and handles must have two independent barriers.**
- **Where possible, nuts and split pins should be used in the valve stem on stationary valve handles and wheels.**
  - **On large handles and wheels bolts and lock nuts should be used instead of split pins.**
- **When mobile handles and wheels are used, they should be secured by a bolt, or locked by a split pin, through the valve stem.**
- **During storage, handles and wheels must be adequately secured against falling.**
- **If Seeger rings are used for locking/ securing, frequent inspections must be made to check for corrosion and/or mechanical damage.**

Snatch blocks



LN UNBRACO SKRUE U/HODE
SKRUES INN GJENNOM MUTTER
OG HALSEN PÅ ØYE.

EN UNBRACO SKRUE U/HODE
SKRUES INN GJENNOM MUTTER
OG LAGERBOLT.

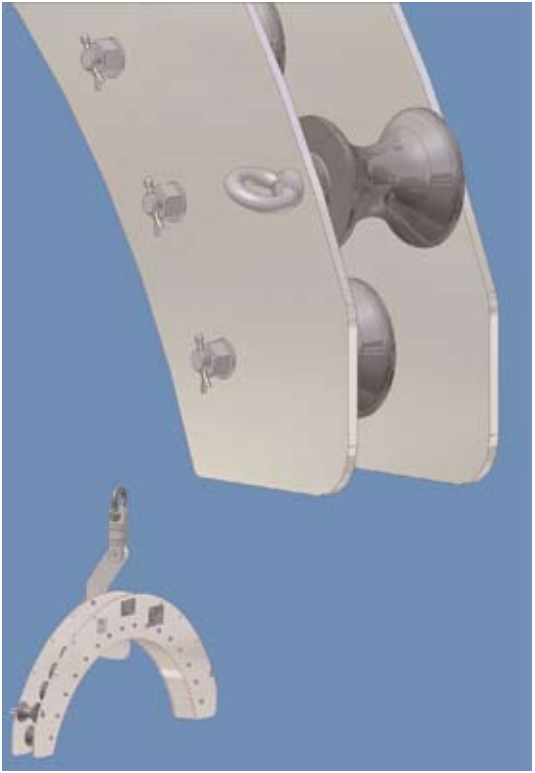
Previously snatch blocks had a "securing wire" as a secondary barrier. This is not a satisfactory way of securing blocks as the wire used for this purpose will be unable to prevent the equipment from falling if the shaft or the suspension were to come loose.

FUNCTIONAL RECOMMENDATIONS

- **Blocks must have two barriers in the suspension and two barriers in the shaft.**
- **A maintenance programme must be established in accordance with the instructions where there is a requirement a competent person of blocks, shackles and lifting lugs.**

  Blocks must be dismantled at the request of the competent person or in accordance with the manufacturer's recommendations or, in any case, at least every fifth year.
- **A competence matrix must be drawn up for personnel who are to maintain and operate snatch blocks.**

Umbilical roller sheaves



As a result of inadequate securing of rollers in umbilical roller sheaves, there have been several serious incidents where rollers have worked loose and fallen onto the deck.

FUNCTIONAL RECOMMENDATIONS

- **Rollers must be secured with two independent barriers. The preferred solution is to use through bolts with lock nuts and split pins.**
- **The umbilical must be installed on deck and the support rollers reinstalled.**
- **An umbilical roller sheave must be used exclusively for the purpose for which it was delivered, ie it is not permitted to use it for suspending wires.**
- **An umbilical roller sheave must have its own maintenance programme and be subjected to annual testing and inspection in accordance with the manufacturer's instructions.**
- **User manuals/instructions must provide guidelines for the correct mounting of securing devices.**
- **User manuals/instructions must also provide guidelines for necessary maintenance and inspection of securing devices.**

Hanging hoses

Securing hanging hoses, in particular jet water hoses, presents a safety problem. Use of clips and chains has proven unsatisfactory. With their many parts, the clips themselves constitute a falling object risk. Incorrect positioning of clips and chain loops that are too long have resulted in breakage/bursting and hoses falling down.

FUNCTIONAL RECOMMENDATIONS

- **The securing system for hoses must be designed to support the maximum loads generated by a burst hosepipe. The calculation basis must be documented.**
- **The required resistance to chemicals, heat and UV radiation must also be documented.**
- **The securing system for hoses must be certified and traceable.**
- **The user manual/instructions must also provide detailed guidelines for correct installation of the hose securing system.**
- **It must be possible for the facility's own personnel to carry out the installation.**
- **The personnel must have documented training.**
- **The user manual/instructions must also provide guidelines for necessary maintenance and inspection of the hose securing system.**

Load carriers

Typical landing sites for potential falling objects

Forklift pockets and roof

Forklift pockets, frame, tank and tank top

Forklift pockets, frame and tank top

Several serious incidents have been discovered relating to the use and dispatch of carriers (containers, baskets, tanks etc).

FUNCTIONAL RECOMMENDATIONS

- **Chain slings must have the necessary certification, be intact, without twists and shackles and equipped with nuts and split pins.**
- **Carriers must have the necessary identification and certified lifting lugs. Lifting lugs, doors, hinges and locks must not be deformed or damaged.**
- **Permitted loads in containers and baskets must be well distributed and adequately secured by stamping, use of lashing rings, lashing and nets (baskets). Lashing rings must not come into contact with sharp edges and padding should be used where appropriate. Heavy objects must be placed at the bottom.**
- **Tanks must have secured and sealed manholes/valves. All attached equipment (grids, covers, plates etc) must be adequately secured. The permitted load must not be exceeded.**
- **It must be ensured that there are no loose objects in the forklift pockets or on top of the carriers or loads.**
- **Documentation must be checked out (signed) before transport to and from locations.**

Temporary storage places

Many cases have been discovered where the design of racks for temporary storage of materials and equipment do not ensure safe storage.

FUNCTIONAL RECOMMENDATIONS

- **Ensure that temporary storage in modules is permitted in a controlled manner with respect to type of goods, shelf life, storage area, cleanliness and orderliness, so that the storage does not obstruct access or egress in alarm situations.**
- **Ensure that the stored materials do not obstruct access to emergency equipment.**
- **Storage racks must be designed so as to ensure that temporarily stored material cannot fall down by accident.**
- **On mobile units, temporary storage places must be secured for maritime conditions.**

Unnecessary equipment at height

Inspections have revealed the frequent presence at height of equipment that is not in use. In view of the fact that equipment that is not in use is often excluded from established inspection and maintenance procedures, this involves a considerable risk potential.

FUNCTIONAL RECOMMENDATIONS

- **Regular analyses must be made of what equipment is needed.**
- **Equipment that is not in use must be removed.**
- **Analyses must also be carried out to establish whether equipment should be moved to reduce the risk of collision with mobile equipment.**
- **Inspection and maintenance procedures must be revised regularly. This should ensure inspections and maintenance of remaining equipment.**
- **A final check must be made to ensure that no equipment/materials are forgotten aloft.**

Notes:

Notes:

Notes:

DROPPED OBJECTS DO HARM AND DO KILL

For further information or details of any DROPS product, including DROPS Membership, DROPS Training and DROPS Workpacks, visit our website or contact the DROPS Administration Team:

DROPS Campaign Team
Silverdot Limited
Blairs College
Aberdeen UK
AB12 5LF

e campaignteam@dropsworkpack.com
t +44 (0)1224 861811
f +44 (0)1224 861812
w www.dropsworkpack.com

CHOOSE YOUR FUTURE MAKE A DIFFERENCE