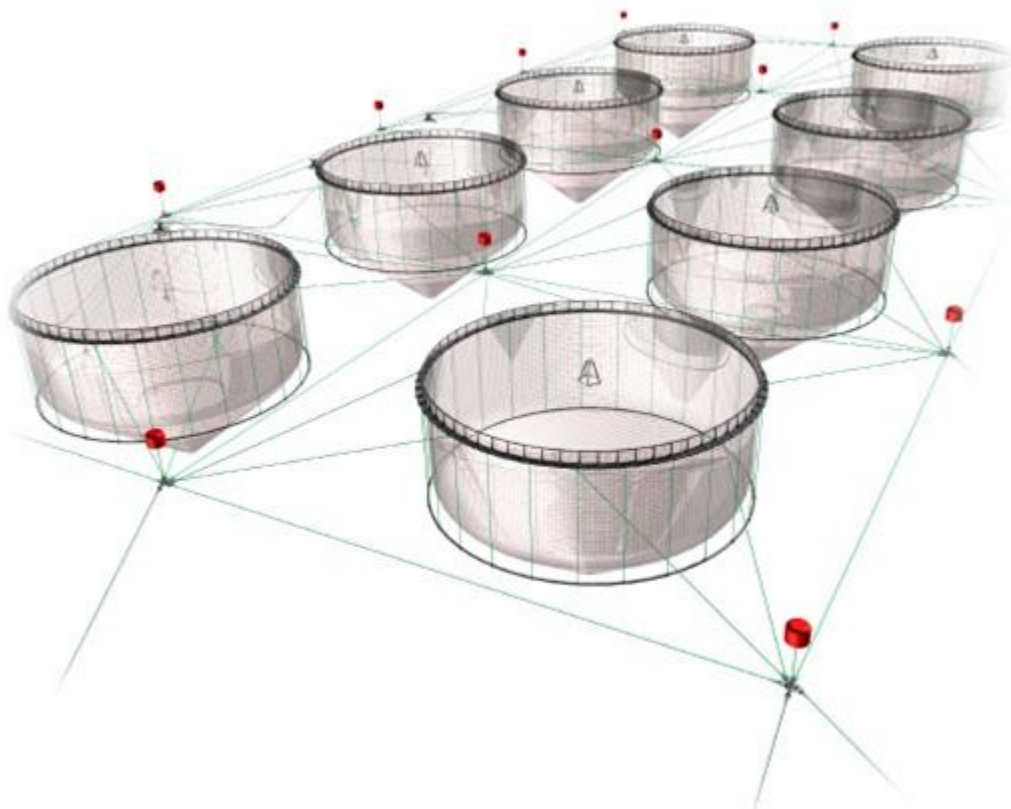




User manual for **aseke** mooring chains and components for aquaculture



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PRODUCER AND PRODUCT INFORMATION (page)

Contact information 3.

Description of aseke mooring components 3.

Requirements for modification 5.

TRACEABILITY, PREREQUISITES, LOADS AND DEVIATIONS

Traceability of component 6.

Prerequisites & limitations 7.

Allowed loads & load distributions 8.

Discrepancies 8.

TRANSPORTATION AND STORAGE

Transportation and storage of components 9.

ASSEMBLY

Requirements for assembly 11.

Instruction manual for assembly of components 11.

INSPECTION, MAINTENANCE AND REPLACEMENT OF MOORING LINES

Requirements for personnel 14.

Scheduled maintenance 14.

Routine inspection 14.

Main inspection 14.

Frequency of replacements 15.

Disposal of components 15.

Definitions 15.

PRODUCER AND PRODUCT INFORMATION

1.1 Contact information

as Einar Kunsts etf (**aseke**) has address in Oslo with a central warehouse in Moss, Norway. The company is certified as producer and supplier of steel chains and corresponding rigging hardware for a.o. mooring systems.

Certifying body: STIM as, certificate no PSB 011
Contact information: **as Einar Kunsts etf**
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NO - 0377 Oslo
tel +47 22 13 02 00 / +47 951 45 920
email post@aseke.no

1.2 Description of aseke mooring components

A floating fish farm has four main components: The net, the mooring, the buoys, and a barge. This User Manual provides instructions for assembly and maintenance of aseke mooring components. All single components that make the mooring line must be produced and product-certified according to the latest version of the NS 9415 standard.

a1) aseke ALLOY mooring chains Grade 60 – continuously hot dip galvanized

Hot continuously galvanized high strength chains in Grade 60 alloy quenched and tempered in diameters 11-35mm. To be used where a lighter, but stronger chain as example wise in the frame and in connection with mountain anchors or other lines ashore. Supplied with stamped ID code and NS 9415:2009 product certificate.

- [aseke ALLOY morings kjetting G60](#)

Alternatively with black electrophoretic surface treatment

...for even higher surface abrasion resistance.

a2) aseke AQUA mooring chains Grade 40 – black bitumen lacquered or hot dip galvanized surface treatment

Black surface chains in Grade 40 to be used between the anchor/mooring and the rope in a mooring line. Dimensions 25-50mm. Supplied with stamped ID code and NS 9415:2009 product certificate.

NOTE: aseke AQUA mooring chains obtain about 5 years longer lifecycles length than traditionally used anchor chain constructions in the market (!) acc to the theory on lifespan listed in NS 9415:2009.

- [aseke Mooring chains G40](#)

a3) aseke AQUA chains Grade 40 – continuous hot dip galvanized surface treatment

Galvanized long link chains in steel quality Grade 40 to be used **ONLY** as distension of fish farming nets. Dimensions 8-25mm. Supplied with stamped ID code and EN 10204-3.1 product certificate.

NOTE: Not to be used as part of a mooring line!

- [aseke Mooring chains G40](#)

b) aseke mooring shackles sherardized galvanization

Mooring shackles in Grade 60 quenched and tempered alloy for the connection of single components in the mooring line. Dimensions MBL 30, 40, 50, 60, 90 and 140 tons. Supplied with stamped ID code and a NS 9415:2009 product certificate.

- [aseke Mooring shackles](#)

c) aseke Connection Plates –hot dip galvanized

Hot dip galvanized circular connection plates of ductile Grade 60 quenched and tempered alloy. To be used in the mooring line where multiple lines are to be connected. Dimensions MBL 50-140 tons with 3, 12, 16 or 20 connection holes. Alternatively, aseke provides triangle connection plates with three connection holes for MBL 50 & 140 tons.

Supplied with stamped ID code and product certificate acc. to the EN 10204-3.1 standard.

NOTE: Dimensioning load is only $\frac{1}{4}$ of the MBL. The connection plate and its connected shackle should have the same MBL in order to achieve the best overall result using the right dimensions of both the connection plate and the shackle.

- [Connection plates](#)

d) aseke Mooring Bolts –hot dip galvanized

Grade 60 quenched and tempered alloy bolts for offshore and onshore connections. Two versions available as T-bolt or Eye bolt in dimensions 32-57mm diameter with MBL 45-120 tons. Supplied with stamped ID code and product certificate acc. to the EN 10204-3.1 standard.



- [Mooring bolts G60](#)

e) aseke Mooring Links/Master Links –hot dip galvanized

Grade 60 quenched and tempered alloy, hot dip galvanized oval links in dimensions 22-70mm diameter with MBL ranging from 25 to 285,6 tons. Supplied with stamped ID code and product certificate acc. to the EN 10204-3.1 standard.



- [Master links HDG](#)

f) aseke Anchors –black bitumen

- [Anchors](#)

f1) PLOW ANCHOR

Anchors produced with Grade 40 or Grade 60 steel plates in construction with a plow bottom plate and a shaft, supplied in two parts for assembly with bolts with nuts.

To be used for mooring in a seabed of sand, clay, or pebbles. Supplied with stamped ID code and product certificate acc. to the EN 10204-3.1 standard.

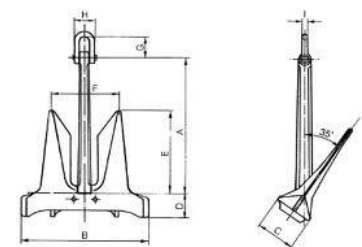
NOTE: The product certificate is advising the holding power in the connection point.



f2) STOCKLESS PATENT ANCHOR

Anchor produced in cast iron with double claws and a transitioned shaft. To be used on an uneven seabed of rocks/stones. Supplied with stamped ID code and product certificate acc. to the EN 10204-3.1 standard.

NOTE: The product certificate is advising the holding power in the connection point.



g) Thimbles –hot dip galvanized

Produced in cast iron or stamped and bent plates for the protection of fiber ropes and hawsers in a connection point of a mooring line. The thimbles are supplied with a product certificate with chemical properties. Primarily four types of thimbles are used in aquaculture; K3, K2A, K2B, and tubular –all of which can be found here:

- [Thimbles fiber ropes hawsers](#)

Alternative thimbles for steel wire ropes:

- [Thimbles wire ropes](#)

h) Fiber ropes/hawsers of Polyethylene + Polypropylene (PE/PP)

3-strand or 8-strand braided Danline fiber ropes in light green or orange color. Other types of fiber ropes and -hawsers can be used, provided they meet the demands of the mooring analysis in the NS:9415 standard. The thimbles are supplied with stamped ID code and EN 10204-3.1 product certificate.

- [Mooring ropes and hawsers](#)

i) Polyester (PES) round slings & webbing flat slings

Both round slings and flat slings are supplied with stamped ID code and product certificate for lifting regarding EN1492-1 with a safety factor of 7:1, which should be used for all PES equipment in aquaculture.

- [Round sling 1](#) WLL 1-6 T
- [Round sling 2](#) WLL 8-20 T
- [Round sling 3](#) WLL 25-50 T
- [WEB Slings 1](#) WLL 1-5 T
- [WEB Slings 2](#) WLL 6-20 T

1.3 Requirements for modification in cooperation with producer/distributor

The producer/distributor should be contacted if one or more of the following changes to the mooring system are made:

- Change of size of the net or its mesh size or diameter of thread or rope if this surpasses the base for the mooring analysis.
- Change in the size or type of the cages or complete fish farm.
- Increased weight of the net – exceeding the basis for the mooring analysis.
- Increase in the number of cages – exceeding the basis for the mooring analysis.
- Change of total weight or the area of the barge.
- Change in the situation of the sea bottom mounts.
- Change in the geographical orientation of the fish farm.
- Change of the connection point from mooring line to the cage.

Contact with the producer or the dealer is not required for normal maintenance or change of single components provided the single component are produced according to NS 9415:2009 and the dimensioning is according to the mooring line analysis.

TRACEABILITY, PREREQUISITES, LOADS AND DEVIATIONS

2.1 Traceability of components

a) aseke Chains

aseke mooring chains are packed in bags, bundled or on a framed pallet. The ID label is connected in each production length or where the chain is bundled. The ID code should be easily readable.

Every chain length has an ID stamp with the following info referring to its product certificate:

- Factory logo
- Alloy code
- ID code stampings in equal intervals on each production length referring to the product certificate.
- **aseke**

Additionally, the label on each bundle is marked with:

- Dimension
- Length per bundle

b) aseke Mooring Shackle

A mooring shackle is set up by a bow and a rotation-free bolt. The bolt and the bow each have their ID-mark stamped. The ID code is stamped into the bow, as well as with the "aseke" and the MBL. The bolt head is stamped with the same ID mark as the bow. Both ID codes are referring to the product certificate.

c) aseke Connection Plates

Connection plates are stamped with ID code, **aseke** and MBL referring to the product certificate.

d) aseke Mooring bolts

Mountain and Mooring bolts are stamped with ID-code, **aseke** and MBL referring to the product certificate.

e) aseke Connection Rings/Master Links

Oval connection rings/Master links are stamped with ID-code, **aseke** and MBL referring to the product certificate.

f) aseke Anchors

- Plow anchors are packed as two parts (shank & fluke) to be bolted together with the enclosed nuts and bolts. Plow anchors are marked **aseke.no**, weight and ID-code referring to the product certificate.
- Stockless Patent anchors AC-14 of casted and welded parts are already ready mounted. Patent anchors are marked **aseke.no**, weight and ID code referring to the product certificate.

g) Thimbles

Thimbles are marked with **aseke** and ID code referring to their product certificate.

h) Danline fiber ropes and -hawsers of Polyethylene/Polypropylene (PE/PP)

Each coil is marked with:

- ID code referring to the product certificate
- Type of rope or hawser
- Dimension
- Length

i) Polyester (PES) round slings and webbing flat slings

Each individual round sling and flat sling is marked with:

- ID code referring to the product certificate
- Type of round sling / flat sling
- WLL at safety factor 7:1
- Dimension
- Length

2.2 Prerequisites and limitations in the use of equipment

If the equipment supplied by as Einar Kunsts etf (**aseke**) is used or handled in contradiction to the prerequisites as described in this user manual, the product certificates can no longer be considered as valid.

a) aseke Mooring chains

The product certificate limits the chains' permissible load. The chains cannot be overloaded by exceeding the limits as stated in the product certificate. The chains may be installed in a mooring line using an aseke mooring shackle or other NS:9415 approved connection elements. The shackle should always be connected to the end link of each chain length. The chains are neither tested nor approved for loads across the long side of each chain link.

IMPORTANT: Note the assembly manual (4.2.a)

b) aseke Mooring shackles

A shackle constructed for the use in a mooring line is NOT to be used for any lifting purpose. The shackle can only be loaded as advised in its product certificate and stamped into the bow of the shackle. The shackle must be loaded only in the direction of the long side and is not designed nor produced to take loads in the transverse direction. Only galvanized safety pins or PVC coated copper wires can be used for securing the shackle bolt. Pins or Wires are supplied with the aseke mooring shackles. Alternative safety pins are to be approved by the producer or dealer before their use.

c) aseke Connection Plates

Connection plates cannot be used at higher loads than listed in their respective product certificate. **NOTE dimensioning load is ¼ of the MBL.**

The plate must be equally loaded in all connection holes and the highest load must be distributed to the opposing hole.

The plate should be positioned in a horizontal direction when being loaded (as horizontal as possible).

NOTE connection and triangle plates must be used in combination with shackles of the same MBL figure to ensure no twist forces to the shackle bolt.

d) aseke Mooring Bolts

T-bolts and Eye bolts produced and supplied by as Einar Kunsts etf (**aseke**) are designed as mooring equipment for solid rock surface both above and below the water surface. The mooring bolts should not be used with a load that exceeds what is listed in its corresponding product certificate. A prerequisite is that the bolts are installed in acc. to the instruction manual * 4.2.d.

e) aseke Master Links

Oval master links should not be exposed to loads that exceed the allowed figures in the product certificate.

f) aseke Anchors

Breaking test figures showing the holding power of an anchor is calculated based on specific and relevant seabed conditions. The holding power can vary a lot dependent on the seabed conditions. The anchor must be tested to its dimensioning holding power related to its intended location of use if there is uncertainty about the seabed conditions. The product certificate advises both the estimated holding power and the calculated maximum load in the connection eye for the shackle. The connection point is calculated for horizontal drag load. The anchor must not be loaded at higher loads than the advised holding power.

g) Thimbles

Thimbles are produced and dimensioned in relation to the maximum diameter of the fiber rope/-hawser with which it is to be combined.

h) Danline fiber ropes/hawsers of Polyethylene/Polypropylene (PE/PP)

The ropes/hawsers must not be exposed to higher loads than listed in the product certificate. Upon assembly and during use, the ropes/hawsers must not be exposed to wear, tear, abrasion or other limiting forces as they will reduce the breaking load. Ropes/hawsers cannot be installed using knots. (Unless it is instructed in the mooring analysis)

i) Polyester (PES) woven round slings and webbing flat slings

The round slings must not be exposed to higher loads than listed in its product certificate. Upon assembly and during use the soft slings must not be exposed to wear, tear, abrasion or other limiting forces as they will reduce the breaking load.

2.3 Maximum allowed loads and load distributions

Both factors are described in the mooring analysis.

2.4 Discrepancies

Upon discrepancy from the user manual or the mooring analysis, the supplier of the mooring systems must be contacted for approval of the assembly and use of the mooring system.

Examples of discrepancies that must be reported to the producer and/or supplier:

- Direct damage to the components
- Wrong line lengths in relation to the description in the mooring analysis.
- Discrepancy between the seabed conditions and type of anchor used.

TRANSPORTATION AND STORAGE

Requirements for packing, transporting, moving, and storing components.
The following requirements must be followed in addition to the general safety requirements for lifting.

a) Chains

Packing: Chains are packed on steel pallet crates or bundled by a suitable steel wire, steel wire rope or webbing strap in fiber.
Transport: No special precautions for transport, except from special precaution rules for securing transport loads.
Moving: Chains that are bundled by wires/steel wire loops or webbing straps should be hoisted with the existing arrangement, not by a chain sling. Palletted chains should be moved by a fork truck or a crane.
Storage: No special requirements for storage.

b) Shackles

Packing: Packed on pallets or bundled for the purpose of lifting.
Transport: No special precautions for transport, except from special precaution rules for securing transport loads.
Moving: Must not be exposed to rough handling and moving.
Storage: No special requirements for storage.

c) Connection plates

Packing: Packed on pallets or bundled for the purpose of lifting.
Transport: No special precautions for transport, except from special precaution rules for securing transport loads.
Moving: Must not be exposed to rough handling and moving.
Storage: No special requirements for storage.

d) Mooring bolts

Packing: Packed on pallets or bundled for the purpose of lifting.
Transport: No special precautions for transport, except from special precaution rules for securing transport loads.
Moving: Must not be exposed to rough handling and moving.
Storage: No special requirements for storage.

e) Oval rings

Packing: Packed on pallets or bundled for the purpose of lifting.
Transport: No special precautions for transport, except from special precaution rules for securing transport loads.
Moving: Must not be exposed to rough handling and moving.
Storage: No special requirements for storage.

f) aseke Anchors

Packing: No special requirements.
Transport: No special precautions for transport, except from special precaution rules for securing transport loads.
Moving: Anchors are to be lifted in the lifting points for shackle or the eye in the shaft for the purpose of mooring of the anchor into the sea.
Storage: No special requirements for storage.

g) Thimbles

- Packing: Packed on pallets or bundled for the purpose of lifting.
Transport: No special precautions for transport, except from special precaution rules for securing transport loads.
Moving: Must not be exposed to rough handling and moving.
Storage: No special requirements for storage.

h) Fiber ropes of Polyethylene/Polypropylene (PE/PP)

- Packing: Coils are packed in plastic for protection as supplied by the producer. Fixed lengths, spliced ropes and hawsers are packed in big bags/cartons or coiled directly on a pallet which is be protected by a shrink-plastic cover or adequate way of protection.
Transport: Ropes/hawsers are transported on pallets, in bags or as whole coils by trucks, boats or vessels. The ropes/hawsers must be protected against abrasion and other mechanical –or chemical influence.
Moving: Ropes/hawsers are stored on pallets and should be moved using fork trucks. Coils can also be moved by crane hoisting –provided the lifting equipment used is certified for the operation. PES lifting straps/slings should be threaded through the entire coil before lifting. Bundles of rope used for packing of the coil should not be used for lifting the coil. Upon moving it is vital that the rope is not exposed to abrasion from the ground surface.
Storage: All ropes/hawsers should be stored indoors for best possible protection against UV radiation. If the ropes/hawsers are covered by a tarpaulin or packed in a material that prevent direct sun light –they do not require to be stored indoors.

i) Polyester (PES) woven round slings and webbing flat slings

- Packing: Round slings and flat slings are packed in plastic for protection and supplied in carton board boxes by the producer.
Transport: Round slings and flat slings should be transported on pallets, in big bags or in their original carton board boxes and lifted by trucks, boats or vessels. The slings must be protected against abrasion or other mechanical or chemical influence.
Moving: Round slings and flat slings should be stored on pallets and moved by fork trucks in the ordinary way. The carton board boxes can be moved by crane hoisting provided the lifting equipment used is certified for the operation. Upon moving it is vital that the slings are not exposed to abrasion by the surface it is lifted from.
Storage: All round slings and flat slings should be stored indoors for best possible protection against UV radiation. If the round slings and/or flat slings are covered by a tarpaulin or packed in a material that prevent direct sun light –they do not require to be stored indoors.

ASSEMBLY

4.1 Requirements for personnel assembling a mooring system.

Personnel should be able to verify his/her competence with the appropriate documentation, as such:

- Certificates from craning on vessel/ship
- Reference from working on other fish farms
- Documented experience and relevant knowledge for the purpose of the operation

4.2 Instruction manual for assembling components in a mooring line

The below survey shows how to assemble components produced and supplied by aseke. Assembling mooring components from other producers/suppliers might defer from this description. Therefore, it is important to contact the supplier of the mooring component for guidance should the manual seem inadequate in regard to functionality and safety.

a) aseke Chains

Chains must be installed in a mooring line using shackles or other approved connection elements. The connecting shackle must always be attached to the short end of the chain link. The chain is not tested, approved, or certified for loads on the long side of the chain link. **NOTE: aseke AQUA** mooring chains has 5 years longer lifecycles acc to the theory on lifespan in NS 9415:2009 than the traditionally used anchor chain constructions in the market!

SPECIAL NOTE:

- **Upon unloading of chains from vessel to the sea the chains must not be exposed to sideways forces or rotations. Unloading operations shall be performed using blocks/pulleys with a sheave diameter big enough to ensure that minimum 4 chain links at any point of the bundle has physical contact to the sheave of the block/pulley. Alternatively, a gypsy (winch) suitable for the chain can be operated. Upon unloading over a gypsy, the chain should only be loaded by its own weight, and the weight of an anchor/block shall be held by a crane or equivalent until the chains are put in their final position.**
- **Upon cutting/shortening of chain lengths by heating, make sure the neighbouring chain links are not exposed to heating.**

b) aseke Mooring Shackle

The **aseke** mooring shackle consist of a bow, a bolt, and a safety nut. Additionally, a safety splint/cord is supplied with the shackle. The splint/cord needs to be threaded through the hole in the bolt next to the safety nut as an additional safety feature. Only the safety splint/cord supplied with the shackles should be used for securing. Using the wrong type of safety splint/cord can lead to quicker corrosion and diminishing of the component. The safety nut should be screwed well into the threads of the bolt. The shackle can only be loaded in the direction of the long side, meaning the top of the bow and the bolt.



c) aseke Connection Plates

Connection plates produced and supplied by **aseke** are designed for the shackle(s) to be the last connecting point on the connection plate. The connection plate's design and construction ensure that deformation by overloads occur in the shackles before the plates. It is of high importance to enter the bolt from the upper side of the plate (nut and safety splint/cord to be situated below the plate) to prevent the bolt from falling out of the plate should the nut unscrew or corrode. Various sizes and types of connection plates are produced/supplied for various uses of forces and sites, but the principle is unchanged in all connection plates produced/supplied **aseke**.

A centred eye on the upper- and under side of the plate is for the connection of flotation buoys. These two points are only to be used for the connection of buoys and are not to be used for the connection of mooring lines.

NOTE connection and triangle plates are to be combined with shackles of the same MBL figure to avoid twisting forces to the shackle bolt.



(ILLUSTRATION OF CONNECTION PLATES IN USE ON A FISH FARMING FACILITY)

d) aseke Mooring bolts

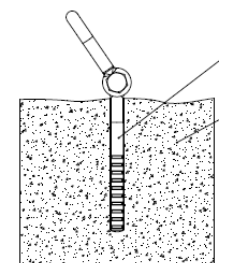
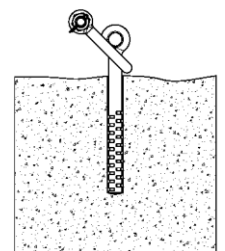
T- and Eyebolts produced and supplied by **aseke** are constructed as mooring connection points to solid rock ground surface both above –and below the water surface and as shore connector. The drill holes shall be drilled to a diameter that is 4mm larger than the diameter of the shaft of the bolt. The strength and structure of the rock ground must be tested and considered strong enough to secure the function of the bolt.

A suitable 2-component grouting must be filled into the drill hole before the shaft of the bolt is entered. The user manual from the grouting's producer must be followed thoroughly. The **aseke** mountain bolt cannot be proof loaded before the grouting is well hardened. One recommended type of 2-component grouting is Loch Set.

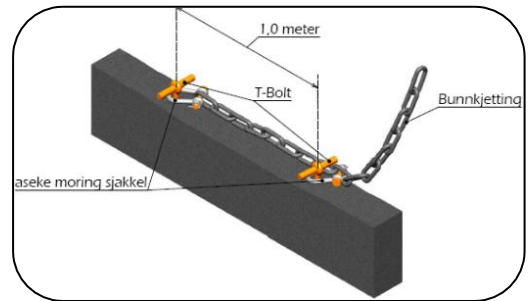
NOTE **aseke** mooring bolts may be connected right into a chain link without the use of a shackle, but only when the shaft's diameter matches the inner width of the bow of the chain link. The diameter of the shaft can force an expansion of the chain link, which is an important factor that must be prevented.

The eyebolt should be lowered into the drilled hole till the eye of the bolt touches the ground.

The T-bolt should be lowered into the drilled hole till the distance between the bottom of the cross bar of the T-bolt and the rocky sea bottom equals the diameter of the shaft of the bolt + max 30%.



An extra layer of security can be achieved by installing a double set of bolts with shackles:



e) aseke Mooring rings / Master links

Rings/links should be connected to **aseke** chains using **aseke** mooring shackles with a safety nut and a safety splint/cord.

f) aseke Anchors

aseke anchors should be installed into a mooring line using aseke mooring shackles and aseke chains. Lowering of the anchor must be performed in a controlled manner as described in the mooring analysis report. When the anchor has reached its designated position, the vessel should drag the anchor in the direction of the cage by a force up to (or alike) the dimensioning force of the mooring line. Should the loaded force not be adequate for the anchor, the positioning process should be redone, alternatively the type of anchor be reconsidered in relation to the seabed conditions.

Testing the holding power of the anchor shall be logged by the crew of the vessel. The mooring system cannot be approved if one or more anchors show a lower holding power than the dimensioning load of the mooring line.

g) Danline fibre Ropes/Hawsers with aseke Thimbles

Ropes/hawsers should use thimbles to prevent abrasion and promote a longer lifespan before they need to be replaced. The rope/hawser should not be knotted directly to the shackle or other components unless it is allowed for in the description of the mooring analysis and the safety factor has been considered in the dimensioning of the rope/hawser. Splicing should always be performed by experienced personnel. Minimum 4 tucks per cordel upon using 3-stranded ropes and minimum 6 tucks using 8-strand braided fibre ropes. The thimble must be prevented from falling out of the eye using bundling yarns or similar (not valid for tubular thimbles). Upon assembly of the mooring line the fibre ropes shall not be exposed to unnecessary loads or abrasion.

h) Polyester Round slings and webbing Flat slings

Applying webbing round slings and/or flat slings to a mooring line must always be undertaken by adequate and experienced personnel. Upon assembly of the mooring line the round slings and webbing flat slings shall not be introduced to unnecessary loads. The webbing material is very sensitive to abrasion, which can decrease the breaking load of webbing flat slings significantly. Webbing round slings and flat slings should be connected to steel components by self-knotting.

Never shorten webbing sling by knotting, as it will weaken the sling over time.

INSPECTION, MAINTENANCE AND REPLACEMENT OF MOORING LINES

5.1 Requirements for personnel

The company that owns the mooring system is responsible for ensuring that personnel who are to carry out operation and maintenance have sufficient competence.

This user manual should be used as guidance for training, maintenance, and replacements.

5.2 Scheduled maintenance

Maintenance of a mooring line shall be carried out according to a maintenance plan. The scheduled time for maintenance should fall in line with the scheduled time for inspection.

5.3 Routine inspection

Shall be conducted every 2nd year (additionally, right after incidents or extreme weather conditions. Mooring lines shorter than 10 meters must be inspected every 5th year.

Functional testing is not required upon routine inspection, but a visual check is required on the components in the upper parts –and above the water surface.

Routine inspection applies for:

- The cage with its connection points
- Components connected to the floating collar

Upon inspection, check for the following:

- Abrasion (reduced diameter on components)
- Biofouling
- UV damages to fiber ropes and hawsers
- Loose nuts and safety splints on shackles
- That the anchor lines are tight
- The connection points are not damaged or corroded
- The chains are not damaged or corroded

Routine inspections are to be logged with a specification of what measures have been performed with their technical description.

5.3.1 Measures required upon main inspection

- 1) Abrasion against other parts of the cage or against the seabed must be prevented
 - 2) Fouling must be removed
 - 3) Abrasion on the galvanization is not a reason for replacement, only provided a reduction in diameter – see next point.
 - 4) The chains/components must be changed upon a reduction of the diameter above **10%** relative to the original diameter.
 - 5) Danline fiber ropes, hawsers and Polyester webbing round slings can be negatively impacted by UV radiation. The breaking force will be negatively influenced, and fiber/webbing components must be changed upon suspicion of considerable damage.
-

5.4 Main inspection

Shall be conducted **minimum every 4th year** through filming using an ROV or a diver. The visual outcome should be logged together with the documentation.

The first main inspection is performed after the first-time installation at the designated location, right after approval/certification, but before fish enters the cages.

Planned exchanges of components should be performed at the same time as the main inspection.

Parts/components for main inspection:

- Cage frame with connection points; chains, shackles, thimbles, fibre ropes and round slings.
- Bridles including chains, shackles, and thimbles.
- Connection plates including chains and shackles.
- Mooring lines including Alloy chains, anchor line chains, shackles, fibre ropes/hawsers, round slings and anchors.

5.5 Frequency of replacements

- 1) **Bridles** – all components are to be replaced by equivalents **every 10th year** or earlier upon a visual 30% reduction of the MBL figures or significant wear and tear.
- 2) **Mooring lines** – all components are to be replaced **every 10th year** or earlier upon a visual 30% reduction of the MBL figures or significant wear and tear.
- 3) **Framework** – all components are to be replaced **every 10th year** or earlier upon a visual 30% reduction of the MBL figures or significant wear and tear.

Replacements can only be made provided the new components proves the same strength and quality as the ones they are replacing. All new components must be produced in accordance with the last revision of NS 9415. All replacements must be logged.

5.6 Rules for disposal of defect components

- a) Chains and components are delivered to a recycling plant for steel/metals.
- b) Fibre ropes, hawsers, and round slings are delivered to a public recycling centre.

5.7 Definitions

Analysis

Determination of load effects in a construction (NS 3472).

User Manual

Document describing the correct identification of parts, transportation, storage, handling, assembly, combinations, use, and limitations –of the main components in a fish farming facility.

Dimensioning load

Load to be used upon the determination of a construction in the advised limited level (NS 3472).

Dimensioning

Determination of dimensions or sufficient for fulfillment of dimensioning (NS 3472).

NOTE An example for dimensioning is the extension of a component in in a certain direction. Length, width, thickness, height, depth, diameter or extension along a certain line (for example the perimeter).

Operations

Fish farming on a location, including all operations performed at the location that has relevance in maintaining and preventing the fish from escaping.

Additional equipment

Technical equipment, mounted or portable, used for certain operations at a fish farm.

Control/inspect

Checking for correct and updated documentation, projecting, execution and assembly of a floating fish farms with its main components and additional equipment on its set location.

Floating collar

A frame with buoyancy to which the net and cage is attached.

NOTE: A floating collar is a complete unit of a floating tube, clamps and the necessary additional equipment.

Barge

A floating working station, free floating or integrated with technical equipment to perform certain functions in connection with fish farming.

NOTE: Such functions can be storage, feeding, electric supply, crewing, and surveillance at the location.

Mooring line

A system of steel chains, shackles, connection components, fiber ropes and sea bed anchors, mainly to keep the floating collar in its required position.

Abrasion

The strength of equipment weakening as a consequence of friction to other surfaces.

Main component

One out of the four parts of a floating fish farm; net cage, floating collar, mooring system, and barge.

Inspection

Systematic physical or visual examination of equipment to match with listed requirements.

Assembly

The connection of parts to become a main component including eventual additional equipment for a floating farm at the given location.

Thimble

An insertion into the loop of fiber a rope to protect the rope. The thimble is usually locked by splicing the rope.

Load

Direct or split forces to have effect on the construction of the cage

NOTE: The term 'load' is primarily used in the sense of impact (NS 3472), but applies for displacements and strains as well.

MBL

Minimum breaking load – the lowest load/force that will imply breakage of the chain or component.

Proof load (PF)

A load/force at which the chain or component from a complete production lot is loaded to detect structural mishaps. The proof load level is determined by the yield point of a breaking load test.

Yield point

The load at which a component or chains start to deform permanently.

Cage

Floating collar with a fixed mounted net bag underneath.

Environmental load

The load on a floating fish farm coming from wind, current, waves and ice.

Routine inspection

The regular inspection on set intervals or following certain incidents to detect damages or irregularities due to the use, abrasion, weather conditions, vandalism or similar.

NOTE: Interval for routine inspection can be a monthly interval, half-annually or annually.

Main inspection

The regular inspection on set intervals to detect the quality level of the equipment as to loads, function, stability, capacity, and strength.

NOTE: Interval for the main inspection can be annually.

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INDIVIDUAL USER MANUALS CAN BE FOUND ON:

<https://www.aseke.no/en/user-manuals>