



USER'S MANUAL

Mooring Shackles & Links

KATRADIS GROUP OF COMPANIES

MANUFACTURER OF SYNTHETIC, HMPE ROPES & SACRIFICIAL ANODES

PROVIDER OF WIRE ROPES, ANCHORS & CHAINS, VESSEL DECK EQUIPMENT, PORT EQUIPMENT

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ROPE TO TAIL MOORING LINK / SHACKLE INSPECTION & DISCARD CRITERIA

All procedures described herein, must be carried out by suitably Qualified and trained Personnel

Regular inspection – routine checks on the connecting links / shackles:

- Visual inspection for any damage, corrosion, pitting, cracks, bending deformations. If any serious defect appears, the link must preferably be replaced in order to avoid any bigger damage or accidents.

Frequency: **Prior to each use and before storage**

- Dimensional verification. The link / shackle must be measured so that the dimensions are verified and possible deformations are identified.

Frequency: **Prior to each use**

In-depth inspection:

- NDT (Non-Destructive Test) shall be carried out as follows.

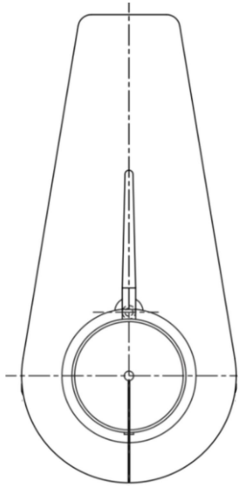
--Magnetic Particle Inspection (MPI) for surface and slightly sub-surface discontinuities and/or

--Ultrasonic Test (UT) for internal / sub-surface discontinuities & cracks, laminations & porous defects and/or

--Penetrating test, using special penetrating fluids

If any cracks, abnormalities or other defects appear the link / shackle shall be replaced.

Frequency: **Annually / semiannually** or at the discretion of the Qualified personnel.



Detailed instructions for an efficient & effective inspection

Inspection Criteria

- Deformation stretch
- Gouges, cracks, and nicks
- Excessive corrosion, pitting
- Heat damage
- Wear in excess of 10% at any point
- Correct pin in place
- Proper size and working load permanently marked

Most Common Causes of Damage

- **Damage due to misuse**
 1. Overload stretch or side load deformation (pin will not screw – unscrew smoothly)
 2. Gouges and nicks
 3. Heat damage exposure to welding or heat source
 4. Excessive wear in load bearing contact points
- **Effects of environment**
 1. Excessive corrosion due to exposure

Applicable Standards

- API RP2 D
- ASME 830.26
- OSHA 1910.184

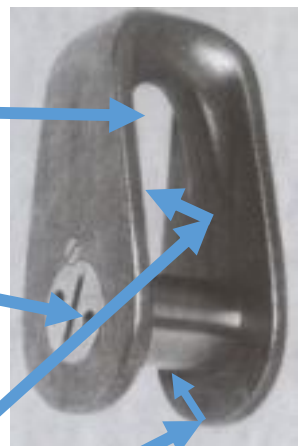
Check for wear in the bowl

Check to see if pin screws smoothly and head levels with shackle's side (proper seating).
Non smooth screwing may mean overloading of shackle

Check for deformation

Check for wear, straightness and tightness, also that pin is properly seated

Check for ear (side) opening and alignment



Repair tools are not supplied, nor are necessary, as in case of a deformation the link / shackle must be discarded. Links / Shackles are accompanied with hex allen wrenches for screwing the main pin and the securing pin.

Discard criteria

Mooring links / Shackles must be discarded after an inspection by Qualified and trained Personnel has determined that:

- Links / Shackles show any dimensional deformation
- Links / Shackles show excessive corrosion & pitting, nicks or gouges
- Links / Shackles show signs of heat damage
- Links / Shackles exhibit severe crack defects, as these have become visible by either the visual inspection and / or the In-Depth inspection
- Links / Shackles exhibit wear in excess of 10% at any point
- Links / Shackles exhibit difficulty when screwing / unscrewing the main pin which is not due to surface rust accumulation that can be cleaned away
- Evidence of unauthorized welding or modification
- Other conditions, including visible damage, that cause doubt as to the continued use of the shackle

Handling and storage

When removing shackles/links from the mooring assembly, it is good practice to re-assemble them immediately. Leaving the pins loose can damage the threads. More importantly, as shackles/links are a forged item the pin and body are individually fettled to fit. It is not uncommon for shackles/links from the same batch to have varying mating alignment making it difficult and time consuming to match pin and shackle pairs.

Periodic Inspection

A complete inspection of the shackle/Link shall be performed. The shackle/Link shall be examined for conditions such as those listed in Chapter "*Discard Criteria*" and a determination made as to whether they constitute a hazard.

Periodic Inspection Frequency

(1) Periodic inspection intervals shall not exceed 1 yr. The frequency of periodic inspections should be based on:

(-a) frequency of use

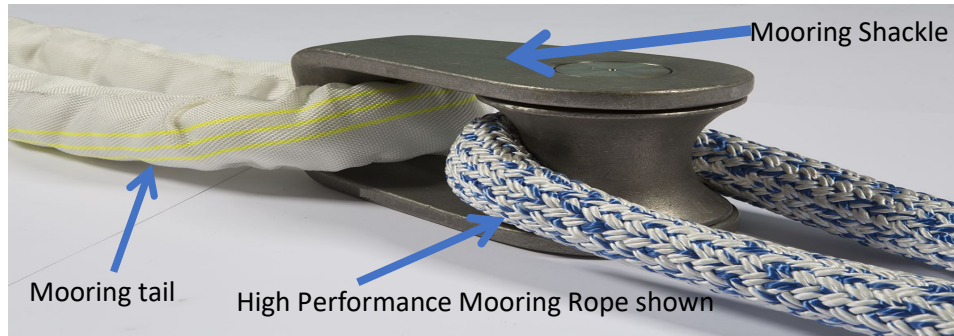
(-b) severity of service conditions

(-c) experience gained on the service life of shackles/links used in similar circumstances

ANNEX A

Mooring Rope to Tail Connection methods

Connection with Mooring Shackle: The synthetic mooring rope or wire rope is attached to the roller of the Shackle and the tail is attached on the back of the Shackle (as shown below).



Connection with Mooring Link: The synthetic mooring rope or wire rope is attached to the back of the Link and tail is attached on the pin of the Link.

Side loading is strictly forbidden.

DISCLAIMER

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