NautilusRigging
Manufacturers of Nautilus Hooks

Nautilus Hooks™
Recommended Maintenance Schedule & Inspection Guidelines

These maintenance recommendations and tolerance specifications are the manufacturers guidelines for ensuring your Nautilus Hooks remain fit for purpose. Nautilus Hooks must conform to manufacturer's specifications and tolerances for annual re-certification.
All lifting equipment, including Nautilus Hooks, should be visually inspected prior to use as best practice. Any equipment found with signs of excessive general wear or damage due to misuse, should be removed from service and replaced with new units.

Annual Thorough Examination

- In accordance with current legislation the manufacturers recommend Nautilus Hooks are subjected to an Annual Thorough Examination by a competent and authorised testing and inspection service. For annual re-certification the Nautilus Hook must conform to all the manufacturers recommended checks and tolerance specifications as detailed herein.

Inspections and General Maintenance Guidelines

- All lifting equipment, including Nautilus Hooks, should be visually inspected for obvious signs of any defects prior to use.
- Nautilus Hooks require inspection/examination every six months by a competent person. Competent persons should follow the manufacturers maintenance and inspection guidelines when visually examining or inspecting Nautilus Hooks.
- In order to maintain the operating functionality of Nautilus Hooks it is essential to apply a general purpose lubrication to the lock slide, main load bearing pin/surfaces, and swivel joint at regular intervals such that these components always remain well lubricated.
- Depending on the application and working environment Nautilus Hooks may require more frequent lubrication or an occasional flush out of the lock area to remove built up grease and grime before re-lubrication, inspection and use.

Nautilus Eye Top Hooks

- There are no components to disassemble in the Nautilus eye top hooks.
- Check for excessive vertical movement of the locking arm on the main pin which may be indicated by an increased "gap" between the locking arm and main hook body.
- Ensure that all moving parts are well lubricated at all times.
- Re-certification must be in accordance with the Nautilus Hooks Specification Guidelines.

Nautilus Clevis Top Hooks

- The load bearing clevis pin should be removed by first removing the retaining "C" pin
- Check for excessive wear on the clevis pin and pin housing.
- Check for excessive vertical movement of the locking arm on the main pin which may be indicated by an increased "gap" between the locking arm and main hook body.
- Note: If the clevis pin has been removed during thorough inspection then a new retaining "C" pin must be used for re-assembly of the clevis pin.
- Re-certification must be in accordance with the Nautilus Hooks Specification Guidelines.

Nautilus Swivel Top Hooks

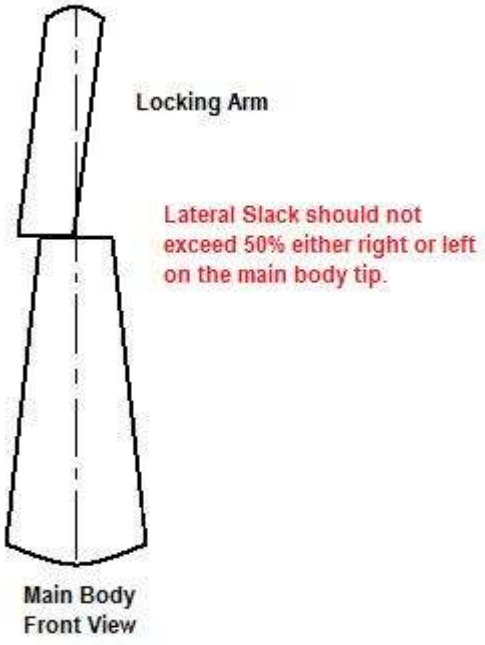
- Nautilus swivel top hooks are fitted with a Brass thrust washer which is designed to wear during use.
- If the vertical “play” between the swivel and hook shank becomes greater than 1 mm the swivel should be disassembled by removing the “C” pin from the castle nut then removing the nut washer and swivel. (Continued)
- Check the hook shank, thread and nut thread for any signs of corrosion or wear.
- Check the brass thrust washer for excessive wear
- (Note: if the wear on the brass thrust washer exceeds 2mm then the thrust washer should be replaced with the appropriate spare part kit)
- To reassemble swivel ensure parts are clean and lightly lubricated, the thrust washer must be replaced in the same orientation ie: swivel washer- worn side against the nut.
- Tighten the castle nut down until finger tight (no movement in swivel) back off the nut approximately ¼ turn before inserting new “C” pin or split pin to lock the nut on.
- Note: If the swivel has been removed during thorough inspection then a new retaining “C” pin or SS split pin must be used for re-assembly of the swivel and castle nut.
- The swivel must be able to rotate freely without excessive play.
- Check for excessive vertical movement of the locking arm on the main pin which may be indicated by an increased “gap” between the locking arm and main hook body.
- Re-certification must be in accordance with the Nautilus Hooks Specification Guidelines
- **Warning :** Nautilus swivel top hooks are NOT suitable for use with cranes that are fitted with powered swivel block function or rotatable main block/hook. (Eye hooks are recommended)

Nautilus Hooks Lateral Slack

- Lateral slack refers to the horizontal (sideways) movement of the locking arm in relation to the main body of the hook at the point where the tips come together. (as seen in the diagram).

- If lateral slack on the locking arm exceeds 50% this indicates excessive lateral wear in the hook.

- Nautilus Hooks which exceed this tolerance for lateral wear should be removed from service and replaced with new units.



Fatigue Rating

- Nautilus Hooks are fatigue rated to 20,000 cycles at 1.5 times the WLL.

- **Note** : The manufacturer recommends that all Nautilus Hooks in very high cycle service (40,000+ PA) should be inspected at more regular/frequent intervals for any signs of fatigue. Hooks that have surpassed the fatigue life should be replaced with new units.

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Nautilus Hooks™ – Specifications/Tolerance Guidelines

Nautilus Hooks are manufactured to EU standard BS/EN 1677-1+A1 2008 which meets the requirements of ASME B30.10. Nautilus Hooks are DNV type approved and certified under DNV regulation 2.22 for lifting Equipment.
Provided Nautilus Hooks are used in an appropriate manner for which they are intended and have been maintained in accordance with the Manufacturers maintenance Schedule they will remain fit for service and re-certification.
If the tolerance values, as determined by an authorised certification and inspection facility, exceed the manufacturers maximum allowable tolerances this would indicate that the Hook has been either misused, over stressed or has accumulated excessive wear and tear during normal use.
Nautilus Hooks that do not conform to the following specifications and tolerance guidelines should be removed from service and replaced.

Notes:

1. Nautilus Hooks incorporate measuring nibs on the main body of the hook, this known nib measurement (centre to centre) when compared with the inspection nib measurement and the inspection "gap" measurement gives an indication that the hooks either remain within specification or they may have been over stressed in use or there is excessive wear on the main load bearing pin or moving components.
   Note : The "gap" should be measured when the tips are hand pressured apart with the hook in a locked position.

2. Particular attention should be given to the swivel and clevis top hooks that have been in service in the marine environment, It is recommended that annual re-certification these units encompass full disassembly and a thorough inspection of the component shafts, threads, and pins for any indications of wear or corrosion.

Model Numbers	Manufactured Body Nibs (centre/centre) measurement	Body Nibs Maximum Tolerance	Arm/Body Maximum "Gap" Tolerance	Proof Load Force (2.5 x WLL) kN
NH-SL4E	68mm	+ 2.0mm	2.50 mm	98.00
NH-SL4C	68mm	+ 2.0mm	2.50 mm	98.00
NH-SL4S	68mm	+ 2.0mm	2.50 mm	98.00
NH-SL6E	79mm	+ 2.0mm	2.50 mm	147.00
NH-SL6C	79mm	+ 2.0mm	2.50 mm	147.00
NH-SL6S	79mm	+ 2.0mm	2.50 mm	147.00
NH-SL8E	90mm	+ 2.5mm	3.00 mm	196.00
NH-SL8C	90mm	+ 2.5mm	3.00 mm	196.00
NH-SL8S	90mm	+ 2.5mm	3.00 mm	196.00
NH-SL10E	90mm	+ 2.5mm	3.00 mm	245.00
NH-SL10C	90mm	+ 2.5mm	3.00 mm	245.00
NH-SL10S	90mm	+ 2.5mm	3.00 mm	245.00
NH-SL12.5E	103mm	+ 3.0mm	3.00 mm	306.25
NH-SL12.5C	103mm	+ 3.0mm	3.00 mm	306.25
NH-SL12.5S	103mm	+ 3.0mm	3.00 mm	306.25
NH-SL16E	118mm	+ 3.0mm	3.50 mm	392.00
NH-SL16S	118mm	+ 3.0mm	3.50 mm	392.00
NH-SL20E	118mm	+ 3.0mm	4.00 mm	490.00
NH-SL20S	118mm	+ 3.0mm	4.00 mm	490.00

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Additional Guidance Notes for Inspection of all Nautilus hooks

- All Nautilus Hooks are manufactured under BS/EN standard 1677. In addition to this international safety hook manufacturing standard Nautilus Hooks are DNV type approved under regulation 2.22. An independent QA procedure that includes verification of the manufacturing processes, assembly, materials and component testing which are common to <u>all</u> Nautilus Hook models.

- Nautilus Hooks are assembled from 5 basic components, the main load bearing body, the load bearing locking arm, the load bearing main pin, together with the non-load bearing handle portion and lock piece.

- During assembly the non-load bearing handle portion is welded to the main body of the hook at three points as shown in the diagram at right. These welds are non-structural and do not contribute to the rated WLL of the Hooks.
  1. The 2 top handle welds are both “L” shaped welds, starting from each side of the top of lock opening in an “L shape to the locking arm slot.
  2. The centre weld runs underneath/across the bottom of the lock space.
  3. The bottom weld runs right around the base of the handle.

- The weld material is a Nickel/Stainless Steel alloy (non-corrosive) and the load bearing components are carbon steel. These metals have contrasting magnetic permeability values, the weld material is <003% magnetic and the carbon steel is 100% magnetic. This magnetic differentiation affects MPI test methods as the induced magnetic field is disrupted along either side of the weld line (see right) concentrating the particles at the weld lines and giving a false impression of potential cracking. The MPI test procedure is <u>not suitable</u> for Nautilus Hooks

  ** **<u>LPI or Dye Penetration is the recommended test for all Nautilus Hooks</u>** **

- The manufacturing standard for lifting hooks calls for fatigue testing/rating of 20,000 cycles at 1.5 x WLL of the hook. (20,000 cycles is the BS/EN 1677 rated hook life)
  All batches of Nautilus Hooks exceed this requirement with no indications of metal fatigue. Extended factory fatigue testing has been conducted to determine the expected fatigue life of Nautilus Hooks. All test samples achieved 120,000+ fatigue cycles (6 x the rated hook life) before hairline cracks became evident, initially propagating from a welded handle joint corner as expected, following this extended test all samples passed a proof load test with no deformation.

- **Should any minor damage become apparent to the <u>non-load bearing</u> handle, including any slight imperfections of the <u>non-structural</u> welded handle joints, the load bearing integrity of the hook (rated 4:1 safety factor) will <u>not</u> be compromised.**
  Note : The welded joints serve only to fix the handle in place.

- **Should minor imperfections develop in a welded joint, for whatever reason, they will <u>not</u> propagate into the main body load bearing portion of the hook. Any Nautilus Hook indicating deficiencies in a handle weld joint when LPI/Dye tested may be re-certified at the users discretion, subject to a 2.5 x WLL proof load test.**

- **In the unlikely event, and for whatever reason, a handle weld should develop clear <u>visual</u> cracks across the full welded joint, then, as a precaution the hook should be removed from service and replaced.**