Maritime and Coastguard Agency

MARINE GUIDANCE NOTE

MGN 106 (M+F)

NATURAL & SYNTHETIC FIBRE CORDAGE FOR LIFE-SAVING APPLIANCES

Guidance to Shipowners, Masters, and Officers of Merchant Ships and Yachts; and to Owners, Skippers and Crews of Fishing Vessels

This Note supersedes Merchant Shipping Notice No.M.1232

Summary

This Note advises all Shipowners, Masters, Officers and Seamen of required standards for natural and synthetic fibre (polypropylene, polyester, polyamide) rope for life-saving appliances (LSA).

- Types of rope acceptable to the Maritime and Coastguard Agency (MCA).
- Evidence from manufacturers' required prior to acceptance of the rope.
- Detailed characteristics given in the Annex.

1. Natural and synthetic fibre ropes intended for use with life-saving appliances should comply with the BSEN standards contained in Annex 1, which is acceptable to the Agency.

2. Before accepting a rope for use onboard, the master should sight a certificate of conformity for the rope. In addition, evidence showing that the rope is sufficiently protected and stabilized against UV degradation.

3. Responsibility for replacing worn, weathered or damaged cordage at all times lies with the master of the vessel.

4. The attached Annex 1 "Cordage for LSA Purposes" indicates the characteristics required of ropes for various life-saving appliance uses and the sizes considered appropriate. Unlike natural cordage the grip provided by different types of synthetic fibre ropes ranges between a grip comparable with manila or sisal to little grip at all. The type of synthetic fibre ropes must therefore be carefully chosen to meet differing grip requirements.

5. Guidance on inspection and care of synthetic fibre ropes in use is included in Annex 2 to this Note.

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An executive agency of the Department of the Environment, Transport and the Regions

Annex 1

CORDAGE FOR LIFE-SAVING APPLIANCES

Note: **M** denotes Manila rope, complying with BS EN 698: 1995-Fibre Ropes for General Service.

S denotes Sisal rope, complying with BS EN 698: 1995-Fibre Ropes for General Service.

Pa denotes Polyamide (nylon) rope, complying with BS EN 696: 1995-Fibre Ropes for General Service (Polyamide).

Pe denotes Polyester rope, complying with BS EN 697: 1995-Fibre Ropes for General Service (Polyester).

Pp denotes Polypropylene rope, complying with BS EN 699: 1995-Fibre Ropes for General Service (Polypropylene).

All ropes to comply with the requirements of BS EN 701: 1995 – Fibre Ropes for General Service General Specification

Where polypropylene is suggested and the grip is required to be similar to that of manila, then only staplespun polypropylene is suitable.

Application	**Type**	**Grip**	**Minimum Size of Cordage Diameter in millimetres**	
			M or S	**Pa, Pe or Pp**
Lifeboat and gunwale grablines	M S Pa Pe Pp	Not critical	16 mm	16 mm
Buoyant apparatus grablines	M S Pp	Not critical	14 mm	14 mm
Lifeboat keel grablines (should be knotted)	M S Pa Pe Pp	Not critical	16 mm	16 mm
Buoyant heaving lines	Cotton or Pp	As Manila	8 mm	8 mm
Lifeboat boarding ladders	M S Pa Pe Pp	As Manila	16 mm	16 mm
Overside ladders for lifeboat or liferaft embarkation	M Pa Pe Pp	As Manila	20 mm	20 mm
Lifebuoy grablines	M S Pp unkinkable	Not critical	10 mm	10 mm
Lifebuoy lines	Buoyant Cotton Pp	As Manila	8 mm	8 mm
Lifelines from davit spans	M Pe Pp	As Manila	20 mm	24 mm
Boats' painters	M S Pa Pe Pp boat under 8 m 8 m and under 9 m 9 m boat and over	As Manila	20 mm 24 mm 28 mm	24 mm 28 mm 32 mm
Buoyant apparatus painters Mass less than 140kg Mass 140kg and over	M S Pp	As Manila	 16 mm 20 mm	 16 mm 20 mm

Application	Type	Grip	Minimum Size of Cordage Diameter in millimetres	
			M or S	Pa,Pe or Pp
Sea anchor for open lifeboats of 6 metres and under	M S Pa Pe Pp	As Manila	Hawser: 20 mm Tripping Line: 12 mm	20 mm 12 mm
Open lifeboats over 6 metres			Hawser: 24 mm Tripping Line: 16 mm	24 mm 16 mm
Open lifeboat Sails: Halyards, sheets and roping	M S Pe Pp	As Manila	As current practice	As for natural fibre cordage
Bowsing tackle	Pe Pp should be of Manila or Polypropylene of a type acceptable to the MCA and having a grip comparable with Manila; the type and size of tackle and size cordage should be as follows:			
Fully laden mass of boat Under 8 tonnes	Gun tackle (two single blocks)			20 mm
8 tonnes and under 10 tonnes	Gun tackle (two single blocks)			24 mm
10 tonnes and under 12 tonnes	Luff purchase (one double and single block)			18 mm
12 tonnes and under 15 tonnes	Two fold purchase (two double blocks)			20 mm
15 tonnes and under 20 tonnes	Three/two fold purchase (one treble and one double block)			20 mm
Boats' falls	Manila, durable, unkinkable, firm laid and pliable. Breaking load to be at least 6 x maximum load when hoisting and lowering. To be not less than 20 mm. To be able to pass freely a hole 10 mm larger than the nominal diameter of the rope. Man made fibre cordage is not generally accepted.			

Annex 2

THE INSPECTION AND CARE OF POLYAMIDE (NYLON), POLYESTER AND POLYPROPYLENE FILAMENT ROPES IN USE

GENERAL

Ropes made from any material are liable to wear and to mechanical damage, and can be weakened to some extent by various agencies such as chemicals, heat and light.

Regular inspection is essential to ensure that the ropes are still serviceable.

It is also emphasized that no matter what agent has weakened the rope the effect will be more serious on the small sizes than on the larger sizes of rope. Consideration should, therefore, be given to the relationship of the surface area of the rope and the rope cross section. Examinations of about 300 mm at a time may prove to be convenient, the rope being turned to reveal all sides before continuing. At the same intervals the strands should be untwisted slightly to allow examination between the strands.

To define a standard of acceptance or rejection is much more difficult than to describe the method of inspection. There can be no well defined boundary between ropes which are safe and those which are not because this depends on the stresses placed on a rope in an emergency. In practice, the decision whether to continue to use a rope or discard it should be based on an assessment of the general condition of the rope. Many of the conditions which will guide the examiner cannot be exactly described, but can only be stated in general terms.

If after examination, there is any doubt about the safety of the rope, it should be withdrawn from service. It is again emphasized that the effects of wear and mechanical damage are relatively greater on thinner ropes which, therefore, require more stringent standards of acceptance.

PHYSICAL CAUSES OF DAMAGE

General external wear
External wear due to dragging over rough surfaces causes surface chafing or filamentation. This is the most readily noticeable cause of weakness, particularly if a new rope is available for comparison. In the extreme, the strands become so worn that their outer faces are flattened and the outer yarns are severed. In ordinary use some disarrangement or breakage of the fibres on the outside of the rope is unavoidable and harmless if not extensive. Polyamide (nylon), polyester and polypropylene filament ropes have a very good abrasion resistance.

Local abrasion
Local abrasion, as distinct from general wear, may be caused by the passage of the rope over sharp edges while under tension and may cause serious loss of strength. Slight damage to the outer fibres and an occasional torn yarn may be considered harmless but serious reduction in the cross-sectional area of one strand or somewhat less serious damage to more than one strand should merit rejection. Protection at points where excessive abrasion may occur should be considered.

Cuts, Contusions, etc.
Cuts, contusions, etc. or careless use may cause internal as well as external damage. This may be indicated by local rupturing or loosening of the yarns or strands.

Internal wear
Internal wear caused by repeated flexing of the rope, particularly when wet, and by particles of grit which have been picked up, may be indicated by excessive looseness of the strands and yarns or the presence of powdered fibre.

Repeated loading
The resistance of polyamide (nylon) or polypropylene filament rope to damage due to repeated loading is good but a permanent elongation may occur so that the extension available in an emergency is reduced.

If the original length of the rope is known exactly, a check measurement made under exactly the same conditions will indicate the total extension of the rope but may not reveal local extension of parts of the rope. Measurement of the distance between regularly spaced indelible markers on the rope may help to reveal severe local permanent elongation which may cause breakdown on subsequent loading.

EXTERNAL CAUSES OF DAMAGE

Heat
Heat may, in extreme cases, cause fusing. Any signs of this should obviously merit rejection, but a rope may be damaged by heat without any

such obvious warning. The best safeguard is proper care in use and storage. A rope should never be dried in front of a fire or stored near a stove or other source of heat.

Surging of a polypropylene or polyethylene rope under tension can cause sufficient frictional heat at the contact surfaces to result in the fusing of the surface of the rope. This can be minimized by not applying more turns of the rope around the winch, drum or capstan than are necessary to obtain satisfactory hauling.

The number of turns required around a winch will vary to some extent according to operating conditions and may be different for each of the different types of polypropylene rope. The melting point of polypropylene is 160°C to 170°C while the softening point is around 150°C. The values for polyethylene are somewhat lower These temperatures are quite quickly produced when a rope is surged on a winch or capstan.

Mildew
Mildew does not attack polyamide (nylon), polyester and polypropylene ropes.

Strong sunlight
Strong sunlight causes weakening of rope fibres, but is unlikely to penetrate beneath the surface. Unnecessary exposure should be avoided.

Solar degradation should be checked by rubbing the surface of the rope with the thumb nail. If degradation has taken place the surface material will come off as powder.

In addition, the surface of the rope will feel dry, harsh and resinous.

CHEMICAL CAUSES OF DAMAGE

General
The variety of possible chemical contaminants of rope is very wide and the information given in above is only a general guide. In cases of uncertainty on the nature of the contaminant and the remedy to be adopted an expert should be consulted. Attack may be more severe if some drying out occurs.

Polyamide (nylon) ropes
Chemical attack of a sufficient degree may be indicated by local weakening or softening of the rope so that surface fibres can be plucked or rubbed off as a powder in extreme cases. The chemical resistance of polyamide (nylon) filament is in general extremely good, but solutions of mineral acids cause rapid weakening. It is advisable, therefore, to avoid immersion in acid solutions, either cold or hot.

Polyamide (nylon) filament is unaffected by alkalis at normal temperatures and by many oils although it swells in contact with certain organic solvents. Exposure to fumes, spray or mist of acids or to organic solvents should be avoided, but if contamination is suspected, the rope should be washed out well in cold water. If there is any doubt after subsequent careful inspection, the rope should be discarded.

Polyamide (nylon) ropes absorb a limited amount of water when wetted and may loose a small proportion of their strength while wet.

Polyester ropes
Chemical attack of a sufficient degree may be indicated by local weakening or softening of the rope so that surface fibres can be plucked or rubbed off as a powder in extreme cases. The chemical resistance of polyester filament is generally extremely good, but hot solutions of strong alkalis progressively dissolve the fibre, causing gradual loss in mass and a corresponding fall in breaking load. It is advisable, therefore, to avoid exposure to alkaline conditions. Resistance to acids and particularly to sulphuric acid is good, although the concentration should not be allowed to exceed about 80%.

Thus, even dilute solutions of sulphuric acid should not be allowed to dry on a rope. If any contamination is suspected, the rope should be washed out well in cold water. If there is any doubt after subsequent careful inspection, the rope should be discarded.

Resistance to hydrocarbon oils and common organic solvents is good, although polyester filament may swell in certain chlorinated solvents. Attack by concentrated phenols is severe and contact should be avoided.

Polypropylene ropes
Polypropylene ropes are unaffected at normal temperatures by acid or alkalis but are attacked by some organic solvents such as white spirit, xylene and meta-cresol.

Rope contact with wet paint, coal tar or paint stripping preparations should be avoided.