ICHCA International Limited

INTERNATIONAL SAFETY PANEL BRIEFING PAMPHLET NO 16

SAFE USE OF TEXTILE SLINGS

By Paul Auston

ICHCA International Limited

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ICHCA International Limited - INTERNATIONAL SAFETY PANEL

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Checkmate Avon

Checkmate Avon consists of two specialist manufacturing divisions in the United Kingdom. Textile lifting products based at Sheerness in Kent and Avon Fabrications based at Melksham in Wiltshire, who specialise in the design, development and production of specialist rubber fabrications, predominantly for the marine industry and used on high speed craft throughout the world. The company holds ISO 9002 certification, in addition to Type approvals on its products from a number of Classification Societies.

Paul Auston

Paul's early career was at sea and when he came ashore took a position with a rope manufacturing company based in Northern Ireland. This led to a lifelong fascination with the use of synthetic fibres and their development into lifting materials. He set up the company Checkmate of which he is now Chairman.

Acknowledgements

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Finally, thank you to all whom, by virtue of my redundant memory cells, I have forgotten to mention and without whose help and forbearance this publication would not have been possible. For the record all the errors and mistakes are of my own making.

Paul Auston

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Safe use of textile slings

1 INTRODUCTION

1.1 The previous ICHCA publication relating to slings was published in 1977 and was produced when the use of textile slings in a marine environment was in its infancy. The last twenty years has seen a massive increase in the use of textile slings, particularly when used for “pre-slinging” cargo, as shippers, receivers, charterers and port handling organisations strive to achieve the lowest possible operating costs.

1.2 In the same twenty-year period the use of slings made from natural fibres has reduced to a very low figure. Their place has been taken by products made from man-made fibres.

1.3 A number of new standards e.g. ISO 4878: 1981 “Flat woven webbing slings made of man-made fibre” and PREN 1492-1:2000 “Textile slings – Safety” have emerged. Many legal requirements have also changed. The European Machinery Directive is now in force in all member states of the European Union and applies to (amongst many things) slings.

1.4 This pamphlet takes into account these developments. It is not meant to be exhaustive but can be considered as a reliable guide and will lead the reader to other more detailed material where appropriate.

2 MATERIALS

2.1 Natural fibres

2.1.1 Natural fibres used for slinging almost always take the form of three stranded ropes, which may be formed into slings by the use of spliced eyes. The two principal fibres in common use are sisal and manila.

2.1.2 Sisal is a fibre obtained from the leaf of a plant of the cactus family. It is readily recognised by its characteristic hairy appearance and is rough to the touch. Manila is a fibre obtained from the leaf of the plantain or wild banana tree. Being a longer fibre than sisal, the resulting rope is less hairy. It is also softer than sisal and, therefore, feels less rough to the touch.

2.1.3 Both Sisal and Manila suffer from the effects of ultra violet light and will become brittle if exposed to excessive amounts. Natural fibres are also prone to attack by airborne organisms that will literally eat the fibre. One of the most common organisms is mildew, which will thrive in warm humid conditions. These organisms can severely reduce the breaking strength of a fibre rope whilst appearing relatively harmless. Their use is largely confined to specialist applications.

2.1.4 Other natural fibre ropes are available, such as Italian or Indian hemp, jute and cotton. Their use is largely confined to specialised applications, such as decorative ropes. Their use in the production of lifting slings is negligible.

2.2 Man-made fibres

2.2.1 The principal materials available are polyamide (nylon), polyester and polypropylene. These are all thermoplastic materials that will melt when heated and re-solidify when cooled. This is a characteristic, which enables them to be formed into various types of fibre by extrusion processes.

2.2.2 Another recently developed material is para-aramid. Similar in many ways to carbon fibre, this material possesses great tensile strength. It is, however, very expensive and possesses some properties which are undesirable for lifting slings. This generic group of materials is not yet covered by any known standard.

2.2.3 An important consideration when choosing a material is the resistance of that material to chemicals. Although it is not exhaustive the following table gives an indication of the resistance of each material at 20^{o}C.

Material resistance to Chemicals

A=negligible effect B=limited effect C=considerable effect D=dissolves or decomposes

Chemical	Nylon	Polyester	Polypropylene	Para-aramid
Acetic Acid (80%)	C	A	A	A
Acetone	A	B	A	A
Ammonia sol (25%)	C	C	A	A
Benzene	A	A	B	A
Brine (saturated)	A	A	A	B
Carbon dioxide	B	A	A	A
Carbon tetrachloride	A	A	A	
Castor oil	A	A	A	
Glycerine	A	A	A	
Hydrochloric acid	B	B	A	B
Hydrofluoric acid	D	A	A	A
Hydrogen Peroxide (10%)		D	D	A
Lactic acid (20%)	B	A	A	
Lanolin	A	A	A	A
Meat juices	A	A	A	
Methanol	A	A	A	B
Motor oil	A	A	A	A
Nitric acid (50%)	D	B	C	D
Phosphoric acid (50%)	D	C	A	B
Sodium Hydroxide (50%)	B	D	A	
Sulphuric acid (50%)	B	B	A	A
Sulphur dioxide	D	B	A	
Tallow	A	A	A	A
Toluene	A	A	A	A
Turpentine	A	A	C	
White spirit	A	A	C	
Xylene	A	A	C	

2.2.4 Nylon is the strongest of the generally available materials. It does however possess properties that make it less desirable for lifting slings.

(a) It stretches substantially under load. Typically nylon will stretch some 18% when loaded to its breaking point

(b) It loses some 10 – 20% of its tensile strength when it is wet.

(c) Temperature stability is generally good between –40^{o}C and 100^{o}C.

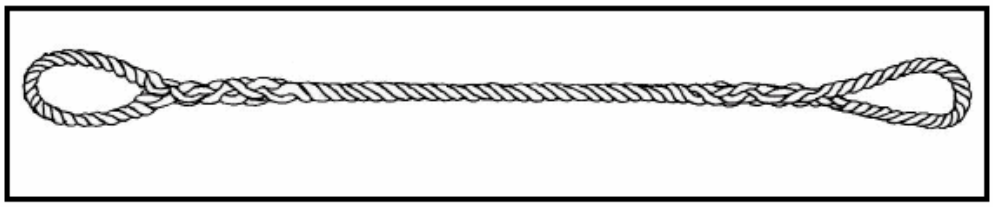
2.2.5 Polyester is a close relative of nylon although slightly less strong. It does not suffer from the excessive stretch of nylon. A typical extension to breaking point is 10%. The strength of polyester does not deteriorate when wet. Temperature stability is generally good between –40^{o}C and 100^{o}C.

2.2.6 Polypropylene is a less strong material than either polyester or nylon but is still considerably stronger than natural fibres. It suffers substantially from the effects of ultra violet light if exposed for long periods and needs to contain suitable inhibitors to minimise this effect. Abrasion resistance is superior to natural fibres but considerably inferior to nylon or polyester. It is relatively cheap and a common application is the “one trip” or disposable sling. The strength of polypropylene will be reduced if exposed to high temperatures (80^{o}C). Careful consideration should be given to the use of polypropylene slings in a choke lift format, as considerable heat can be generated should the choke slip.

3 SLING CONFIGURATIONS

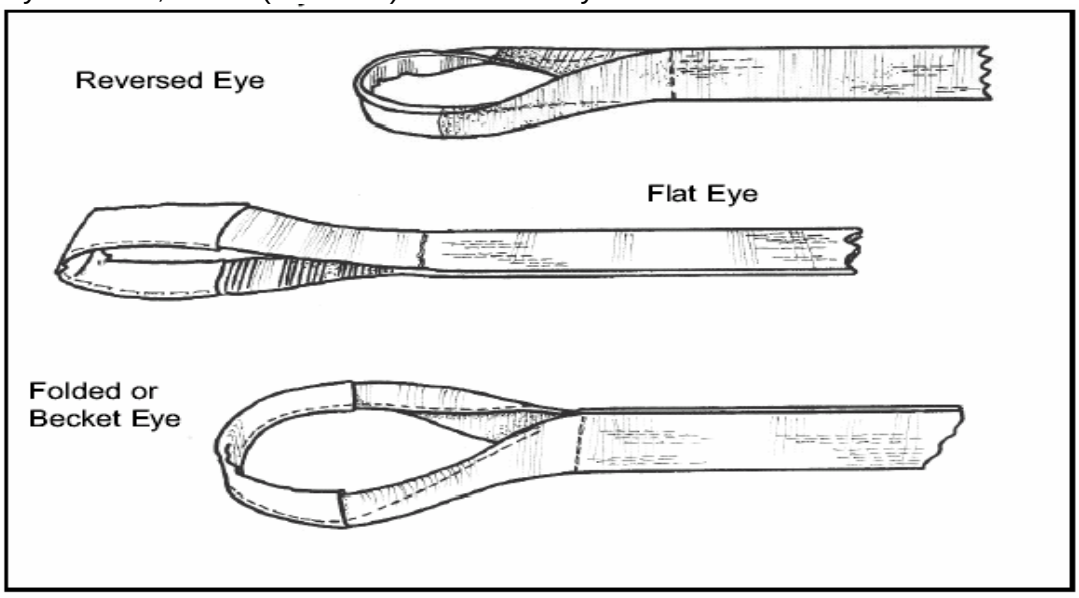
3.1 Eye to eye slings

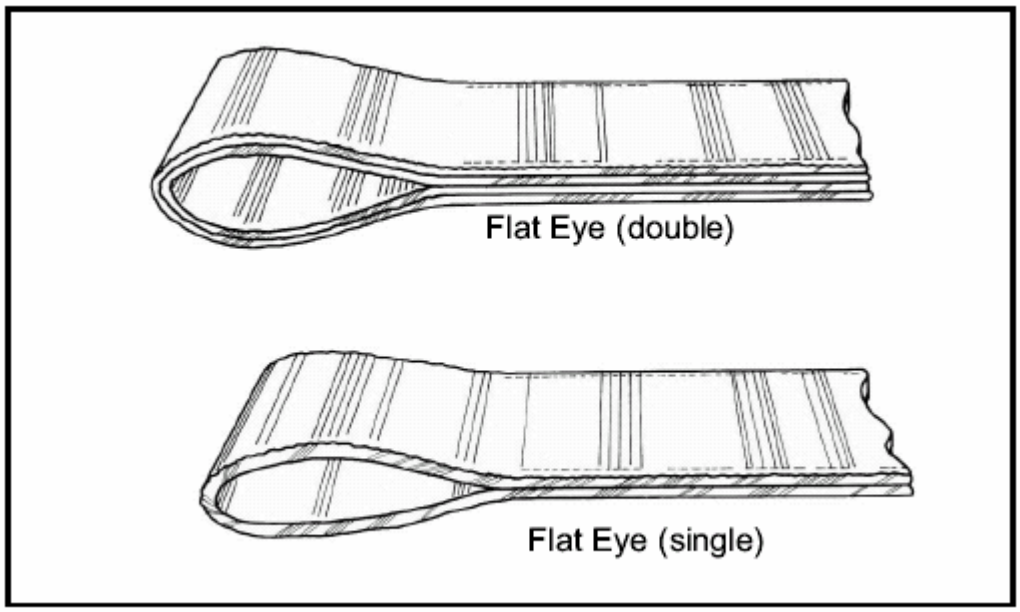
3.1.1 Eye to eye slings (strops) are the simplest type of sling that may be formed from rope or webbing. In the case of rope, the eye is formed by splicing.



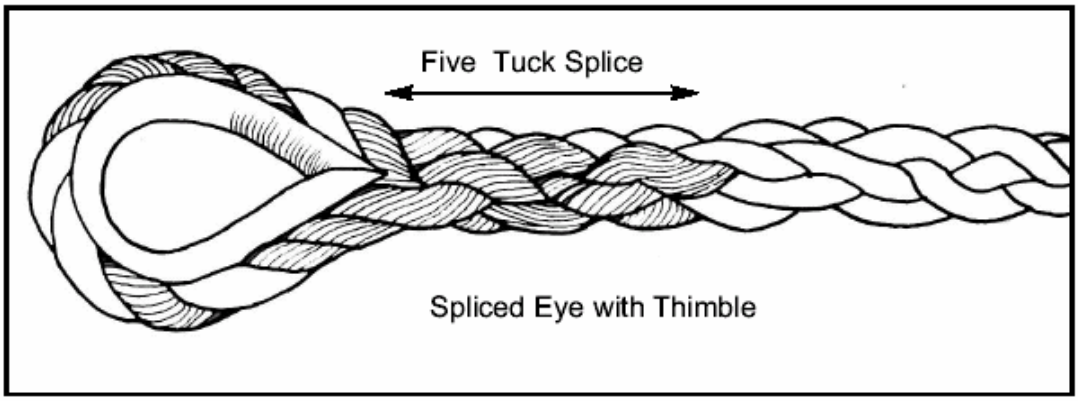
Spliced eye to eye Rope Sling

3.1.2 Eyes are formed in webbing products by stitching. Single thickness webbing slings will require stitching at each end whereas a double thickness or duplex sling will have only one sewn joint. Webbing slings may have flat, folded (becketed) or reversed eyes.

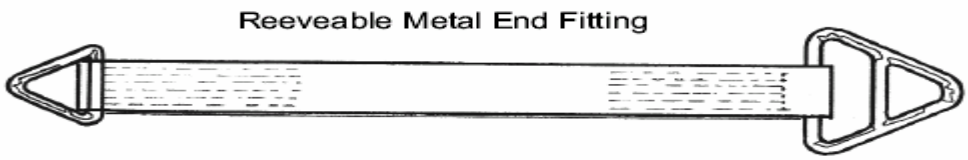




3.1.3 Eyes of rope slings may incorporate a metal thimble to give added wear resistance. This is essential if the eye is to be fitted with a shackle or other metal end fitting.



3.1.4 The same objective may be achieved with webbing slings by the use of metal end fittings.

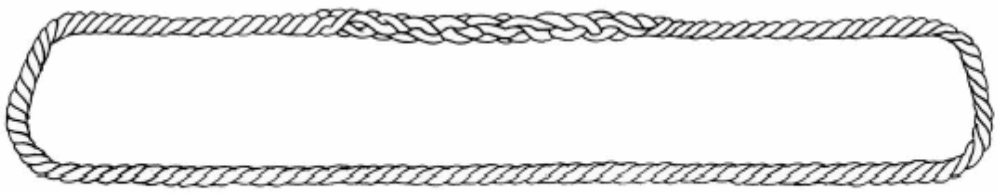


3.1.5 Eye to eye slings are commonly used in choke or basket hitch (see diagrams in section 7) for general, non specific dock work and are also frequently used in conjunction with lifting frames or spreaders designed to lift a specific load.

3.2 Endless slings

3.2.1 Endless, or ring slings, are the most commonly used slings for marine cargo handling. There are three basic types - rope, webbing or roundslings.

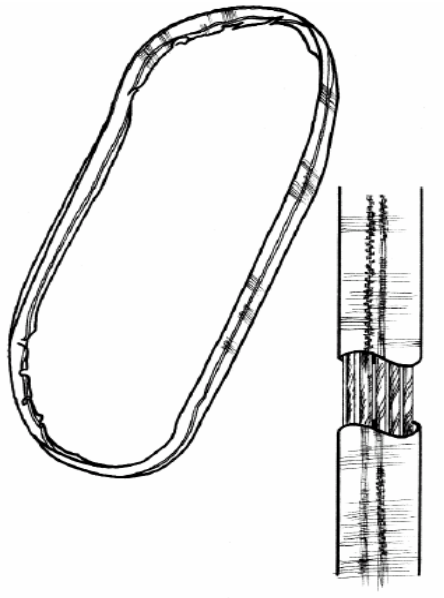
3.2.2 Endless rope slings are formed by making a loop of rope and then splicing it.



Endless Rope Sling

3.2.3 Webbing slings are formed by making a loop of webbing with a sewn joint. For heavier applications webbing slings may be made with multiple layers of webbing.

3.2.4 Roundslings are formed by making a continuous loop of fibre that is then encased in a sleeve, which may be stitched along its edge or, more commonly, will take the form of a tube, which is stitched where the ends meet.

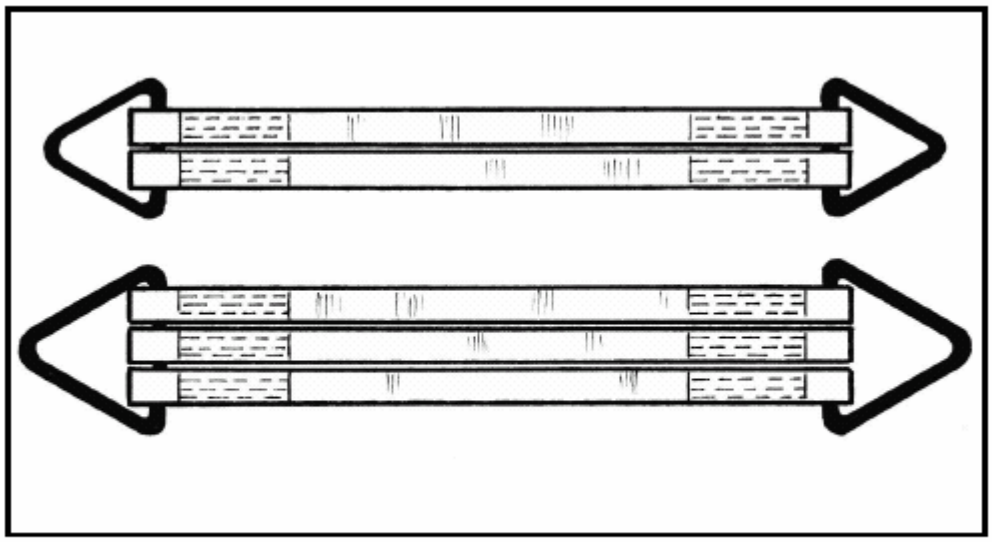


3.2.5 Endless slings may be used for pre-slung cargo operations in either choke or basket hitch. It is likely, however, that the safe working load will be given on the label of the sling and on the test certificate in the vertical configuration only. Refer to mode factor adjustments in section 5.3.1.

3.3 Parallel construction slings

3.3.1 Parallel construction slings are used for very heavy cargoes. They are normally constructed from duplex (double thickness) webbing laid side by

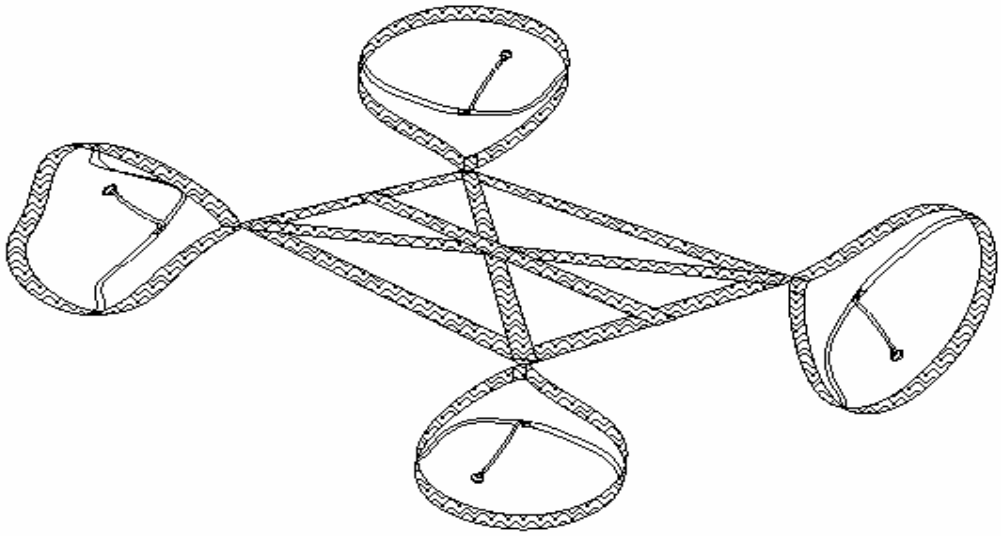
side with smaller, lightweight, webbing of approximately 50mm width used to join the heavier, load bearing, webbings. Separate eyes are formed in each of the load bearing webbings and these normally incorporate metal end fittings. Such slings are normally made for use in basket hitch only and may vary in width from 300mm to more than 1200mm.



Parallel Construction Slings

3.4 Cloverleaf slings

3.4.1 Cloverleaf slings are normally manufactured as one-trip slings i.e. they are intended to remain with the cargo throughout its journey and should be discarded after the cargo is delivered. The material used is usually woven or extruded polypropylene, although in some cases polyester yarn encased in a plastic sheath may be used. The centre section of the sling forms a square with each crossover point being secured by stitching or welding. The design of cloverleaf slings is specific to individual and particular cargo types, as the dimensions of each sling are critical to its lifting capability.



Cloverleaf Sling

4 STORAGE OF TEXTILE SLINGS

4.1 Storage conditions for textile slings should include protection from the effects of extreme weather, the potential for mechanical damage and accidental exposure to injurious factors such as heat, chemicals or solvents.

4.2 A closed room or container that is kept at ambient temperature, with good ventilation, is waterproof and excludes direct sunlight would be the preferred choice of store.

4.3 Lifting slings should be clearly identified and, wherever possible, be stored loosely laid on suitable racks or suspended from pegs or hooks. They should not be kept on the floor where they may become damp and then rot.

4.4 Any restrictions on the use of the slings should be shown. This will assist the selection of the appropriate slings when required for use

5 USE OF TEXTILE SLINGS

5.1 A responsible person should inspect all slings before each period of use. (See section 8.1).

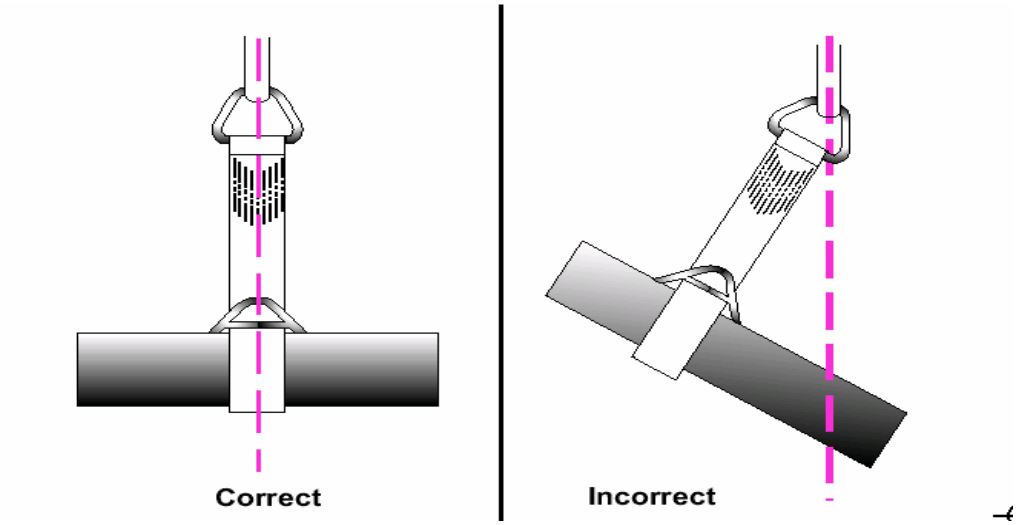
5.2 General

5.2.1 The following is general advice applicable to all types of sling made from all types of material.

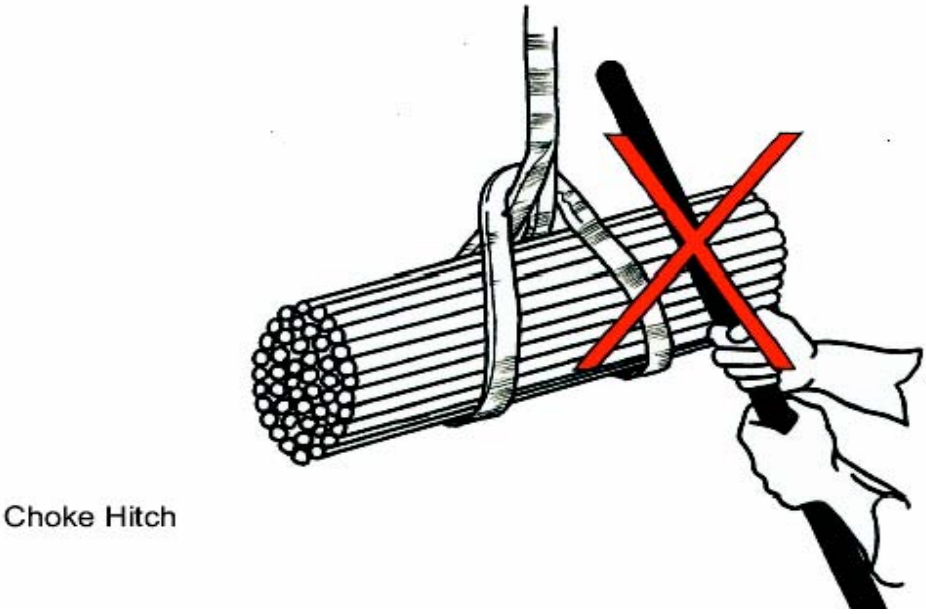
5.2.2 Only use slings that are properly identified. (See section 4.3).

5.2.3 Do not use damaged slings. Damage seen on the surface is the most noticeable cause of potential weakness. Damage to splices, stitching and metal fittings may also be present.

5.2.4 In order to achieve the correct balance of any packages to be lifted, it is strongly recommended that two slings are used. These should be positioned equally along the load to be lifted, with due regard for any mode factor incurred (see section 5.3.1). In the event that such an attachment is not possible, it is essential that the suspension point is directly above the centre of gravity of the load. If it is not, the load may swing violently when it is lifted, resulting in personal injury.

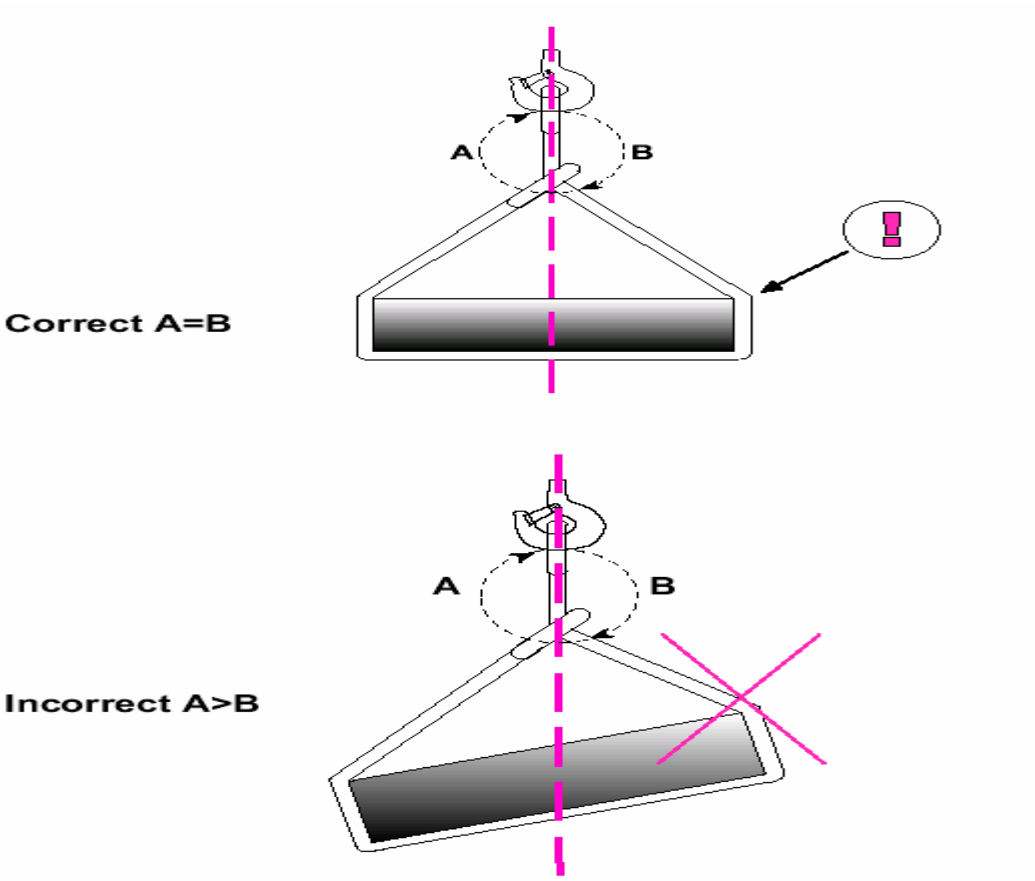


5.2.5 When using slings in choke hitch, allow the choke to form naturally. Do not try to force the angle of choke by hammering or by other means.



Choke Hitch

5.2.6 When using slings in choke hitch, position them symmetrically



5.2.7 Do not engage soft eyes with anything that may damage them. Bearing surfaces must be smooth and without sharp edges.

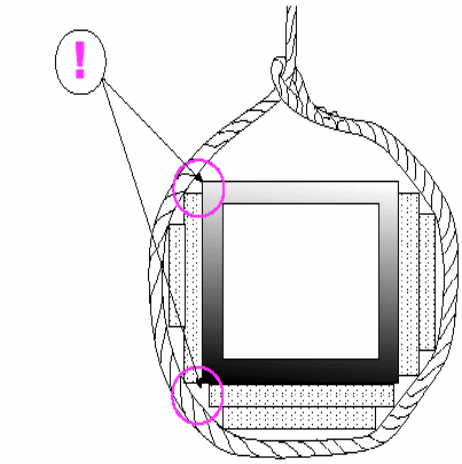
5.2.8 Do not engage soft eyes with anything that will, due to its size, force the eye apart. The included angle in the eye should not exceed 30°(see diagram in section 6.5).

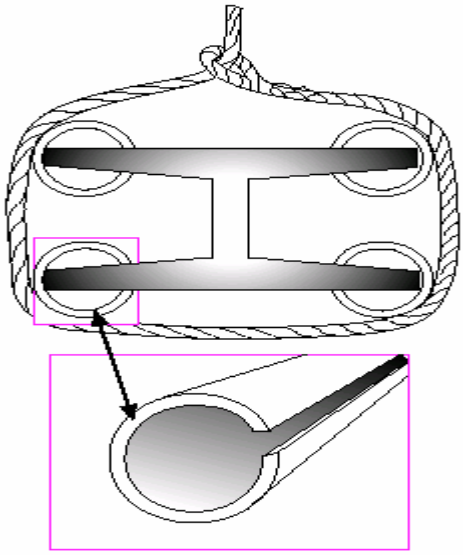
5.2.9 Do not drag loads by means of slings.

5.2.10 Do not lift with twisted slings.

5.2.11 Do not make knots in slings.

5.2.12 Fit protective sleeves or packing between slings and loads with sharp edges.





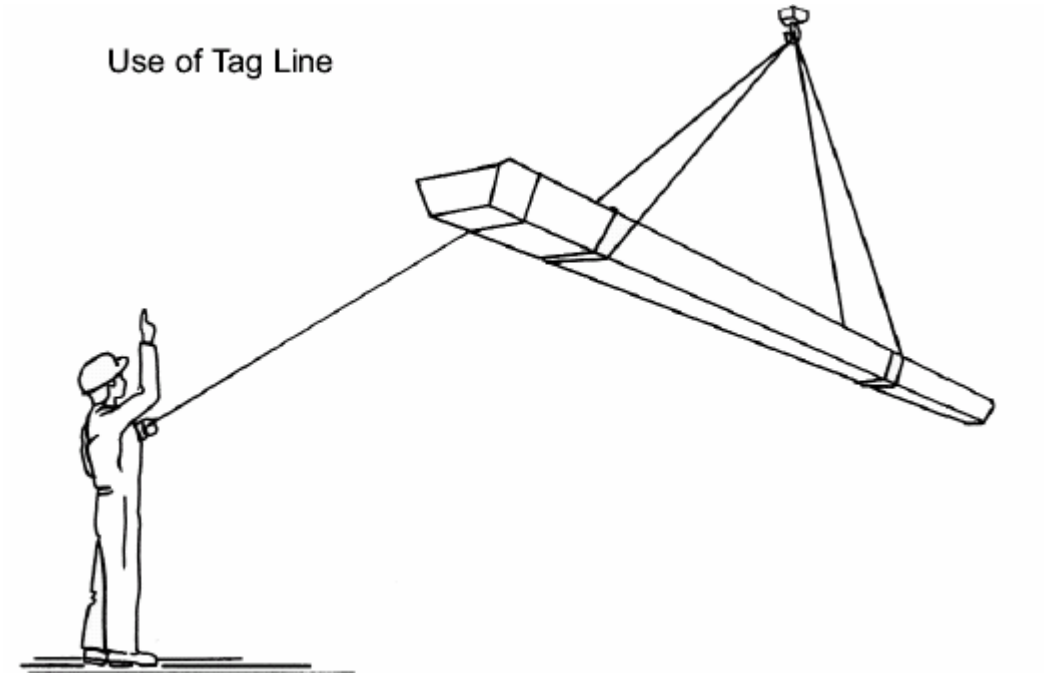
5.2.13 Do not trap slings when loads are set down as this may damage slings.

5.2.14 Do not pull slings from under loads when loads are resting on the slings.

5.2.15 Avoid snatch or shock loading.

5.2.16 Consider the effects of temperature, chemicals and other environmental factors when choosing slings and deciding on the manner in which they will be used.

5.2.17 Guide suspended loads manually, where possible, this should be done by means of a “tag line” so that the person guiding the load is not likely to be struck by it.

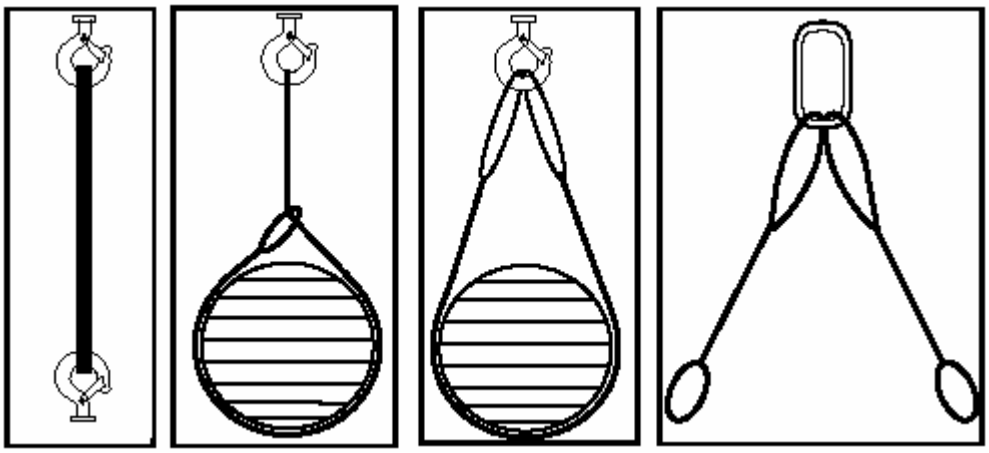


5.2.18 Wear suitable personal protective equipment when engaged in lifting operations i.e. gloves to protect hands from rough loads, safety boots and protective headgear.

5.2.19 Do not attempt to repair damaged slings.

5.3 Eye to eye slings

5.3.1 In addition to the general advice in section 5.2, observe the mode factor (M).

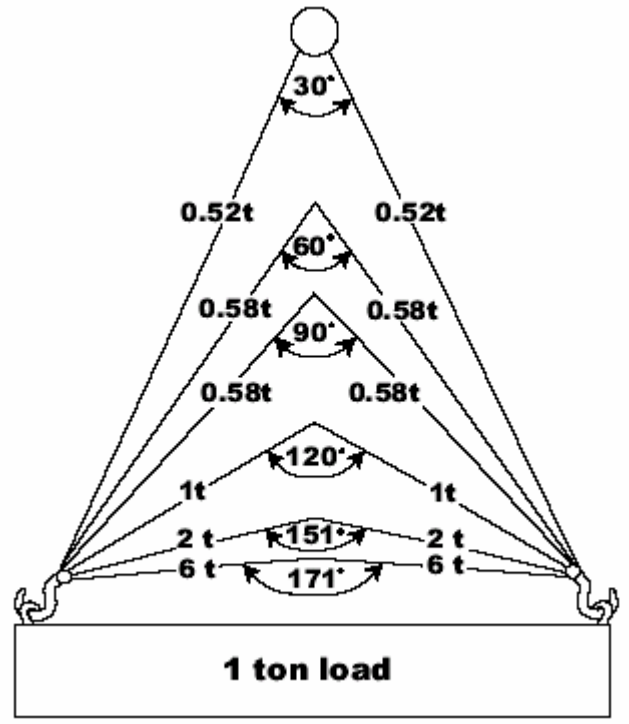


M=1 M=0.8 M=1.4 M=1.4 @ 90^{O}

The mode factor is multiplied by the Working Load Limit (WLL) of a single leg to give the WLL of the assembly

5.3.2 When using multi-legged slings or multiple slings to form a multi-leg configuration, the included angle at the point of suspension should, ideally, be greater than 60^{o} but should not exceed 90^{o}. Remember that as the angle to the vertical of a sling leg increases the tension in that leg

also increases and, if the angle is large enough, can exceed the value of the total load being lifted.



Tension of legs in a two-legged sling

5.4 Parallel construction slings

5.4.1 In addition to the general advice in section 5.2 care needs to be taken to ensure equal distribution of the load between the individual load bearing webbings.

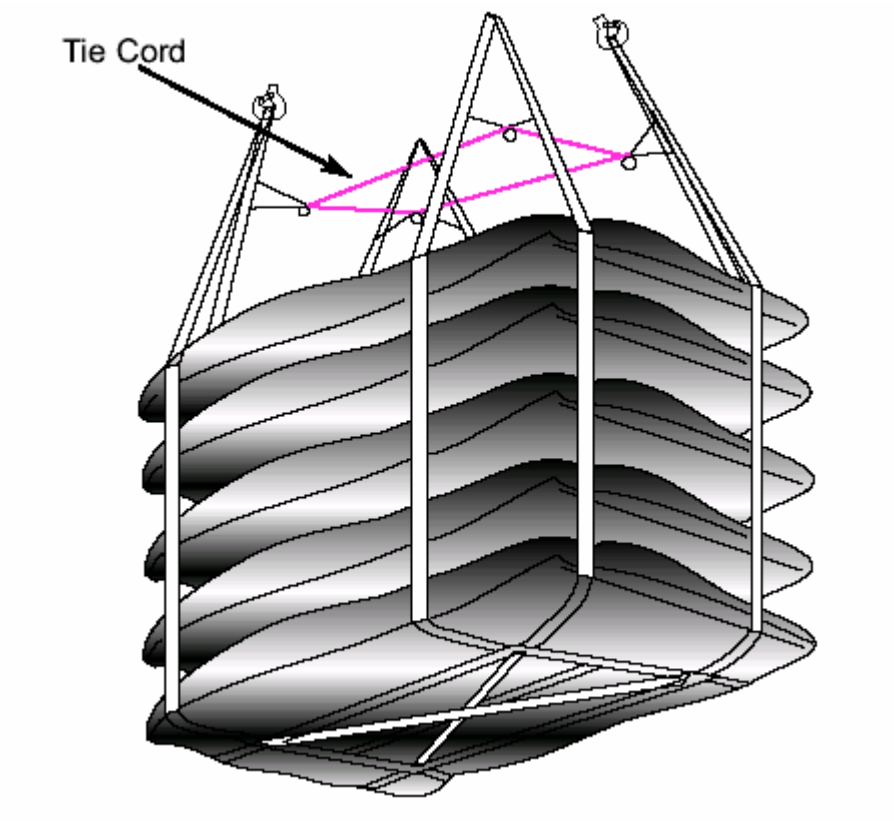
5.4.2 Parallel construction slings should only be used in basket hitch.

5.5 Cloverleaf slings

5.5.1 In addition to the general advice in section 5.2, cloverleaf slings should only be used to lift loads for which they have been designed.

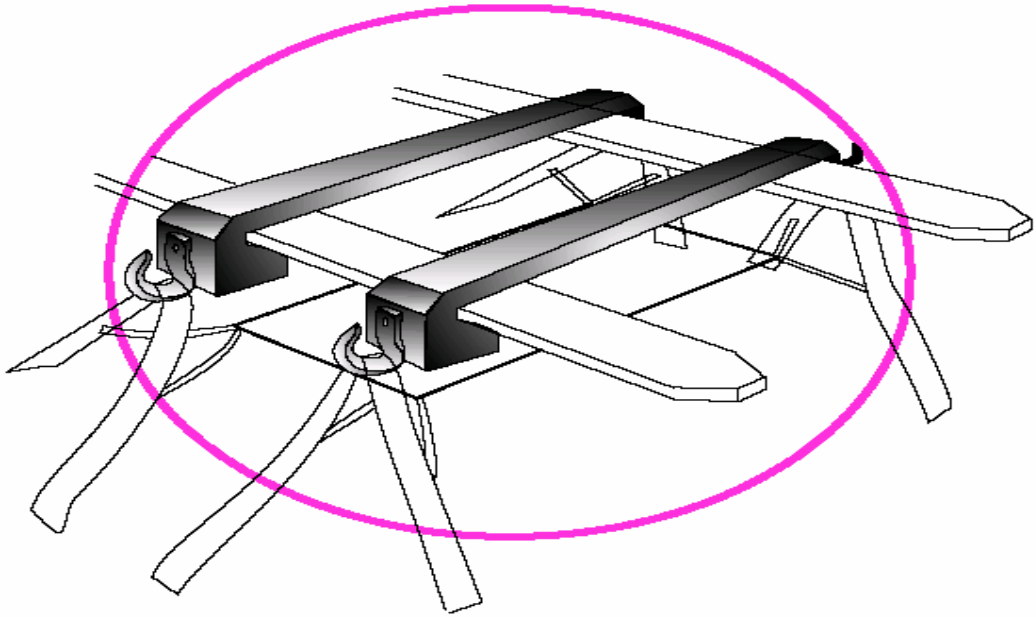
5.5.2 The cloverleaf loops must extend above the uppermost part of the load.

5.5.3 The loops should be bound to each other by means of a tie cord, as shown below, to ensure that they remain in place when the load is set down.



5.5.4 Cloverleaf slings must not be handled with a forklift truck unless the forks are fitted with round bar hook terminations, as shown below.

Round Bar Hook Terminations

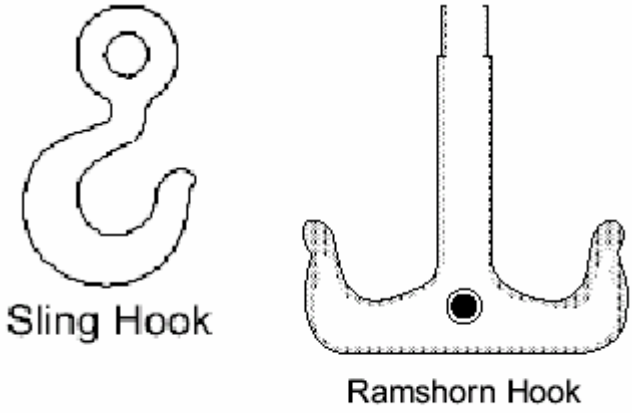


5.5.5 The main use of cloverleaf slings is for lifting bagged cargoes. Care needs to be taken to ensure that there is friction between the outer

surfaces of the bags and the sling, to ensure that the load does not shift whilst being lifted or lowered.

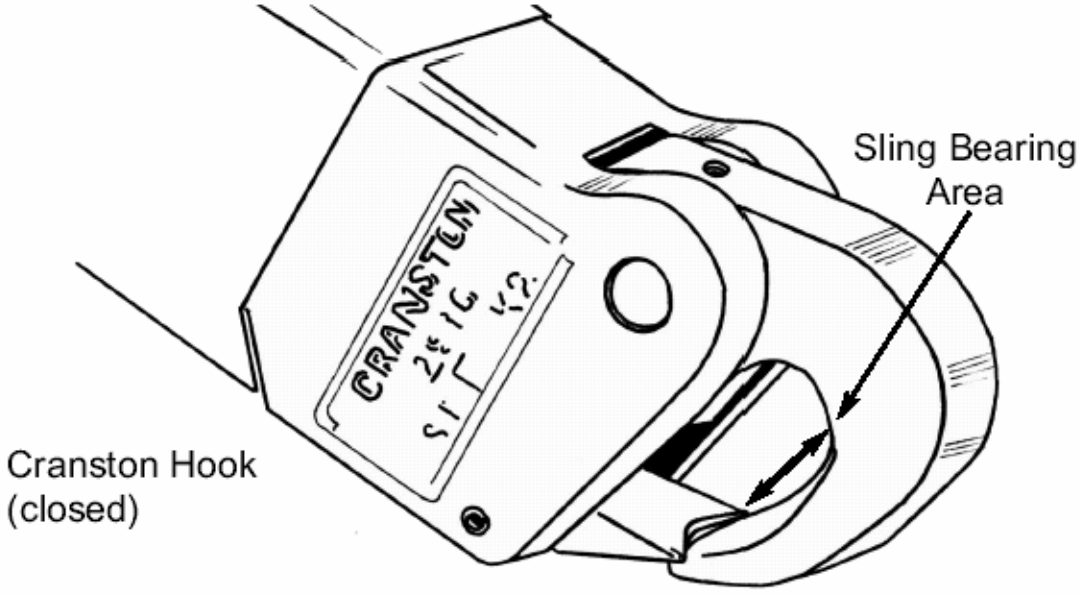
6 CONNECTION POINTS AND HOOKS

6.1 Connection points of lifting appliances need to be strong enough to support the load and be of such a size and shape that they do not damage, or place extra stresses, on the slings. The most frequently used connection is a single point crane hook although “ramshorn” hooks may also be used and are desirable when more than two sling eyes are to be accommodated.

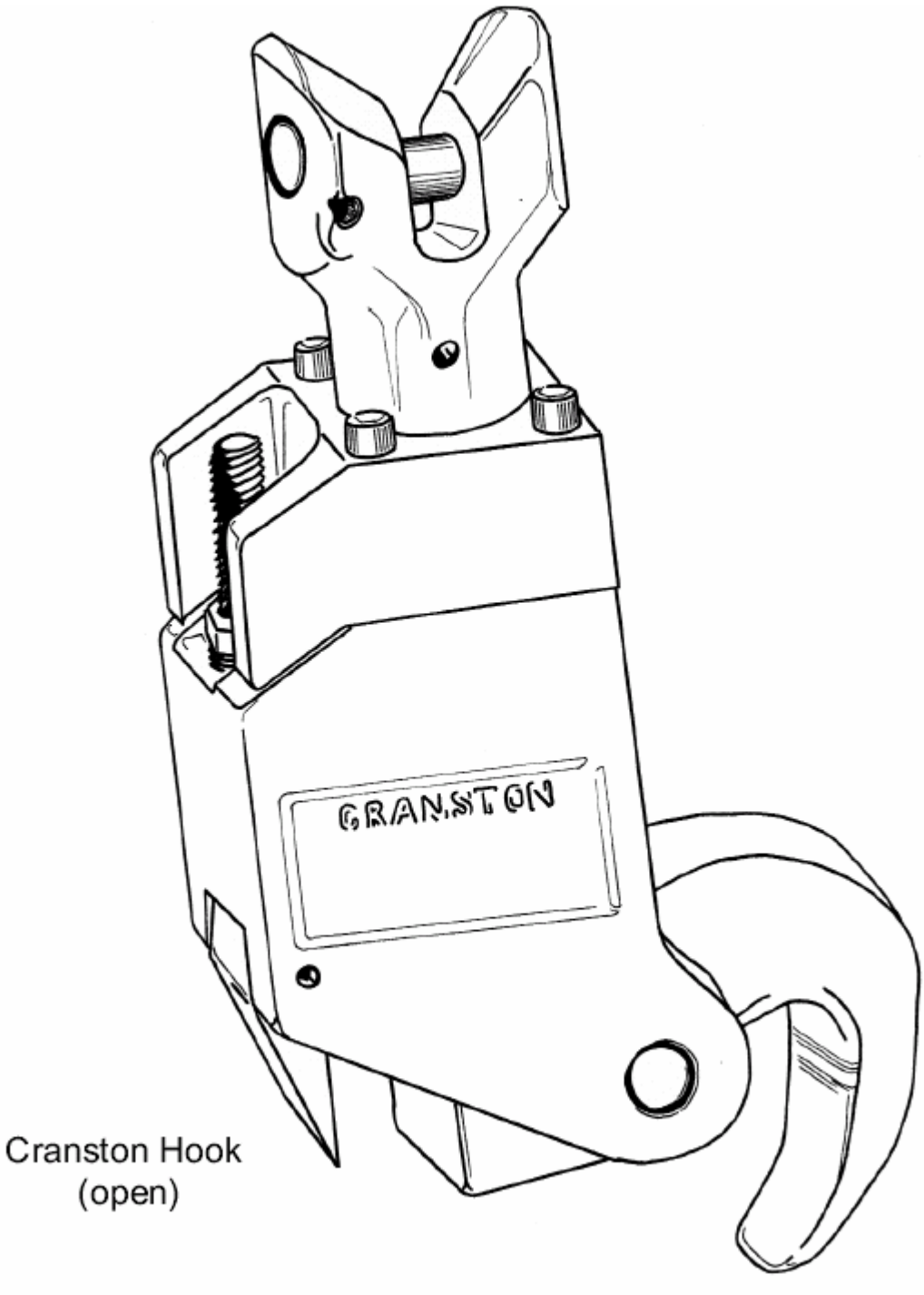


6.2 Semi-automatic and purpose made hooks

6.2.1 Shippers involved in the regular handling of pre-slung cargo, utilising webslings, have tended to use round bar hooks, with a shape similar to a triangle, thus allowing the whole width of the sling, up to 4” (100mm) to be laid along the bar equally. The stresses involved in the use of such a hook led to the development of the semi-automatic hooks produced by companies such as Cranston.

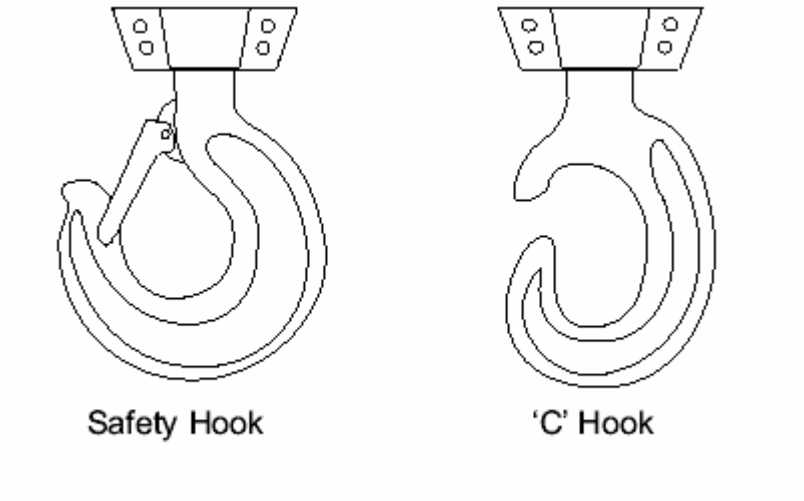


6.2.2 These vacuum operated hooks, have a load bearing area that is radiused to be web sling friendly and can in certain circumstances, accommodate the full width of the sling, up to 4” (100mm).



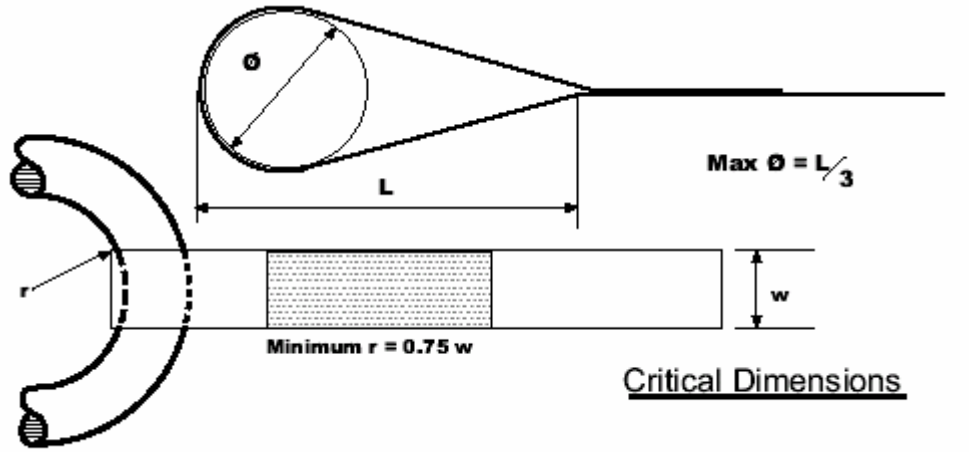
Cranston Hook
(open)

6.3 The use of a “C” hook that is specifically designed to prevent snagging and accidental displacement of the slings when loads are lifted, is an acceptable alternative, although it should be stressed that for the optimum in safe lifting any lifting device connecting with a sling should, under ideal circumstances, be fitted with a safety latch to ensure that the eye of the sling remains captive.

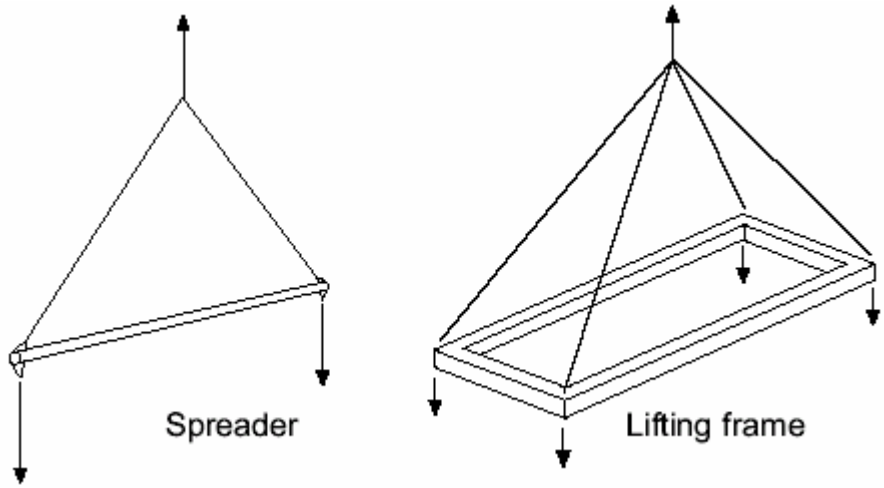


6.4 Crowding of hooks should be avoided by placing no more than two eyes on a hook (two on each side of a ramshorn). When more than two eyes need to be accommodated, a shackle or ring should be used to join the eyes together and the shackle or ring placed on the hook.

6.5 It is important that the bearing surface of the attachment point is smooth and wide enough to support the eye of the sling. It must not be so wide as to force the eye apart as this could severely weaken the eye by tearing the stitching or the splice apart. The critical dimensions of suspension points, with views at right angles to each other, are shown below.



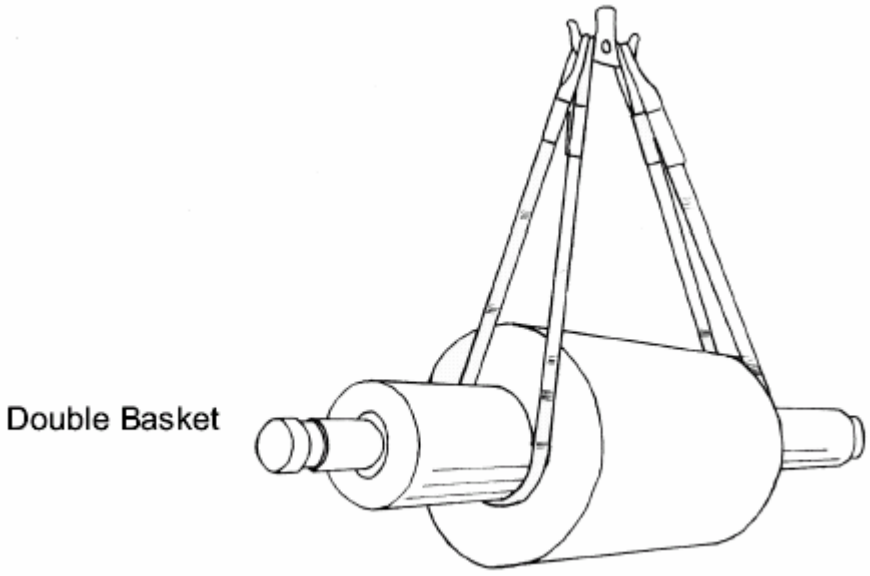
6.6 For large or long loads a spreader or lifting frame may be used to achieve a stable lift. The essential feature of these aids to safe lifting is that the load is supported by slings attached to the spreader or frame, which is then attached to the crane hook.

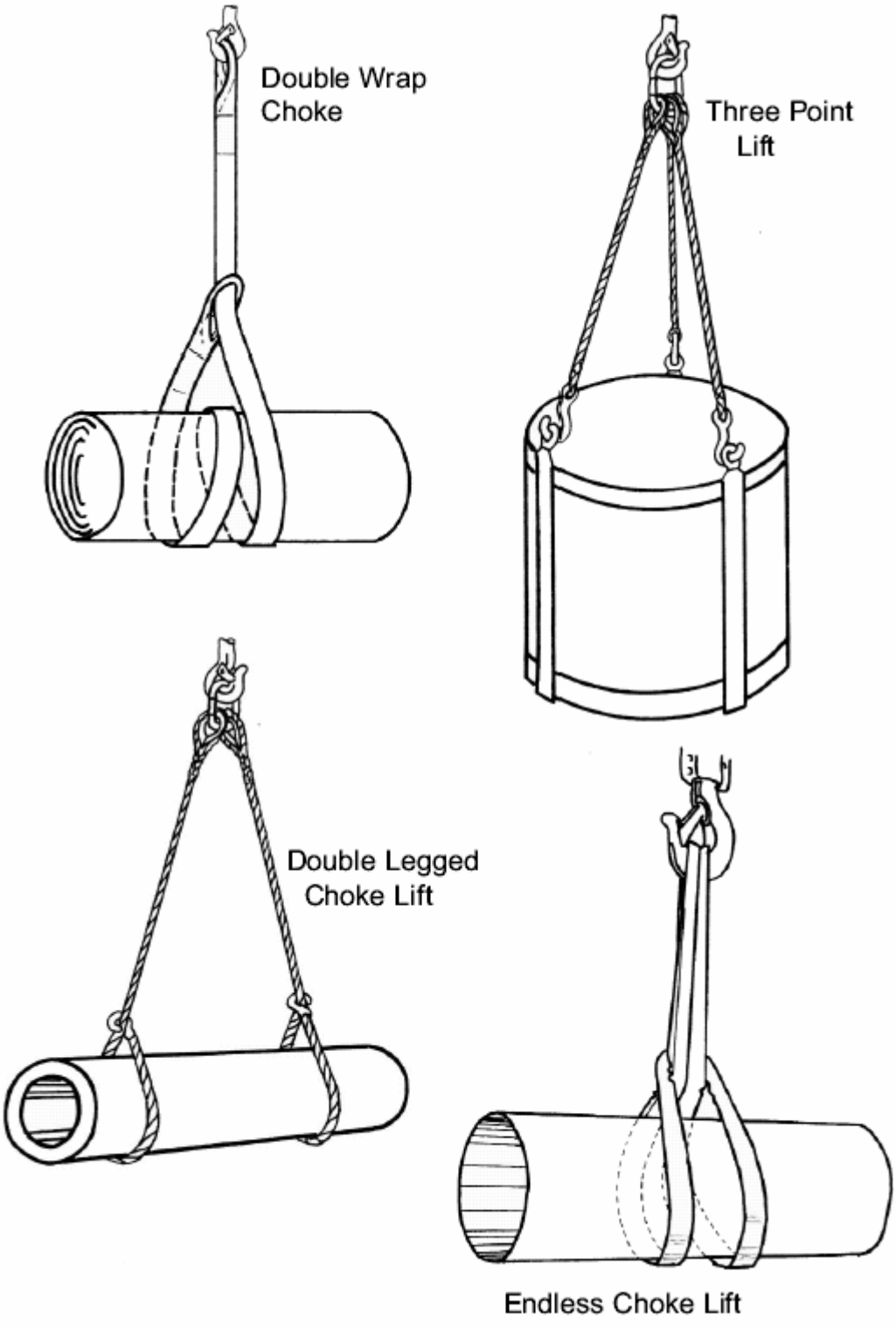


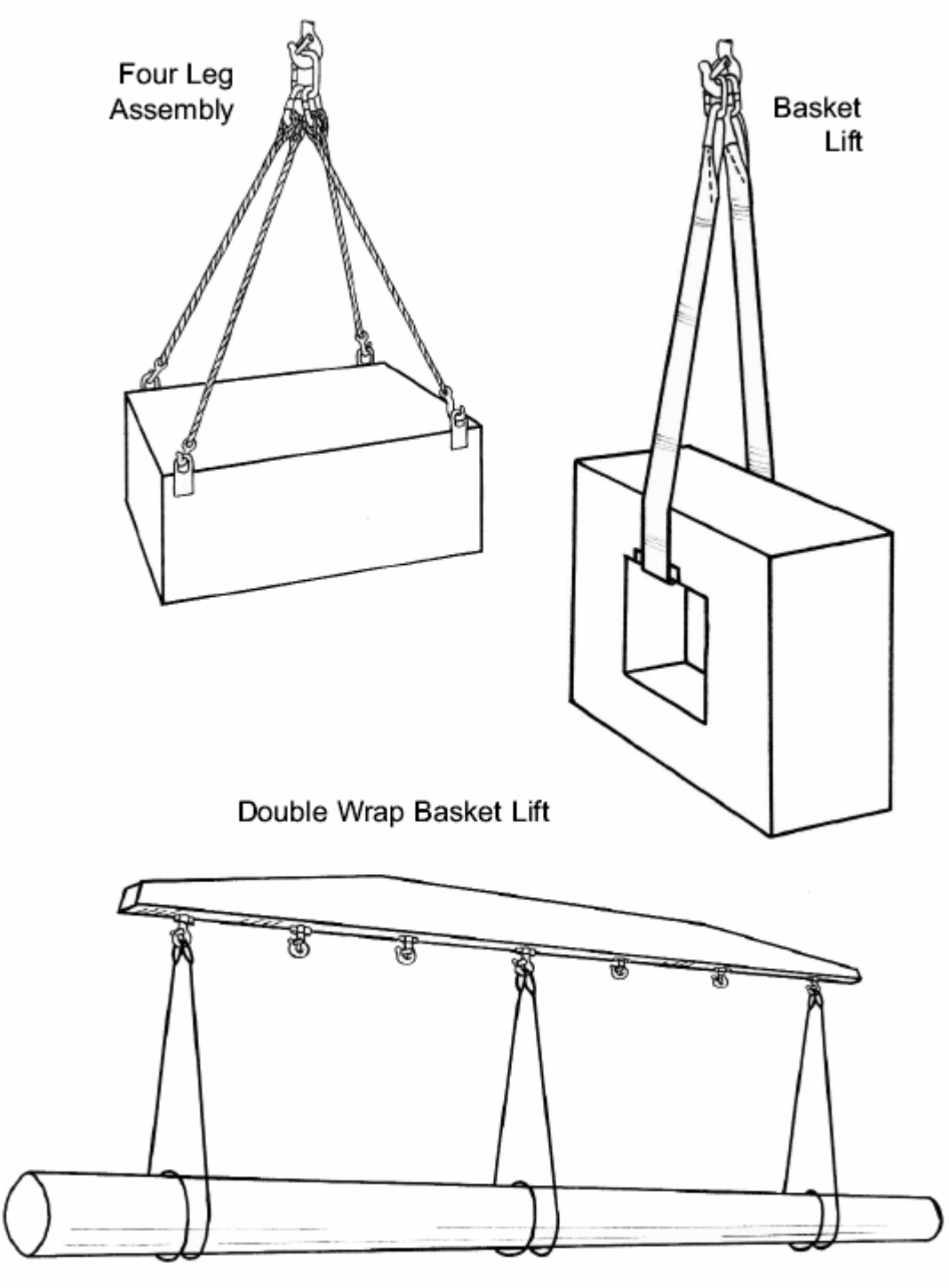
6.8 When using 4-legged slings it is likely that at least one of the legs will not take its fair share of the load. For this reason the W.L.L. is based on the strength of 3 not 4 legs, and in some countries it is based on the strength of only 2 legs.

7 GENERAL CARGO CONFIGURATIONS

7.1 The following diagrams illustrate commonly used safe methods of handling different types of cargo. The common names of the different types of hitch are shown.







8 PRE-USE INSPECTION

8.1 All lifting slings, including those attached to pre-slung cargo, should be inspected by a competent person before each period of use.

8.2 General

8.2.1 This section is not exhaustive and reference should be made to appropriate standards and supplier's literature.

8.2.2 All lifting slings should be properly identified with an identification number, which permits traceability and relates to a test certificate or declaration of conformity. The safe working load necessary is shown in the vertical lift mode and should be clearly shown on each sling. For other configurations refer to the mode factors in section 5.3.1 Each sling, or batch of slings, should have the instructions for safe use that were supplied with them made available to the user.

8.2.3 Colour coding of slings to indicate their working load limit and labels to indicate the material from which the sling is made is commonplace. However, as at September 2002, no internationally recognised colour-coding system exists and reference needs to be made to the supplier's literature or the appropriate standard. It should be remembered that a significant number of people have a degree of colour blindness and a label giving the W.L.L. in figures may also be needed

8.3 Rope slings

8.3.1 Pre-use inspection of slings should include checking for the matters listed in 8.3 to 8.6 as appropriate.

8.3.2 **Wear and chafing.** In use some disarrangement or breaking of surface fibres is to be expected. In the case of man made fibre ropes this will raise a pile or fur on the surface of the rope. It is not a cause for concern unless it is excessive or if the wear extends beneath the outer layer of fibres.

8.3.3 **Abrasion (External).** Abrasion is a more substantial form of wear, which may be localised. It may be caused by the sling rubbing against a sharp edge whilst under tension. Only surface damage may be considered acceptable.

8.3.4 **Abrasion (Internal).** Abrasive particles from cargoes or the surroundings can enter the rope and cause internal abrasion. This can only be detected by slightly opening the rope by twisting it against the lay.

8.3.5 **Fraying.** Fraying is usually an indication of cutting of the yarns or strands and if found to be severe would cause concern.

8.3.6 **Internal wear.** Internal wear is caused by the ingress of abrasive particles, such as grit, getting into the rope. It is characterised by the presence of fibre dust. If severe, the strands of the rope will become loose.

8.3.7 **Mildew.** Mildew is caused by use or storage of natural fibre products in damp stagnant conditions and the presence of a mould, which lives on the cellulose, within the material. It has a characteristic smell and can severely weaken natural fibres despite looking innocuous. Mildew may occur on the surface of man-made fibre products. In this case it can be washed off with clean water. Detergents should not be used as these can damage the material of the sling.

8.3.8 **Chemical attack.** Natural fibre products should not be assumed to be resistant to any chemical. Man made fibres will resist chemicals selectively. The correct material needs to be chosen if exposure to chemicals is likely. Chemical attack will often soften or embrittle the fibres, which can then be rubbed or plucked from the rope. Sling that have become contaminated should be soaked immediately in several changes of clean, cold water. It should be noted that contamination of a dilute nature may concentrate as the sling dries out and its effect on the sling strength may become more serious.

8.3.9 **Heat damage.** Charring in natural fibres and the fusing or glazed appearance of man-made fibres is evidence of heat damage. It may result from an external source or may be the result of friction, for example when slings are carelessly used in choke hitches.

8.3.10 **Solar Degradation (Ultra-Violet Light).** Ultra violet light causes fibres to become brittle. Accidents have been reported where unstable material has been used in the sling manufacture. It is not possible to detect the presence of a suitable ultra-violet stabiliser in the sling material by visual inspection. Generally, polyester and nylon have good resistance to ultra-violet but polypropylene can degrade very quickly unless a suitable stabiliser has been added at the time of manufacture. Where doubt exists obtain information from the manufacturer/owner before use.

8.3.11 **Heavy Soiling.** Although some soiling in use is inevitable, heavy soiling may obscure the identification or colour coding of the sling. Soiling may also act as an adhesive for grit and other abrasive particles and may soil the cargo. Washing with clean water will remove some soiling but if it is oil based, water will not remove it. No attempt should be made to clean soiled products with solvents.

8.4 Webbing products

8.4.1 **Surface Chafing.** This is normal. If confined to the surface fibres as opposed to the yarns it has no serious effect. If the outer yarns of the webbing are severed this will severely weaken the slings.

8.4.2 **Local Abrasion.** Local abrasion can be severe and may result in serious loss of strength.

8.4.3 **Cuts.** These may occur, either longitudinally or laterally, in the webbing and will result in loss of strength. Cuts at the edge of the webbing will result in serious loss of strength even though the cut may look insignificant.

8.4.4 **Chemical Attack.** Man made fibres will resist chemicals selectively. The correct material needs to be chosen if exposure to chemicals is likely. Chemical attack will often soften or embrittle the fibres, which can then be rubbed or plucked from the sling.

8.4.5 **Heat damage.** Fusing or glazed appearance of man-made fibres is evidence of heat damage. It may result from an external source or be the result of friction, for example when slings are carelessly used in choke hitches.

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8.4.6 **Damaged Stitching.** This should be regarded as a potential cause of severe loss of strength no matter how insignificant it may appear. In duplex construction slings, where the stitching is not load-bearing on the plied material, stitch damage is less critical. In such cases the manufacturer's advice should be obtained.

8.4.7 **Loose webbing.** Webbing can become loose and soft to the touch so that the weft can be moved or separated easily, this can have a serious effect on the strength of slings.

8.4.8 **Heavy Soiling.** Although some soiling in use is inevitable, heavy soiling may obscure the identification or colour coding of the sling. Soiling may also act as an adhesive for grit and other abrasive particles and may soil the cargo. Washing with clean water will remove some soiling but if it is oil based, water will not remove it. No attempt should be made to clean soiled products with solvents.

8.5 Roundslings

8.5.1 **Exposed Core.** Some scuffing and wear of the protective sleeve is to be expected but on no account should this be so severe as to expose the load bearing core of the sling.

8.5.2 **Cuts.** Cuts in the protective sleeve will expose the core and are not acceptable.

8.5.3 **Damaged Stitching.** Any damage to stitching must be regarded as a potential for serious loss of strength.

8.5.4 **Heat Damage.** Damage to the sleeve, and a glazed appearance, if due to friction, may indicate serious heat damage to the load-bearing core. Any heat damage that causes penetration of the outer sleeve is serious.

8.5.5 **Chemical Attack.** This may be difficult to detect. Knowledge of previous use is desirable. There may be some discolouring of the sleeve but the underlying load-bearing core is not visible. It may be necessary to err on the side of caution and discard any slings that look as though they may have suffered attach from chemicals.

8.6 Metal fittings

8.6.1 Metal end fittings should be inspected for signs of mechanical damage, corrosion or significant distortion. Apart from being an indication of abuse in a previous use or during storage, such defects may damage the body of the sling when it is next used.

9 DISPOSAL

9.1 When a sling has reached the end of its useful life it must be disposed of carefully and properly. It is not acceptable to throw it on the nearest rubbish heap. It should be rendered useless by cutting through the sling to prevent further use by a third party.

9.2 Since most slings are manufactured from thermoplastic material they may need to be disposed of by a licensed, or authorised, waste contractor. Incineration should not be carried out unless it is the only form of disposal allowed. Only experienced contractors with the appropriate equipment should carry out incineration because toxic gases are released during burning.

10 LEGISLATION AND STANDARDS

10.1 It should be appreciated that legislation and standards, although often closely allied, are different things. Legislation has the backing of the force of law whereas standards are voluntary codes of practice. In many cases compliance with a recognised standard will be accepted in a court of law as satisfying legal requirements.

10.2 Legislation varies from country to country. Within the European Union, national law is increasingly becoming a reflection of European directives. One such example is the European Machinery Directive, which lays down essential safety requirements (ESRs) for the products that it covers. As slings are classified as machines in the directive, they are subject to its requirements. These include a factor of safety of 7:1 for textile slings. In the absence of a harmonised standard (see 10.3 and 10.4), the directive does not require the issue of a test certificate but demands a “declaration of conformity”. This is a document issued by the supplier that certifies that the product meets the ESRs in question. In addition, any product that warrants a declaration of conformity must be “CE” marked. For textile slings the “CE” mark usually appears on the label. The directive also requires that a supplier issues instructions for the care and safe use of the product.

10.3 European standards or euro norms as they may be referred to, are gradually replacing national standards. Harmonised standards, in this context, are those that have been prepared to address the requirements of a European directive and, therefore, a product made in compliance with such a standard is deemed to comply with the ESRs of the relevant directive(s).

10.4 In areas outside Europe, the European Machinery Directive is of no direct consequence although it may be regarded as a useful “Code of Practice”.

10.5 This raises the question of what regulations apply to slings on a ship from outside Europe operating in a European port. Schedule 5 of the European Machinery Directive excludes from the application of the directive, equipment on board ocean-going ships. Such equipment is known as “ships’ equipment”.

10.6 There is no agreed standard that can be universally applied but it is useful to note that ISO 4878; 1981, which was withdrawn in November 2000, has been adopted by the following countries: Australia, Belgium, Bulgaria, Canada, Cyprus, Czechoslovakia, Egypt, Finland, Ghana, Indonesia, Israel, Italy, Japan, Korea, Republic of, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, South Africa, Spain, Sweden and Switzerland. This standard may enable those responsible for the safe unloading of pre-slung cargo to make an informed judgement.

10.7 When ships are to be loaded, using pre-slung cargo, the Master should be presented with the appropriate test certificates / certificates of conformity before loading commences. As a minimum, these should certify that the slings meet the requirements of ISO 4878; 1981, or national legislation or standards of the loading country. All slings should be traceable to their certificates. The Master should retain the documentation for presentation at the port of discharge. Where special procedures are in force for the handling of pre-slung cargo the Master should hold a current copy of those procedures.

10.8 When unloading, the situation is a little more complex. Often the first sight of the slings is when the hatches are opened and stevedores / longshoremen are under pressure to unload the ship as quickly as possible. Legislation within Europe, North America, Australia, New Zealand, Japan, South Africa to name but a few, requires employers to provide safe systems of work and equipment that is fit for purpose. The use of any equipment before firstly seeing a valid certificate conforming to International Labour Office Convention 152 may, in the event of an accident, be considered to be contributory negligence. It is, therefore, essential to ensure that equipment to be used for discharging the cargo is safe to use. In the absence of a test certificate, a competent person should examine the slings and, if appropriate, make a trial lift before allowing operations to proceed. Ultimately, advice may be sought from the relevant port state occupational safety enforcement authority and/or from the rigging community, often to be found close to any port or terminal operation

10.9 One trip slings and pre-slung cargo

10.9.1 One-way slings/ disposable slings/ one trip slings have gained immense popularity for spot-cargo requirements in recent years. The author cannot pretend that he is anything other than baffled by the “regulations” he has seen imposed in various places throughout the world, covering this type of equipment.

10.9.2 Use of one-trip disposable slings that are designed for specific cargo should be the subject of discussion and agreement, between the consignor, vessel operators and the consignee. They should consider the route that the pre-slung cargo is intended to take. However, the ship may be compelled to alter route then consideration of other National regulations may be required. *In meeting whatever requirements apply, the manufacturer should enjoin the other parties to ascertain by what means of sampling and/or testing, he can ensure that the method used and the certification provided, will meet the regulations which apply at all points and stages, where the cargo will be loaded and/or unloaded.* The requirement that one-trip slings must be destroyed at the final destination is a matter of enforcement. There is an increasing concern that this is done in an environmentally friendly manner. This lends itself to the use of readily disposable and/or biologically degradable materials. This presumes that such materials are suitable for the marine environment in which they will be predominately used.

10.9.3 The International Labour Office has confirmed that the second edition of the ILO code of practice “Safety & Health in Dockwork” (ISBN 92-2-

101593-9) fifth impression 1997 is current at the time of printing. The following extracts from section 22.3 of the code of practice may be helpful in the decision making process:

a) The width of the belt should be not less than 25mm
b) The declaration required under subparagraph 22.1 (a) should state the sling would not break at less than five times its safe working load, in the case of a belt width from 25mm to 50mm and at less than four times its safe working load in the case of belt width of 50mm and above.
c) The declaration referred to is a certificate containing a declaration by the manufacturer, of the safety factor in relation to the safe working load, the safe working load in straight lift, the distinguishing mark of each sling to relate it to the certificate. The belt and stitching material from which the sling is made and marked to indicate that it has been made to an approved standard.
d) The sling should be marked in a suitable place in such a way, that it would remain legible throughout the life of the sling, with the following information:
    1. Its safe working load 0^{o} to 60^{o}
    2. Either the mark “U” indicating a disposable sling, or the word disposable” in English and in the language of the country where it will be taken off the load.
    3. The maker’s identification.
    4. A batch number including reference to its year of manufacture.

10.9.4 As can be seen the ILO refers to standards, it may be helpful to consider at this point, the British Standard 3481:1970 (Part 3),

10.10 Further advice on both re-usable and one-way slings may be obtained from specific rules and standards relevant to specific countries. Some of these are described below:

10.10.1 Australia. - Standards enshrined in Marine Order Part 32 dated February 1998, as follows: Slings Fibre ASI 1380 - 1972
Synthetic webbing ASI 1353 - 1990
Roundslings Synthetic fibre ASI 4497 - 1997

10.10.2 Canada. - The Canadian coastguard standard requires a minimum factor of safety of 6:1 for re-usable slings. Additionally, the factor of safety for older slings is defined by reference to a wear standard and there are provisions for testing of slings to establish a “manner of use”

10.10.3 U.S.A. - ASME BE30.9-1990 specifies design factors for synthetic webbing slings.

10.10.4 New Zealand. - Whilst national standards exist they are in the main a reflection of ISO 4878; 1981 and BS 3481. The same is true of Japan.

10.10.5 Russia (as opposed to USSR). - Has imposed a factor of safety of 9:1 for industrial products. It would seem however that they continue to comply with ISO 4878; 1981, which was confirmed by the USSR for marine environments.

10.10.6 Legislation in various parts of the World may change rapidly and this booklet cannot be considered definitive. It attempts to advise on good

practice and refers to sources of legislation and standards known to the author. For a specific application, it is wise to seek the advice of a reputable manufacturer who will provide appropriate information and training and offer the added comfort of worldwide product liability cover.

Appendix 1

The following countries have ratified ILO 152.

Brazil
Congo
Cuba *
Cyprus
Denmark *
Ecuador
Egypt
Finland *
France *
Germany
Guinea
Iraq
Italy *
Mexico *
Netherlands *
Norway *
Peru
Spain *
Sweden
Tanzania

* These countries had previously ratified ILO 32