6. Usage and care

The following gives general guidance on steel wire rope usage and care in service. More detailed information can be found in EN 12385-3, ISO 4309 and in the Wire Rope Technical Board's Wire Rope User's Manual. Further advice should also be obtained from the line manufacturer

6.1 A clean, well-ventilated, dry, under cover location such as a rope locker is preferred. If outdoor storage is unavoidable, the rope should be covered with waterproof material to protect it from the sun and weather. The rope should be stored in a location where it is not likely to be affected by salt water contact, steam, chemical fumes or other corrosive agents, and protected in such a manner that it will not be exposed to any accidental damage. During long periods of storage, the reel or winch should be rotated periodically, particularly in warm environments, to prevent lubricant from leaking out of the mooring line and/or migrating to other areas of the mooring line. It should be ensured that the rope does not make any direct contact with the deck and that there is a flow of air under the reel. Consideration should be given to supporting a reel on a simple. A-frame or cradle securely located in the rope locker or on deck. Ropes in storage should be examined periodically and, when necessary, a suitable dressing that is compatible with the manufacturing lubricant should be applied. The rope supplier should be contacted for guidance on the type of dressings available and the methods of application. After the dressing has been applied, the rope should be re-wrapped unless otherwise specified by the manufacturer. Steel wire ropes installed on winches should be covered with water proof tarpaulins or other suitable coverings when not in use.

6.2 The procedure for installing the steel wire rope should be planned in accordance with manufacturer's recommendations and should be carried out in accordance with a detailed plan under the supervision of a competent person or persons' To avoid accidents, ropes should be offloaded with care. The rope reels or coils should not be dropped and care should be taken to prevent the rope being damaged during handling. The steel wire rope should be checked to verify that it is not damaged when unloaded and when transported to the storage compound or site. A turntable or similar rig should always be used for installing new mooring wires to avoid twists and kinks developing if the temporary storage drum is not rotated while running the wire off. The relevant certificate should be obtained before installing and putting a rope into service, ensuring the marking on the rope or its package is verified and matched to the certificate. The rope diameter shoutd be checked and terminations examined to ensure they are compatible with the equipment to which they are to be fitted. More detailed guidance on installation should be obtained from the line manufacturer. Design requirements for drum length are included in ISO 3730. The minimum number of turns needed on the tension section of the drum may vary depending on the type of mooring line. Ship designers are recommended to allow for at least ten turns to accommodate varying mooring line types. As a general guideline allow for the following: A minimum of ten turns for steel wire rope mooring lines.

6.3 The entire length of line should be inspected at routine intervals by a competent person, with attention paid to those sections that are proven by experience to be the main areas of deterioration. These include wear zone areas, eyes, splices and sections of the line prone to be on the top layers of the winch while under load during mooring operations. Steel wire ropes in service may suffer corrosion damage. Corrosion affects the residual strength of a wire but it can also affect the wire ductility and other mechanical characteristics and may shorten the service life. It is recommended that steel wire ropes should have corrosion protection provided by both galvanizing individual wires and the application of an appropriate lubricant, which should be reapplied as required through the service life of the wire. Steel wire rope itself is not affected by UV, although in some instances lubricants that may be used could be affected by UV. Advice should be obtained from the rope manufacturer.

6.4 Specific inspection procedures and frequency should be defined and documented as part of the operator's LMP. Only qualified and experienced personnel, taking the appropriate safety precautions and wearing the appropriate protective clothing, should be responsible for inspecting wire in service. The main causes of deterioration of wire are excessive wear, broken wires or strands, distortion and corrosion. Areas that should be regularly inspected as part of the LMP include:

Winch anchor point and the section of wire close to it.

Sections of rope in wear zones, particularly sections that run regularly through deck fairleads and around pedestal rollers.

The eye, especially at the bend of the eye and its termination.

Cross-overs on winch drum.

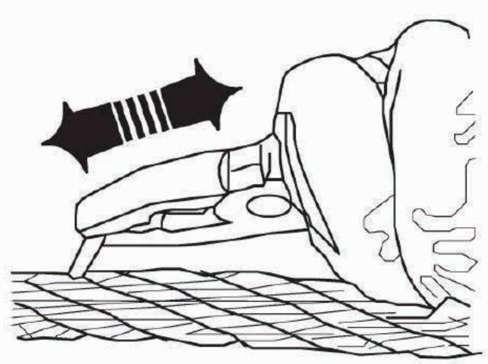
Terminations, particularly the Taturit type, to identify any looseness, cracks, distortion or corrosion.

Table 1 gives a summary of the criteria for inspection and discard of steel wire ropes in ISO 4309.

	Inspection Criteria	Discard Criteria
Visible wire breaks	Number in length of 6d or 30d	Discard if over 4 in length 6d or 8 over 30d
Wire breaks at termination	Evidence of broken wires	Remake termination or discard rope
Fracture of strand	Strand fracture	Discard if present
Reduction of rope diameter	Percentage reduction	Discard if diameter decreased by 10%
Abrasion of outer wires	Degree of deterioration (%)	Discard if over 7%

Table 1: Summary of criteria for inspection and discard of steel wire ropes in ISO4309

In order to avoid any localized deterioration, which might otherwise originate from a broken wire protruding excessively from the rope and overlying others when that portion travels through a sheave, it may be removed by gripping the protruding end(s) and bending the wire backwards and forwards (see below Figure), until it eventually breaks (invariably in the valley position between the strands). When a broken wire is removed from the rope as part of a maintenance exercise, its location should be recorded for the information of the rope inspector. If such action is taken, this shall be counted as a broken wire and taken into account when assessing the condition of the rope in relation to the discard criteria for broken wires.



Removal of protruding wire