



## **S1790002 Tata Steel Standard**

Chain slings and eye bolts/eye nuts

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Applicable to the IJmuiden site

Possible amendments will not be sent to you.

The latest version can be requested at Project.net or

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# 1. GENERAL PROVISIONS

## 1.1. Area of application

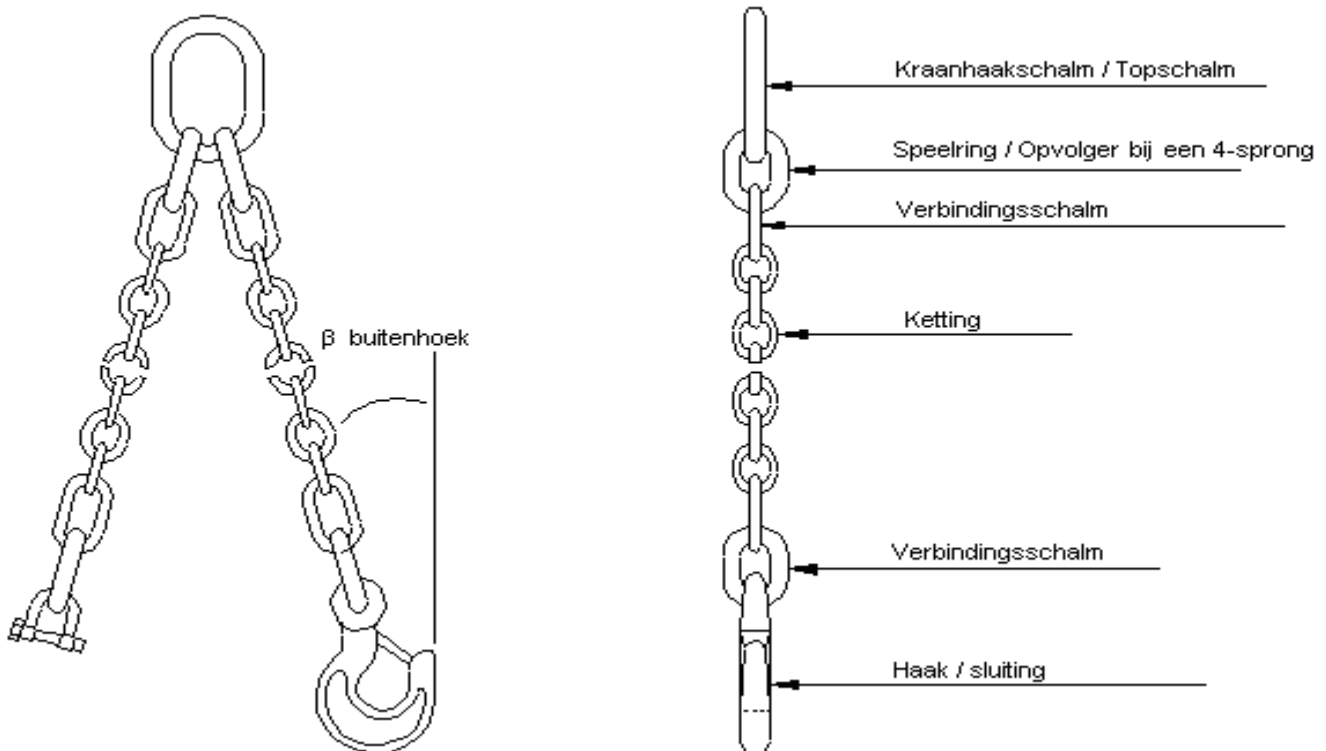
This Tata Steel Standard applies to the acquisition of new chain hoisting equipment and the use, repair, periodic inspection and testing of existing chain slings used for hoisting.

Chain slings include the following parts:

- chains
- coupling and end links
- master links
- hooks/clasps
- swivels
- eye bolts
- assemblies of the above components

Chain slings that are part of electrically, pneumatically or manually operated tackles are excluded from this Tata Steel Standard.

### Diagram of chain sling example



$\beta$ buitenhoek	$\beta$ exterior angle
Kraanhaakschalm/topschalm	Master link / upper end fitting

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Speelring / opvolger bij een 4 sprong	Master coupling link for a quadruple chain sling
Verbindingsschalm	Coupling link
Ketting	Chain
Haak / sluiting	Hook and clasp

## 1.2. Requirements

Chain slings supplied to EU member states from 1 January 1995 must meet the requirements of the EU Machinery Directive. In the Netherlands, the Working Conditions Act (Arbowet), the Working Conditions Decree (Arbobesluit) and the Working Conditions Information Sheet (Arbo Informatieblad) AI-17 have applied additionally since 1997.

Over and above these European and national regulations, Tata Steel has the following additional requirements for chain slings:

- Suppliers of new chain slings and companies that carry out repairs, periodic inspections and periodic tests of existing chain slings must have a valid EKH certificate based on the EKH hoisting work instructions (“under the hook”).
- Inspections and tests carried out by Tata Steel must be carried out in accordance with the EKH hoisting work instructions (“under the hook”).
- New chain slings must be manufactured and tested according to the harmonised series of standards EN 818 and EN 1677. Acceptance on the basis of non-harmonised standards is possible in exceptional cases for coupling links, if it can be proven that the fundamental safety requirements of the Machinery Directive are met and explicit permission is granted by a crane engineer of PTC’s Crane Engineering department.
- New chain slings must meet the requirements of Grade 8 or 10 materials which are not susceptible to aging according to EN 818-1 Table 0. In the case of exposure to acidic liquids or fumes during use, Grade 2 materials from this table must be used in consultation with the manufacturer.

## 1.3. Markings

Chain sling assemblies and removable components must be marked with the following information in a clearly legible and indelible way:

- the working load (WLL) in tonnes
- the Tata registration for the assembly as a whole
- the manufacturer’s registration symbol and number (as stated on the certificates)
- CE mark (in the case of chain slings supplied after 1 January 1995)
- the quality (grade) of the material
- number of slings (coding in consultation with the HTM department of HTD)
- “UGD” followed by the month and year (**mm-yy**) of the last permissible usage (expiry) date.

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**On assemblies delivered to Tata Steel, these markings must be stamped into the master link of the chain at a place that is not subject to wear. In order to avoid problems with notches, the characters used should be somewhat rounded.**

## 2. ORDERING NEW CHAIN SLINGS

### 2.1. Selection

All new chain slings must be ordered in consultation with the HTM department of HTD. The aim is to work with standard purchased products. Orders for chain slings, or components that will be used for chain slings, that are not standard products available on the market, **must** be made in consultation with the crane engineer from PTC's Crane Engineering department.

Chain slings should be selected in accordance with EN 818-6. The most important selection criteria are as follows:

- The master link must be suitable for the dimensions of the hook.
- For operating temperatures of -40°C to 200°C standard use of Grade 8 or 10 is prescribed. For other temperatures, the EN 818-6 selection standard should be applied.
- If the operating conditions entail exposure to acidic or basic (caustic) fumes, use Grade 2 in consultation with the chain manufacturer or apply special Armco steel.
- For abrasive operating conditions (environments with much wear), make allowance for higher grade material being required according to EN 818-6.

It is preferable to use wrought master links and to use the so-called "hammered" method for master coupling links and coupling links. The use of welded master links, master coupling links and coupling links is not desirable, but if this cannot be avoided, the following conditions apply:

Components made from round steel must be welded using upset or flash welding. If the components were manufactured as a series, the series certificate must be present to verify the approval.

Non-standard purchased parts must be evaluated and tested by PTC's Technical Quality Department (KDT).

### 2.2. Documentation

The following documentation must be included in PDF file format with each delivery:

- EU declaration of conformity (Annex IIA of Machinery Directive) (\*)
- Chain sling manufacturer's certificate (according to EN 818 or EN 1677 standards) (\*)
- Instructions for use in Dutch (see Annex I of Machinery Directive)
- If applicable, the Tata-approved drawings and calculations
- (\*) These may be combined into a single document (see EKH Certificate for Hoisting Equipment)

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### 2.3. Acceptance inspection

During the acceptance inspection the HTM department of HTD will check for conformance with the following:

- The construction/type of the chain sling must correspond with the order and the certificate.
- The markings on the chain sling must be complete and correspond with the information on the certificate.
- The documentation must be complete and meet the requirements of the Machinery Directive, the harmonised series of standards EN 818 and EN 1677 and the EKH Work Instructions (“under the hook”).
- The manufacturer must have tested all components of the chain using a manufacturing proof force (MPF) of at least 2.5x WLL, or for assemblies MPF 1 to 4 according to EN 818-4.
- The chain sling must be registered with the Crane Maintenance department of HTD with the correct number.

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### 3. INSPECTION AND TESTING

#### 3.1. Before first use

Before first use of a chain sling, it must be verified that the hoisting equipment has been inspected and registered by the HTM department of HTD (see Paragraph 2.3).

#### 3.2. Before each use

Before each use of the chain sling, the chain must be visually inspected by the user for any possible damage. This applies both to new chain slings and to chain slings which have already been used. In case of damage, the user must contact the HTM department of HTD.

Rejection criteria upon inspection are:

- More than 10% wear
- Permanent deformation
- Cracking
- Pitting
- Damage
- Missing or illegible markings (Tata registration number, work load and UGD)

#### 3.3. Periodic inspections

According to AI-17, chain slings must be inspected by an expert at least once a year depending on the intensity and/or type of use, and an inspection report must be drawn up. This periodic inspection is carried out by the HTM department of HTD.

The HTM department files the inspection report and ensures inspections are carried out with the required frequency. Periodic inspections must be carried out according to Part 2 of the EKH work instructions (“under the hook”).

The owner of the chain sling is responsible for having it inspected in good time.

#### 3.4. Periodic testing

According to AI-17, chain slings must be tested by an expert at least once every 4 years depending on the intensity and/or type of use. A report of the tests must be drawn up. These periodic tests are carried out by HTD HTM, or an EKH-certified external company on behalf of this department. The periodic tests must be carried out before the expiry date (UGD).

Tata applies a stricter inspection regime to chain slings that are used intensively or under severe conditions. These chains are inspected 4 times a year and, if necessary, tested more frequently than once every 4 years. These chain slings are identified as “special” in SAP. The inspection frequency is specified in the class overview.

The HTM department of HTD is responsible for ensuring that the chains are tested with the required frequency and that the proper inspection reports are drawn up. Periodic tests must be carried out according to Part 2 of the EKH work instructions (“under the hook”).

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### 3.5. Replacement, modifications and repairs

The user is not permitted to make any modifications or repairs to the chain sling assembly. All modifications and repairs must be carried out by the HTM department of HTD.

Based on the inspections for each use, periodic inspections or periodic tests, a decision may be made to replace the entire chain sling or parts of it. In the case of replacement, the rejected chain must be handed in to the HTM department of HTD for destruction and registration of this fact in the archives. For ordering new chains, see Chapter 2.

Repairs or modifications must be carried out by the HTM department of HTD, or an EKH-certified external company on behalf of this department. Repairs or modifications must be carried out according to Part 2 of the EKH work instructions (“under the hook”). A test must be carried out after the repairs or modifications (see Paragraph 3.4). After a successful test, the expiry date (UGD) is extended by up to 2 years after the test date. The HTM department of HTD files the test report.

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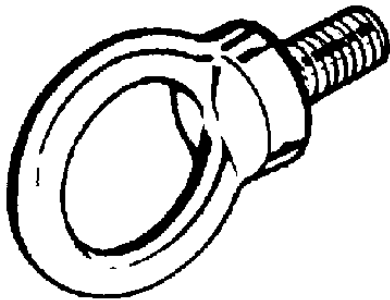
## 4. Using chain slings

### 4.1. General

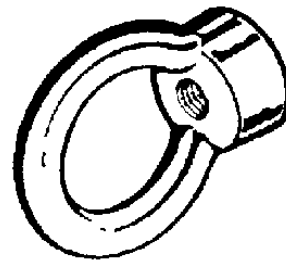
- Chain slings may only be used by authorised personnel.
- The user must visually inspect the chain sling before every use (see Paragraph 3.2).
- The user must also follow the user instructions for the particular chain sling and the general instructions according to Part 1 of the EKH work instructions (“under the hook”). The user may request these instructions from the HTM department of HTD.
- The maximum specified work load (WLL) for the chain sling may not be exceeded.
- When using the chain sling during assembly work, the hoisting equipment (crane and chain sling) must be suitable for being used together. Unknown forces may arise in the event of the load breaking loose and/or getting caught on something.
- Hoisting equipment, including chain slings, must be stored in a clean and tidy manner.

### 4.2. Eye bolts (DIN 580 and 582)

#### 4.2.1. One-off use of C15 eye bolts (DIN580) or eye nuts (DIN582)



DIN 580 eye bolt



DIN 582 eye nut

**Working with eye bolts is described below. The same instructions apply to eye nuts.**

The standard eye bolt (C15 material with CE marking and no expiry date (UGD)) may only be used at Tata in the following situations:

- The equipment may be unloaded using these eye bolts.
- These eye bolts may also be used once for hoisting the equipment into position.

Often, equipment is delivered with these DIN580 eye bolts. After installation, the eye bolts must be removed and scrapped. The tap holes in the equipment must be filled with a slightly greased bolt.

Only personnel with the relevant competence may carry out hoisting operations using eye bolts (see instructions in Paragraphs 4.2.2 and 4.2.3).

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#### 4.2.2. Repeated use of C15 eye bolts (DIN580) or eye nuts (DIN582)

These are the same eye bolts as described in Paragraph 4.2.1. However, an expiry date (UGD) is specified for these bolts when delivered.

When carrying out repeated hoisting activities, non-swivel eye bolts or eye nuts should preferably not be used, because there is a high risk of their incorrect use. The use of swivel eye bolts is strongly recommended (see Paragraph 4.2.4).

If, despite the above, non-swivel eye bolts are used for repeated hoisting work, the following rules apply:

- The eye bolt must carry a CE mark.
- The eye bolt must have an expiry date (UGD). Eye bolts with any damage or an expired date must be rejected/replaced.
- Tata registration number starting from M 24.
- Maximum permissible vertical load.
- The eye bolt must be completely screwed in and tightened, possibly with a thin filling.
- The thread of the hoisting device and the load may not be damaged.
- If several eye bolts are used for a hoisting operation, the force on each eye bolt must be directed radially. The exterior angle must be  $\beta \leq 45^\circ$  (see illustrations in Paragraph 4.2.3).
- After use, the eye bolt must be removed. The tap hole must be filled with a slightly greased bolt to prevent corrosion.

#### 4.2.3. Repeated hoisting operations with high-quality eye bolts and eye nuts



**High-quality eye bolt**



**High-quality eye nut**

When carrying out repeated hoisting activities, it is preferable not to use non-swivel eye bolts or eye nuts, because there is a high risk of incorrect use. The use of swivel eye bolts is strongly recommended (see Paragraph 4.2.4).

If, despite the above, non-swivel eye bolts are used for repeated hoisting work, the following rules apply:

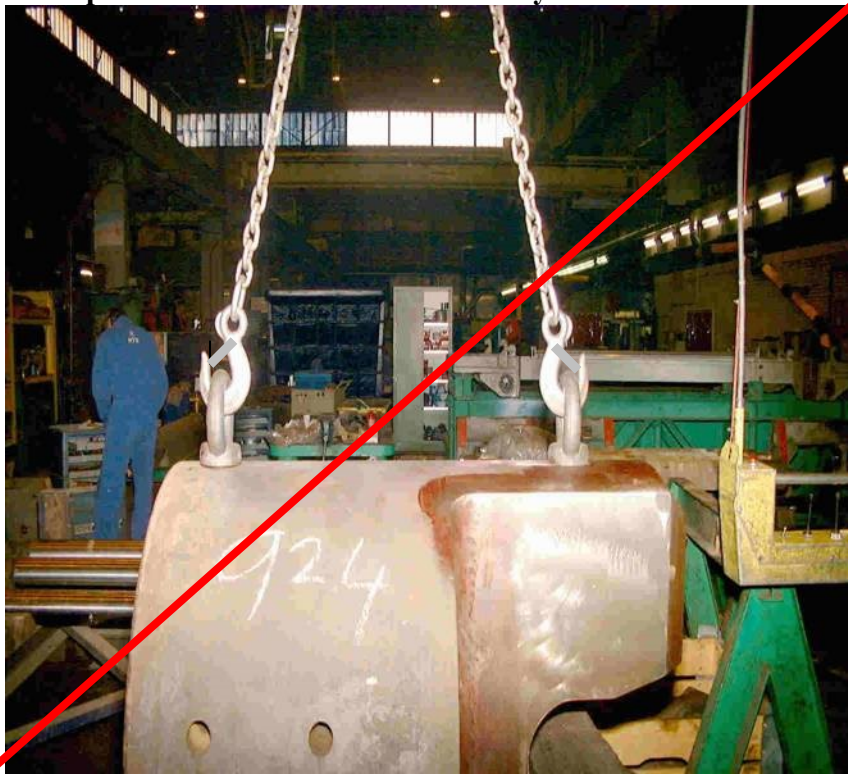
- The eye bolt must carry a CE mark.
- The material quality must be Grade 8 or higher.
- Manufacturer's mark.
- The eye bolt must be marked with an expiry date (UGD). Eye bolts with any damage or an expired date must be rejected/replaced.
- Tata registration number starting from M 24.
- Maximum permissible vertical load.
- The eye bolt must be completely screwed in and tightened, possibly with a thin filling.
- The thread of the hoisting device and the load may not be damaged.
- If several eye bolts are used for a hoisting operation, the force on each eye bolt must be directed radially. The exterior angle must be  $\beta \leq 45^\circ$  (see illustrations).

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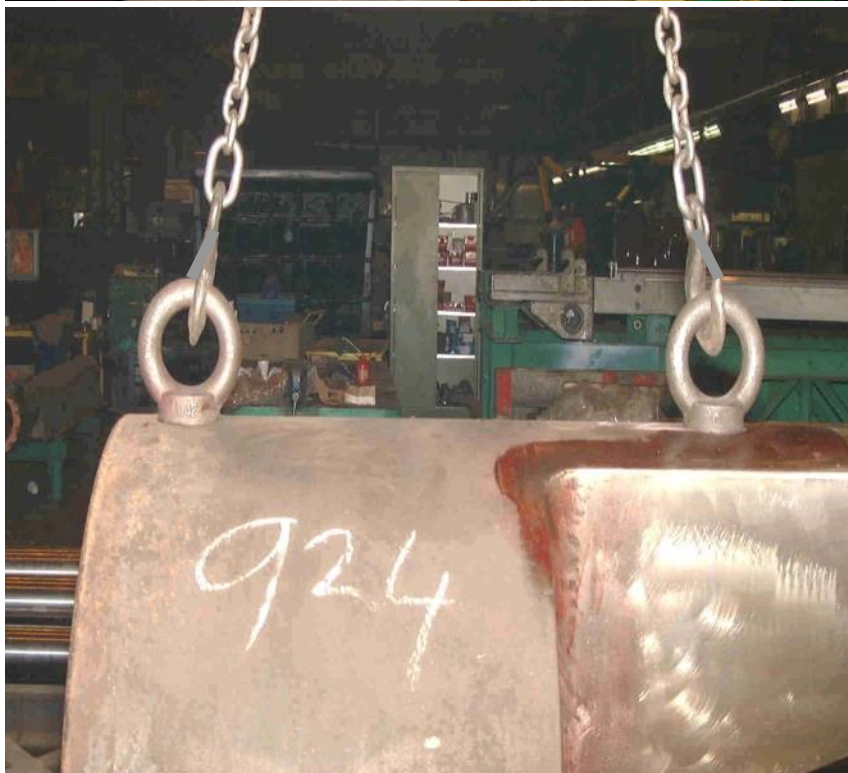
- After use, the eye bolt must be removed. The tap hole must be filled with a slightly greased bolt to prevent corrosion.

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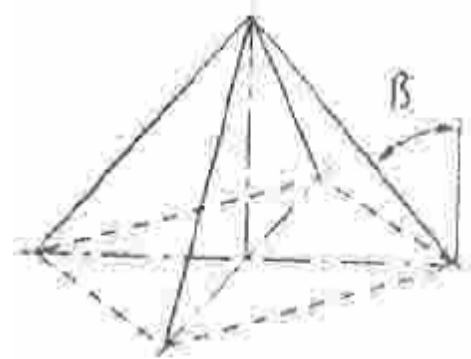
**Example of incorrect use of standard eye bolts**



NOT THIS WAY (due to lateral force)



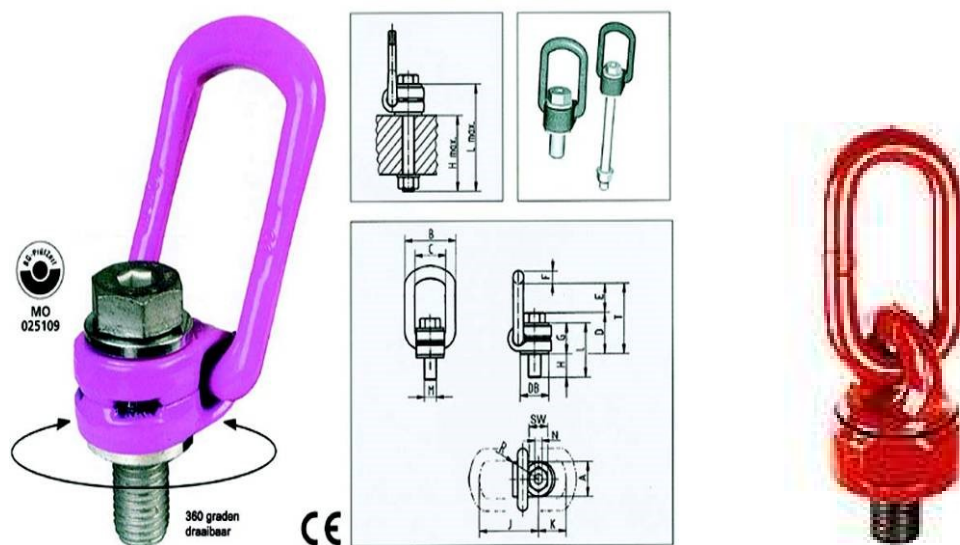
BUT THIS WAY (radial force)



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#### 4.2.4. Repeated hoisting operations with swivel eye bolts

It is strongly recommended that swivel eye bolts be used for carrying out hoisting activities. Some examples are shown below. These are certified bolts made from high-quality material with a Tata registration number, expiry date (UGD) and certificate. These hoisting bolts are available from the HTM department of HTD.



**Pictures and diagram of swivel eye bolts**

The advantage of swivel eye bolts is that they automatically adjust to a radial position in which the eye bolt is not subjected to any lateral forces. It remains important that the eye bolt is completely screwed in and the forces are carried by the datum surface (possibly with a thin filling). It is also important that the underlying structure is able to carry the load and that the screw thread is not damaged. After using the eye bolts, the tap holes must be filled with slightly greased bolts to prevent corrosion.

The following information must be present on the swivel eye bolts:

- Tata registration number
- Manufacturer’s mark
- Material code
- Expiry date
- Maximum permissible vertical load
- CE mark

If one of the marks is missing and/or damage is present, the eye bolt/nut may not be used any more. All swivel eye bolts/nuts must be registered at the HTM department of HTD. This department is also responsible for the periodic tests carried out every 2 years.

The owner of the eye bolts/nuts is responsible for presenting them to the HTM department of HTD for certification in good time.

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## 5. REFERENCES

In this Tata Standard reference is made to:

The Working Conditions Act (Arbowet)

The Working Conditions Decree (Arbobesluit)

Working Conditions Information Sheet (Arbo Informatieblad (AI))  
17

DIN

580

582

EN

1677-1

1677-4

818-1

818-2

818-4

818-6

EU Machinery Directive (2006/42/EC)

EKH Work Instructions (“under the hook”)

Part 1

Part 2

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## 6. AMENDMENTS

### Version 3.1:

In Paragraph 3.4 “Periodic testing” and the entire document: “Crane Maintenance” replaced with “HTM”.

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