(HAE-026572) AGREEMENTS REGARDING PURCHASE, USE AND INSPECTION OF HOISTING- AND LIFTING EQUIPMENT

Note:
- Complete revision of the procedure.

1. PURPOSE

The purpose of this procedure is to prevent incidents during hoisting and lifting work by laying down the agreements and minimum requirements regarding the purchase, use and inspection of hoisting and lifting equipment

2. SCOPE

This procedure applies to all employees (permanent and contractors) working on the premises of Yara Sluiskil B.V. The requirements apply to:
- All hoisting and lifting equipment used.
- For moving loads and moving with fixed hoisting equipment such as overhead cranes and (wall-mounted) slewing cranes.

A separate procedure has been drawn up for working with mobile cranes and tower cranes (HAE-026858)

3. DEFINITIONS

Hoisting beam	Beams that are not in themselves lifting appliances but to which a hoisting or lifting appliance is attached during maintenance work. These beams have been installed specifically for this purpose.
Crane gantry	Rail profiles along which the overhead crane moves.
Hoisting and lifting equipment inspection	An examination to establish whether a lifting device is still safe to use
Hoisting and lifting equipment test	An examination to assess whether the hoisting and lifting equipment complies with the regulations; this is recorded in a test report
WLL	Working Load Limit. The working load limit is the maximum permissible useful load with which the lifting equipment may be loaded.
Trial	A trial involves loading a crane with a test load that is greater than, or at least equal to, the maximum load that is permitted to be lifted with the crane.

Over the hook	All cranes and lifting equipment connected to a fixed place or gantry.
Under the hook	Hoisting equipment located under the hook, such as chains, slings, hooks, fork-lift trucks, etc.
Visual check	A visual check is carried out to assess whether the device to be deployed is safe for use. The user makes a visual check of: - Working load, - Markings, - Rejection standards, - Use in accordance with the user manual.
Monorail	Hoisting beam along which a hoist or trolley can move.

4. GENERAL AGREEMENTS ON HOISTING AND LIFTING EQUIPMENT

4.1 Purchasing requirements

All purchased hoisting and lifting equipment is accompanied by a certificate with user instructions in Dutch and a declaration of conformity.

Additional purchasing requirements for the Nitrate Department:
- In connection with corrosion in the Nitrate Department and the risk of breakage, the permanently installed hoists must be made of stainless steel.

Flow chart for the purchase of hoisting equipment:

Flow schema aankoop hijsmiddel

4.2 Qualifications

The user of hoisting and lifting equipment must have sufficient knowledge and experience of working with the hoisting or lifting device:
- The user must at least be in possession of a valid 'Attachment of Loads' (AoL) certificate for the hooking/attachment of loads.
- To attach, move and relocate loads using manual equipment, the user must at least be in possession of a valid certificate for “Moving Loads with Hand Tools" (MLHT).
- To move loads with an overhead crane/slewing crane, the user must at least be in possession of a valid certificate for 'Safe Hoisting with an Overhead Crane' (SHOC).
- To attach and guide loads using a dynamic lifting device operated by a crane operator, the user must at least be in possession of a valid 'Attachment and Guidance of Loads' (AGL) certificate.
- To work with a forklift truck, the user must at least be in possession of a valid forklift truck certificate.

4.3 Use

Primary references are the user instructions of the hoisting device's manufacturer/supplier, which must be adhered to, and the standard operating procedure (SOP) composed for the hoisting or lifting device.

- Before using the hoisting and lifting equipment, the user must visually assess whether it can be used safely.
- If hoisting or lifting equipment is found which has not been tested (any more), it may not be used.
- A load must guided in such a way as to avoid having any part of one's body in the line of fire, for example by employing a guide line or adapting the working method accordingly.
- Hoisting/lifting equipment and lifting beams should be seen as a combination. This means that no more may be lifted than can be borne by the weakest link.
- Hoisting above workstations/people is not permitted.
- To prevent unauthorised use of electrically powered gantry cranes, the power switch must always be at <off> and locked. The key is held by the department Proco.

4.4 Responsibilities for maintenance and tests

The FAC (Facility Management) department is responsible for the maintenance and inspection/testing of overhead and slewing cranes (and accessories) and lifting beams throughout the site.

The owner (department) is responsible for the maintenance, inspection and testing of all other lifting equipment.

- Over the hook: manual chain hoists, electric hoists, trolleys etc.
- Under the hook: chains, hooks, slings, hoisting belts etc.

4.5 Tests and inspections

Fixed cranes and the equipment to be used (chains, hooks, slings, hoisting belts, etc.) must be inspected and tested periodically by a competent person(EKH standard). The year colour or inspection sticker indicates the year in which the hoisting equipment was approved.

Yara Sluiskil uses the IMO (International Maritime Organisation) year colours

IMO year colours				
Brown	2010	2016	2022	2028
Blue	2011	2017	2023	2029
Yellow	2012	2018	2024	2030
Red	2013	2019	2025	2031
Black	2014	2020	2026	2032
Green	2015	2021	2027	2033

These tests and inspections are carried out by an independent EKH testing and approval company, which provides the hoisting equipment with an approval sticker.

Hoisting materials belonging with a crane must be listed in the crane logbook (an inspection sticker need not be present on the hoisting materials). This only applies to hoisting materials belonging with a crane, and not to other hoisting materials. The user must always be able to check on the spot whether the hoisting material is suitable for use.
In case of urgent inspections or tests, the contracting company which is designated for the testing of hoisting and lifting equipment on the Yara Sluiskil site is to be contacted.

Flow chart for the testing of hoisting equipment:

Flow schema keuring hijsmiddele

4.5.1 Test intervals for hoisting equipment over the hook

	Check before use	Annual inspection	Annual mechanical test	Annual full mechanical test and trial	CE and trial in case of new delivery or major change
Hoists					
Manual chain hoists	✓			✓	✓
Electric hoists	✓			✓	✓
Manually operated trolleys	✓		✓		✓
Electric trolleys	✓		✓		✓
Cranes (complete installation)					
Column-mounted slewing cranes	✓			✓	✓
Wall-mounted slewing cranes	✓			✓	✓
Overhead cranes	✓			✓	✓
Gantry cranes	✓			✓	✓
Support					
Crane gantries	✓	✓			✓
Hoisting beams	✓	✓			✓

Source: EKH

Exceptions:

- Hoisting beams which are used only occasionally (less than once a year) are to be inspected before use. The relevant department is responsible for passing this on to FAC.

  The relevant department is to determine whether a lifting beam should meet the annual inspection requirement or only be inspected before use. Beams that are inspected annually can be used at any time. Beams that are not inspected annually are to be inspected before being taken into use.

Supplement for the Nitrate department:

- Inconnection with the danger of stress corrosion, the trial interval for hoisting and lifting equipment used in a Nitrate environment is 1 year.

4.5.2 Test intervals for hoisting equipment under the hook

	Check before use	Annual inspection	Annual test and trial	4-yearly test and trial	One-off certification for new deliveries
Chainwork					
Chain slings	✓	✓		✓	
Chain slings	✓	✓		✓	
Top links and rings	✓	✓		✓	
Connecting links	✓	✓		✓	
D and bow shackles	✓	✓		✓	
Eye bolts and nuts	✓	✓		✓	
End fittings for hoisting belts	✓	✓		✓	
Hooks (all types, forged or made of sheet metal)					
Loading forks and C-hooks	✓	✓		✓	
Carabiners	✓	✓		✓	
Safety hooks	✓	✓		✓	
Steel cables					
Slings	✓	✓			✓
Hoisting clamps					
Beam clamps	✓		✓		
Plate grips	✓		✓		
Hoisting clamps	✓		✓		
Lifting equipment and tools					
Hydraulic jack	✓	✓	✓	✓	
Mechanical jack	✓	✓		✓	
Forklift truck forks	✓	✓		✓	
Hydraulic pallet truck	✓		✓		
Lifting tables	✓		✓		
Hoisting belts					
Endless hoisting belts (round)	✓				✓
Flat hoisting belts	✓				✓
Attached hooks, rings	✓			✓	
Miscellaneous hoisting tools					
Hoisting yokes	✓	✓			✓
Bulk bins	✓	✓			✓
Forklift truck attachments	✓	✓			✓

Source: EKH (the complete list of test intervals via EKH.nl)

4.6 Maintenance

Maintenance is to be carried out in accordance with the maintenance schedule specified in the manual.

Flow chart for the repair of hoisting equipment:

Flow schema reparatie hijsmiddel

5. TYPES OF HOISTING EQUIPMENT

5.1 Introduction

Various types of hoisting equipment are in use on the Yara Sluiskil site. In order to limit the risk when working with this hoisting equipment, specific requirements have been drawn up at Yara. This document contains the test requirements that different types of hoisting construction must meet.

5.2 Hoisting beams

At Yara Sluiskil, hoisting beams refer to those beams which are not hoisting or lifting equipment in themselves, but to which hoisting or lifting equipment is attached during maintenance activities. These beams have been installed specifically for this purpose.

Prior to the first test, a verification calculation is made for each hoisting beam and this, together with a drawing, an overview photo and an inspection form, is stored centrally in Yara's system.

5.2.1 Hoisting beam for frequent use

Hoisting beams for frequent use are those installed at strategic positions and frequently used for vertical transport.

Image - Hoisting beam for frequent use

5.2.1 Hoisting beam for occasional use

Some lifting beams are only used occasionally. This refers to the beams that are used less than once a year. These beams are only used during scheduled maintenance.

The relevant department is to determine whether a hoisting beam should meet the annual inspection requirement or be inspected before use (occasional use).

Hoisting beams which are used only occasionally should be inspected before being put into service.

5.2.3 Hoisting with the use of structural elements not explicitly intended as hoisting beams

In addition to the standard hoisting beams, existing structures are used temporarily as hoisting constructions during special maintenance. The difference between hoisting beams and temporary

hoisting structures lies mainly in the fact that the beams also fulfil another function in the supporting structure of the building.

Procedure:
- Structural members that are to be used for hoisting must first be evaluated, via FAC, for the loads by a structural engineer.
- After approval by the structural engineer, the structural members must be marked with a hoist label (sticker), stating at least the IMO year colour, the year and the WLL.

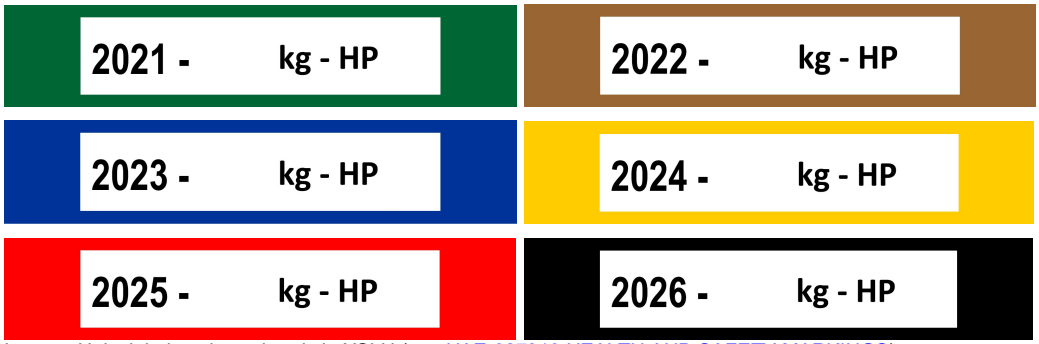


Image - Hoist labels to be ordered via XSLU (see HAE-027319 HEALTH AND SAFETY MARKINGS)


Picture - Temporary provision for hoisting on a structural beam

Attention:
Temporarily installation of a new beam for the purpose of hoisting loads falls under the category of hoisting beams and must be tested, inspected and marked before being taken into use.

5.2.4 Agreements with regard to the application of approval stickers and bolt/nut marking of hoisting beams

Applying approval stickers:
On the nearest column is a plate with FL, WLL and approval sticker. Multiple beams within the grid are clustered on one plate.

Marking of bolts and nuts:
Bolts and double nuts with which the hoisting beam is secured to the structure are painted red so that one can see from the fixed floor whether a nut is loose. This eliminates the need to build scaffolding to check whether the nuts are loose.

5.3 Monorail

With a monorail, the hoisted load can be moved mechanically both horizontally and vertically. The monorail is a combination of beam and gantry crane, and the beam is never used without the gantry crane.

Image - Monorail

5.4 Fixed cranes

Fixed cranes shall have a crane logbook in which the maintenance history, inspections and tests are recorded. The crane logbook must be kept with the crane.

5.4.1 Overhead cranes

An overhead crane is a crane used for hoisting and moving loads along the length and breadth of a room. An overhead crane rides on girders (the crane gantry) that are installed within a room. This is done using two tracks that are attached along the length to the brackets. The overhead crane and the crane gantry are viewed as a single system, and are inspected/approved at the same time.

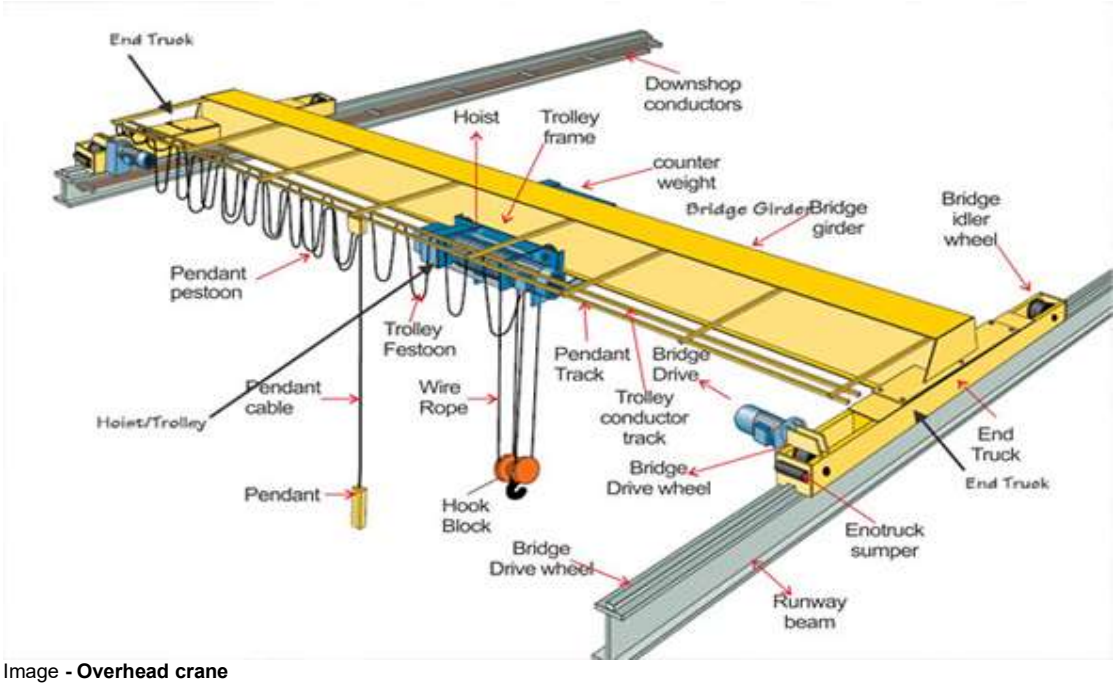


Image **- Overhead crane**

5.4.2 (Wall-mounted) slewing cranes

We speak of a wall-mounted slewing crane if the crane jib is attached to the wall or structure. We speak of a slewing crane if the crane has its own column that is secured to the floor.

Image - Wall-mounted slewing crane

Image - Slewing crane

6. REQUIREMENTS FOR HOISTING STRUCTURES

6.1 Design requirements for hoisting structures

A number of requirements have been drawn up for calculations with regard to hoisting structures, based on current legislation. Because there are different situations on the Yara site, it was decided to divide the design requirements into three groups:

1. New hoisting structure.
2. Existing hoisting structure, according to Eurocode.
3. Existing beams according to Eurocode and NEN8700.

The factors to be used are shown in the tables below. These factors apply to both the hoisting structure and the supporting structure.

6.2 New hoisting structure (based on Eurocode standards)

Factors	**UGT (strength/stability)**		**BGT (deflection)**		**Test**	
	$\gamma_{G/Q}$	φ_2	$\gamma_{G/Q}$	φ_2	Strength	Deflection
Permanent load	1.50	--	1.00	--	--	--
E.g. hoisting equipment	1.65	1.50	1.00	1.50**	--	--
Hoisting load	1.65	1.50	1.00	1.50**	125%	100%
Persons / goods*	1.65	--	1.00	--	--	--
Snow*	1.65	--	1.00	--	--	--
Wind*	1.65	--	1.00	--	--	--
Deflection requirements Hoisting structure Other structure	 L/700 L/500					

This relates to a new hoisting structure according to Yara specifications. Here, a higher safety level is built in than is minimally required according to the Eurocode.

6.3 Existing hoisting structure (based on Eurocode standards + NEN 8700)

With this option, reduced safety factors are applied. Based on the Dutch Buildings Decree in combination with NEN 8700, these factors may be applied if the hoisting structure does not meet the safety factors according to the Eurocode standards.

Factors	**UGT (strength/stability)**		**BGT (deflection)**		**Test**	
	$\gamma_{G/Q}$	φ_2	$\gamma_{G/Q}$	φ_2	Strength	Deflection
Permanent load	1.20	--	1.00	--	--	--
E.g. hoisting equipment	1.50	1.15	1.00	1.15**	--	--
Hoisting load	1.50	1.15	1.00	1.15**	125%	100%
Persons / goods*	1.50	--	1.00	--	--	--
Snow*	1.50	--	1.00	--	--	--
Wind*	1.50	--	1.00	--	--	--
Deflection requirements Hoisting structure Other structure	 L/500 L/500					

These structures are calculated with reduced safety factors in accordance with the current Dutch Building Regulations (NEN8700).
* Load combinations are looked at per hoisting beam, and applied as applicable.
** Impact factor φ2 is taken into account for deflection in accordance with the Hoisting and Lifting Equipment Manual.

6.4 Drawing requirements

The documentation of a hoisting structure should include a construction drawing. This drawing is to include at least the following elements:
- Situation and overview of the hoisting beam and supporting structures.
- Profile dimensions.
- Gridworks and levels
- Attachments and end stops.
- Load and tare weight of hoisting equipment.
- Functional location.
- Requirements for paintwork and connecting materials.
- Position of attachment of the hoisted load.
- Calculation report number.

6.5 Implementation requirements

An overview of the implementation requirements that a hoisting structure must meet is given below. The following does not apply to temporary hoisting structures.
Purchase of beams with certificate.
- New hoisting beams are to be built from H-sections (HEA, HEB, IPE, INP...). Closed profiles such as tubular profiles are not permitted.
- Bolted connections are to be made of A4 80 stainless steel. Connections should be fitted with Teflon washers.
- Connections of the hoisting beam should be made with double nuts.
- Paint beam yellow (RAL1028) according to Yara specification SK-DS-MEN-00019.
- The hoisting beam must be mounted exactly horizontal.
- Indicate function location (identification number) and WLL (working load limit) on both sides of the hoisting beam in letters 80 mm high.
- Furnish beams with EKH approval sticker.
- Fit beams with end stops in accordance with §6.7

6.6 Documentation

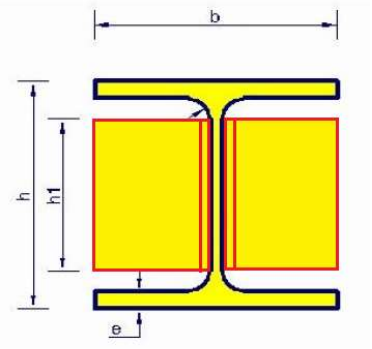
Link calculation to function location in SAP.
Link drawing of hoisting beam to function location in SAP.
Photo hoisting beam to function location in SAP.
Approval certificates and crane logbook.

6.7 Requirements for end stops

The hoisting beam must be fitted with end stops. If there are removable end stops, these must be replaced with fixed end stops.

All end stops must:

- Be at least as wide as the beam.
- With new hoisting beams, the height of the end stop should be the same as the straight part of the flange (h1).
- With existing lifting beams, the space between the bottom flange and the end stop should be a maximum of 40 mm (smallest wheel of the trolley is 46 mm).



6.8 Exceptions

When, in specific cases, it is not possible to comply with the aforementioned requirements, they may be deviated from in consultation with the SPTM department.

6.9 Checklists (only to be used by Liftal during inspection)

Checklist bestaande hijsbalken.doc

Checklist hijsbalken niet zijnde officiële hij

Checklist nieuwe hijsbalken.doc

7. LIFTING EYES

7.1 Types of lifting eye

There are various types of lifting eye, which can be divided into the following categories:
a. Lifting eye which is permanently attached to an item of work equipment and is also part of a hoisting or lifting device.
b. Lifting eye that has been / is to be screwed into an item of work equipment.
c. Lifting eye which is permanently attached to an item of work equipment, is not part of a hoisting or lifting device, and is used for 1 specific object.

Lifting eyes falling into categories a and b must be tested in conformity with all hoisting and lifting equipment. See Section 3. All other types of lifting eye that are individually marketed must also be tested in accordance with Section 4.

Lifting eyes that fall under category c are detailed below.

7.2 Lifting eye which is permanently attached to an item of work equipment, is not part of a hoisting or lifting device

This category includes the lifting eyes used with:
- Manholes
- Inspection hatches
- Well covers
- Etc.

Based on the weight, the inspection schedule is determined:
- If the weight is > 1000 kg, the normal testing programme must be followed, see Section 3. These are lifting eyes attached to a device/cover, e.g. cover of a large heat exchanger.
- All other lifting eyes are given a visual check before use during the job preparation stage to determine whether safe use is possible. If there are doubts about the integrity of the lifting eyes during the visual inspection, the Equipment Inspection Department should be consulted for a more detailed inspection. They will make a report on this more extensive inspection.

7.3 Tapped holes for screwed-in lifting eyes

The tapped hole in the item of work equipment should be visually checked in the job preparation phase to determine whether it can be safely used. If there are doubts about the integrity of the tapped hole during the visual inspection, the Equipment Inspection Department should be consulted for a more detailed inspection. They will make a report on this more extensive inspection.

This category includes engines, among other things.

8. REFERENCES

8.1 Legislation

BWBR0010346 - Working Conditions Act
BWBR0008498 - Working Conditions Decree 7.18 and 7.20
BWBR0005577 - Commodities Act Decree on machinery
BWBR0006022 - Commodities Act Regulation for machinery
BWBR0030461 - Building Act 2012

8.2 Standards

NEN-EN 1990	Eurocode: Principles of structural design
NEN-EN 1991-1	Eurocode 1: Loads on structures - Part 1-1: General loads
NEN-EN 1991-3	Eurocode 1: Loads on structures - Part 3 Loads caused by cranes and machines
NEN-EN 1993-1	Eurocode 3: Design and calculation of steel structures - Part 1-1: General rules and regulations for buildings.
NEN-EN 1993-6	Eurocode 3: Design and calculation of steel structures - Part 6: Crane gantries
NEN-EN 1993-8	Eurocode 3: Design and calculation of steel structures - Part 1-8: Design and calculation of connections
NEN-EN 13001-1	Crane safety - General design - Part 1: General principles and requirements
NEN-EN 13001-2	Crane safety - General design - Part 2: Load actions
NEN-EN 13001-3-1	Crane safety - General design - Part 3-1: Limit States and proof competence of steel structure
NEN 8700	Assessment of the structural safety of an existing building during alteration and rejection - Principles
NEN 2017	Cranes; General provisions

8.3 Directives

AI-17 Hoisting and lifting equipment and safe hoisting
EKH Hoisting and Lifting Equipment Manual
Yara specification YPO-Y50-00003