

## Tata Steel Technical Standard

**S1790001      New crane hooks**

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### **Information and changes**

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## 1 Introduction

This Tata Steel Standard sets out the minimum requirements for orders of new crane hooks.

Crane hooks that are an integral part of electrically or manually operated hoists are excluded from this Tata Steel Standard. They are subject to the requirements provided by the manufacturer/supplier (according to the Machinery Directive).

The following types of crane hooks are found at Tata Steel IJmuiden:

- Hook with fixed shank (shank hook)
- Eye hook
- Laminated hook for transporting liquid steel/iron

## 2 Directives, standards and legislation

Crane hooks supplied by the supplier must comply with all the relevant Dutch, European and international rules and regulations, and with specific TATA STEEL standards and guidelines.

### 2.1 European directives

The crane hook and its parts must comply with all the European directives listed in Table 2.1.

#### 2.1 European directives

Number	Description
2006/42/EC	Machinery Directive

### 2.2 European standards

Compliance with this Standard is achieved by applying the most recent version of the harmonised European standards as listed in Table 2.2.

#### 2.2 European standards

Number	Description
NEN-EN 13001-3-5	Cranes - General design, Parts 3-5: Limit states and proof of suitability of forged hooks.
DIN 15400 series	Lasthaken für Hebezeuge

### 3 Documentation

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#### Requirement

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The following documents must be supplied on delivery of the crane hook to Tata Steel:

- EU declaration of conformity (Annex IIB of Machinery Directive)
- Manufacturer's certificate for crane hooks (according to standards series)
- Operation and Maintenance instructions in Dutch language (see Annex I of Machinery Directive)

Documents to be supplied as digital files in PDF format and hard copy to the commissioner of the work.

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## 4 Shank hook and eye hook

### 4.1 Engineering

#### Requirement

Selection criteria:

- Maximum working load (WLL or SWL)
- Intensity of use or crane group classification according to NEN-EN 15011
- Operating conditions

Static calculation to be carried out according to NEN-EN 13001-3-5, Chapter 5, using the following factors:

	Vertical	Horizontal
$\phi$	1.2	1.2
$\gamma_n$	1.10	1.1
$\gamma_p$	1.34	1.34
a		6.3s
$\Phi_5$		According to NEN-EN 13001-2

Fatigue calculation to be carried out according to NEN-EN 13001-3-5, Chapter 6, using the following factors:

	Vertical	Horizontal
$\Phi_2$	1.2	
a		6.3s
$\Phi_5$		According to NEN-EN 13001-2

### 4.2 Material

#### Requirement

Crane hooks must be manufactured from Class V material according to NEN-EN 13001-3-5, section 6.5.4.

Eye bolts for a crane eye hook must be manufactured of 42CrMo4.

### 4.3 Material test

#### Requirement

The crane hook must be supplied with a materials certificate according to NEN-EN 10204.3.2 drawn up after a test on a control piece that is forged with the crane hook.

The notch toughness must be a minimum of 27 J at -20°C.

The eye bolt must be supplied with a materials certificate according to NEN-EN 10204 3.2. A materials certificate according to NEN-EN 10204 3.1 will be sufficient if the materials supplier is in a CEN member country.

## 4.4 Manufacture

Requirement	Explanation
Crane hook to be manufactured according to NEN-EN 13001-3-5 and the requirements in this Standard.	Cranes supplied before 1 January 2010 may be fitted with a crane hook according to the DIN 15400 series. This crane hook to be replaced with a crane hook according to NEN-EN 13001-3-5.
A crane hook whose dimensions do not comply with NEN-EN 13001-3-5 or DIN 15.400 must be assessed on the basis of the original drawing and manufactured according to NEN-EN 13001-3-5 and the requirements in this Standard. The crane hook must be fitted with a safety catch.	Crane hooks made before 1995 may not comply with the dimensions in NEN-EN 13001-3-5 or DIN 15.400. These crane hooks must be assessed based on the Tata Steel drawing.  Crane hooks manufactured according to a Tata Steel IJmuiden drawing may be fitted with a separate safety catch according to a Tata Steel IJmuiden drawing.
An eye bolt must be manufactured according to this Standard.	In the case of a crane hook with a clevis the eye bolt is then part of the crane hook and these requirements shall also apply to the eye bolt.
The nut for mounting the crane hook (shank hook) or eye bolt in the sleeve block is a single assembly which must be ordered together.	

## 4.5 Markings

Requirement
A permanent, clearly legible, indelible markings must be affixed to the crane hook.
<p>Markings according to NEN-EN 13001-3-5, section 8.2 a-d plus:</p> <ul style="list-style-type: none"> <li>○ registration symbol and number (as stated on the certificates)</li> <li>○ CE mark</li> <li>○ Tata Steel registration number (to be provided by the ordering party)</li> </ul> <p>Markings to be affixed at a place where no damage or wear and tear can occur. Markings to be affixed in a recessed area using rounded-edge number and letter stamps (for an example see Figure 4.5)</p> <div style="border: 1px solid black; border-radius: 15px; padding: 10px; margin: 10px 0;"> <p><b>Size and shape: No. 63 single hook</b>  <b>Material: V</b>  <b>Reference standard: e.g. NEN-EN 13001-3-5</b>  <b>Test load: ...tonnes</b>  <b>Registration number: 123456789</b>  <b>CE mark: CE</b>  <b>Tata Steel registration number: KH123</b></p> </div>

Figure 4.5

## 4.6 Test load

### Requirement

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Test load according to NEN-EN 13001-3-5, section 4.5.

Test report to be supplied containing at least the following data:

- Measured value before the test load
  - Measured value after the test load
  - Non-destructive test
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## 5 LAMINATED HOOKS

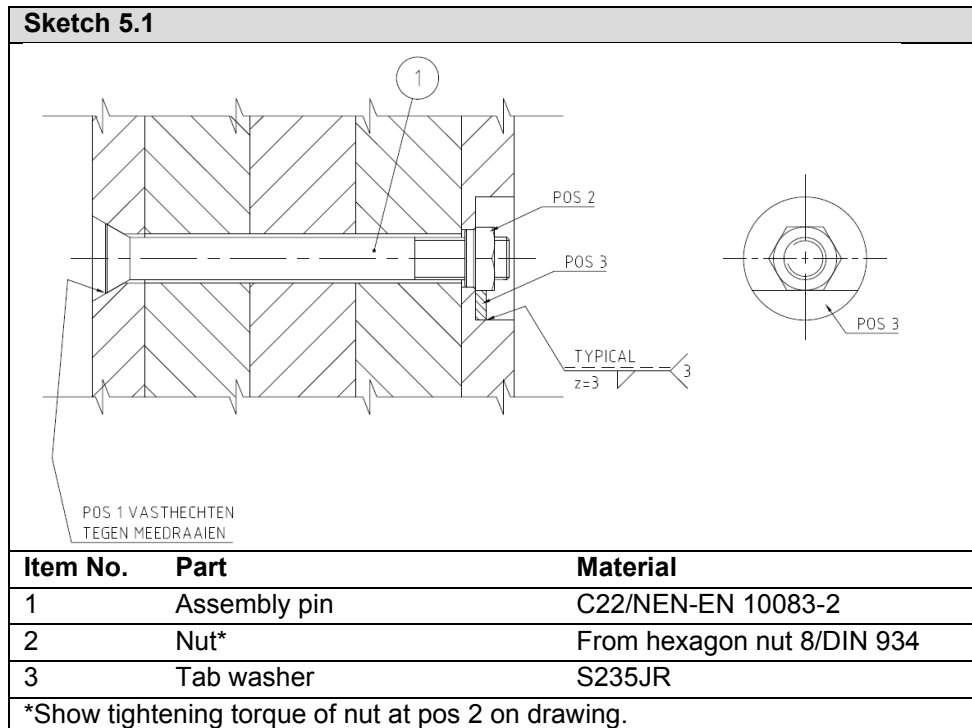
### 5.1 Engineering

#### Requirement

Selection criteria:

- Maximum working load
- Intensity of use or crane group classification according to NEN-EN 15011
- Safety factor 3.5
- Operating conditions
- Assembly pins according to Sketch 5.1

Sketch 5.1



Perform static calculation according to NEN-EN 13001-3-5, Chapter 5, using the following factors:

	Vertical	Horizontal
$\phi$	1.2	1.2
$\gamma_n$	1.10	1.1
$\gamma_p$	1.34	1.34
$a$		6.3s
$\Phi_5$		According to NEN-EN 13001-2

Perform fatigue calculation according to NEN-EN 13001-3-5, Chapter 6, using the following factors:

	Vertical	Horizontal
$\Phi_2$	1.2	
$a$		6.3s
$\Phi_5$		According to NEN-EN 13001-2



## 5.2 Material

### Requirement

Laminated hooks must be manufactured from S690QL material according to EN 10.137.

Material of bushes: X120Mn12.

Material of shaft: 42CrMo4, surface treatment: nitriding.

## 5.3 Material test

### Requirement

Material test according to EN 10.204 3.2, stating all mechanical values, including notch toughness, which must be greater than or equal to 27 joules at -20°C, according to the Charpy V method.

Testing must show that the material is satisfactory at the suspension eye. Testing to be carried out according to NEN-EN 10160, Classes S2 and E3.

## 5.4 Type

### Requirement

Laminated hooks with a working load of 225 or 240 tonnes must be manufactured according to the drawing in Table 5.4.

Execution	Drawing No.
Working load 225 tonnes	F69493
Working load 240 tonnes	F51570
Table 5.4	

Other laminated hooks must be manufactured according to the specifications of the commissioner of the work.

Type according to the information shown on the drawing. If no information is supplied, then according to NEN-EN 13001-3-5

### Requirement

To achieve the best possible quality and service lifetime, the laminated hook must be manufactured according to the steps set out below.

1. Cut the lamella >2 mm oversize from sheet using a plasma cutter, with cutting edge roughness in ISO Range 2 (15-30Rz).
2. Grind the assembled lamellae.
3. Grind the cutting edge in the longitudinal direction with the temperature remaining <100°C.
4. Drill and ream holes.
5. Test cutting edge for cracks non-destructively.
  - a. Cracks of any kind on delivery are unacceptable.
6. Preserve lamellae separately (see section 5.8).
7. Assemble laminated hook according to the drawing.
8. Torque-tighten and check the nuts of the assembly pins.
9. Fit protective plating.

## 5.5 Markings

### Requirement

A permanent, clearly legible, indelible markings must be affixed to both sides of the laminated hook in the auxiliary construction, pos 8 on drawings (see Table 5.1).

Markings according to NEN-EN 13001-3-5, section 8.2 a-d plus:

- registration symbol and number (as stated on the certificates)
- CE mark
- Tata Steel registration number (to be provided by the ordering party)

Markings to be affixed at a place where no damage or wear and tear can occur.

Markings to be affixed in a recessed area using rounded-edge number and letter stamps (for an example see Figure 5.5)

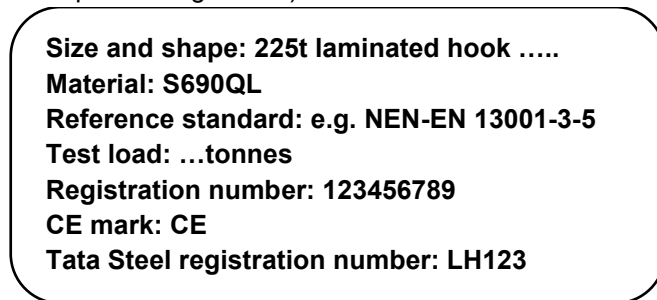


Figure 5.5

## 5.6 Test load

Requirement	Explanation
Test loads to be performed according to NEN-EN 13001-3-5, section 4.5.	After assembly and completion, the laminated hook must be subjected to a test load.
A test report to be supplied stating: <ul style="list-style-type: none"><li>○ Measured values before the test load</li><li>○ Measured values after the test load</li><li>○ Non-destructive test</li></ul>	The test report must form part of the documentation supplied with the goods.
Measured values according to Figure 5.7 dimensions A-F.	

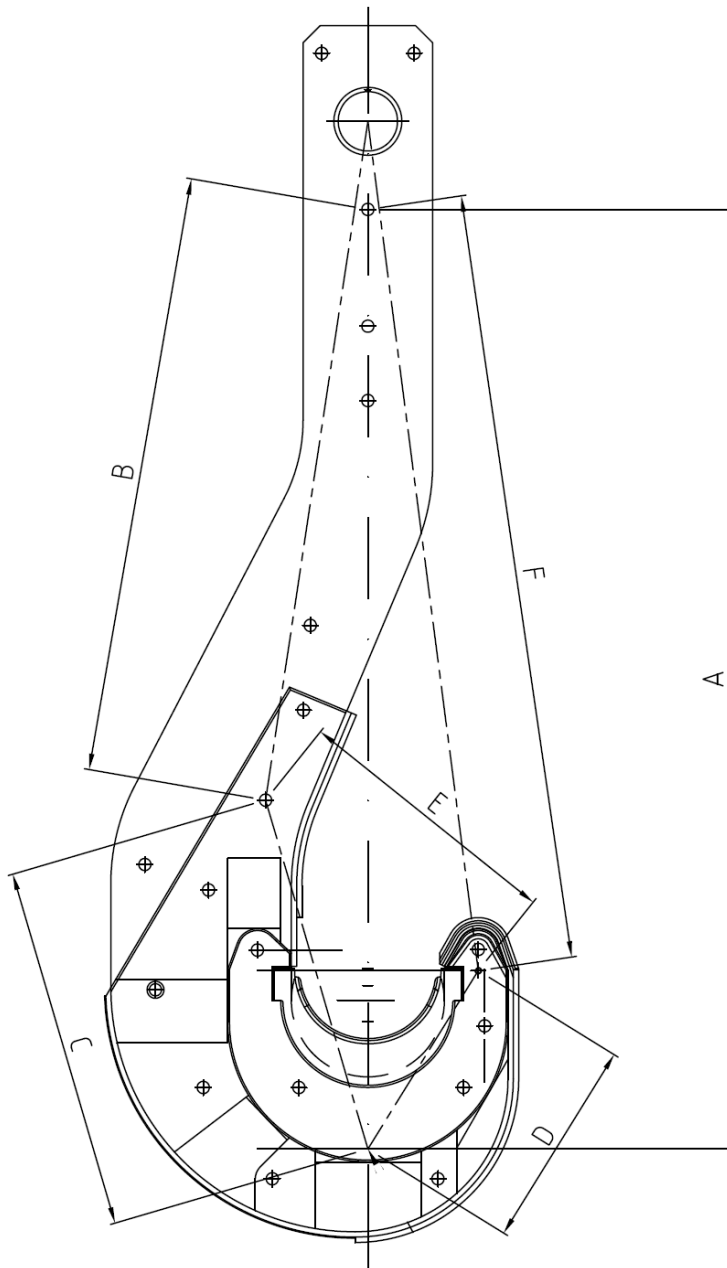


Figure 5.7

## 5.7 Corrosion protection

### Requirement

Corrosion protection according to Tata Steel standard S310560.

Each plate to be preserved separately with coating system T04 (see Table 5.8).

Assembled laminated hook:

- Surface treatment S-01
- Coating system T-03
- Colour RAL 1003

T-04a	DFT	WFT	International Paint	Kleur	Glans	Overcoating time @ 20°C		Thinner	Cleaner
Primer	50 µm	80 µm	Interzinc 22	Green grey	Matt	≥ 7 h	Extended	GTA803/415	GTA803/415
Buildcoat	25 µm	56 µm	Intertherm 50	Aluminium	-	≥ 14 h	Extended	GTA007	GTA007
Finish	25 µm	56 µm	Intertherm 50	Aluminium	-	≥ 14 h	Extended	GTA007	GTA007
	100 µm					Lead time ≥ 5d			
T-04b	DFT	WFT	PPG	Kleur	Glans	Overcoating time @ 20°C		Thinner	Cleaner
Primer	50 µm	77 µm	SigmaZinc 170	Grey	Flat	≥ 32 h	Unlimited	90-53	90-53
Buildcoat	25 µm	56 µm	SigmaTherm 540	Aluminium	Eggshell	≥ 16 h	Extended	-	21-06
Finish	25 µm	56 µm	SigmaTherm 540	Aluminium	Eggshell	≥ 16 h	Extended	-	21-06
	100 µm					Lead time ≥ 5d			
T-04c	DFT	WFT	Jotun	Kleur	Glans	Overcoating time @ 20°C		Thinner	Cleaner
Primer	50 µm	75 µm	Resist 86	Green grey	Flat	≥ 7 h	Unlimited	No. 4/25	No. 4/25
Buildcoat	25 µm	63 µm	Solvalitt	Aluminium	Alu sheen	≥ 4¼ h	Unlimited	No. 7	No. 7
Finish	25 µm	63 µm	Solvalitt	Aluminium	Alu sheen	≥ 4¼ h	Unlimited	No. 7	No. 7
	100 µm					Lead time ≥ 3d			

Table 5.8: