Australian Standard®

Fibre-rope slings

Part 2: Care and use

Originated as part of AS 1380—1972.
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PREFACE

This Standard was prepared by the Standards Australia Committee ME/25, Lifting Tackle, to supersede in part AS 1380—1972, *Fibre-rope slings (of natural or synthetic rope)*.

This edition is a major revision, including redrafting of Clause 7 and Appendices B and C of the superseded edition. The safe working load of three-leg slings and four-leg slings has been reduced so that they are the same as for two-leg slings, because loads that are considered to be flexible may not in fact be fully flexible.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

CONTENTS

STANDARDS AUSTRALIA

Australian Standard

Fibre-rope slings

Part 2: Care and use

1 SCOPE This Standard sets out practices for the care and use of fibre-rope slings, but does not consider repairs to such slings or the use of such slings for the lifting of personnel.

NOTE: Standards for components used in lifting systems are listed in Appendix A.

2 INNOVATION It is not intended that this Standard should impose any unnecessary restriction on the use of new or unusual methods that meet its intent.

3 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS
1380 Fibre-rope slings
1380.1 Part 1: Product specification

1418 Cranes (including hoists and winches)
1418.1 Part 1: General requirements

4142 Fibre ropes
4142.2 Part 2: Three-strand hawser-laid and eight-strand plaited

4 DEFINITIONS For the purpose of this Standard, the definitions in AS 1380.1 and those below apply.

4.1 Competent person—a person having practical and theoretical knowledge and relevant experience, sufficient to enable that person to detect and evaluate any defects and any weaknesses that may affect the intended performance of the equipment.

4.2 Shall—indicates that a statement is mandatory.

4.3 Should—indicates a recommendation.

4.4 Working load

4.4.1 *Working load limit (WLL)*—the maximum load that may be applied to the sling, in tension, under general conditions of use.

4.4.2 *Safe working load (SWL)*—the maximum load that may be applied to the sling under the particular conditions of use (see Clause 7).

5 SELECTION

5.1 Product specification Fibre-rope slings shall comply with AS 1380.1.

5.2 Working load limit (WLL) The sling shall have a WLL that will provide adequate safe working loads for the intended uses (see Clause 7), taking into account the mode of connection and use and the nature of the load to be lifted.

5.3 Material The sling material shall be chosen to resist any degrading effects from the environment such as moisture, chemicals, microbiological attack, ultraviolet light, sunlight, heat and surface abrasion.

Also, sling materials should have adequate resistance to any chemicals or sunlight to which the sling may be subjected. A combination of heat with acid or alkali will accelerate any deterioration, which will reduce its service life. The advice of the manufacturer should be sought when determining the material that should be used in such cases.

When selecting a synthetic filament sling as a substitute for a natural fibre sling, strength is not the only property to be considered.

Relevant properties of sling materials are as follows:

(a) *Nylon* Nylon (i.e. polyamide) yarns generally have a high chemical resistance, but solutions of mineral or formic acids cause rapid weakening. They suffer a loss of strength in the range of 15% to 18% on wetting with water, but regain that loss of strength after drying out. They should only be used within the temperature range of −40°C to 100°C.

(b) *Polyester* Polyester yarns generally have an extremely high chemical resistance, except to hot strong alkaline conditions. Resistance of polyester to oils and common organic solvents is high. They should only be used within the temperature range of −40°C to 100°C.

(c) *Polypropylene* Polypropylene yarns are unaffected by most acids or alkalis, but are attacked by organic solvents such as white spirit, xylene and metacresol. They should only be used within the temperature range of −40°C to 80°C.

(d) *Aramid polyamide* Aramid polyamide yarns are very resistant to most types of chemical attack and to heat, but have low stretch characteristics. They shall only be selected for use after consultation with the manufacturer, as some applications may cause a degradation of the yarns. They should only be used within the temperature range of −50°C to 130°C.

(e) *Natural fibres* Compared to synthetic fibres, natural fibres generally—

  (i) have greater friction properties;

  (ii) have lower stretch characteristics; and

  (iii) are much more susceptible to rot, which is difficult to detect.

(f) *Other materials* The properties of other materials should be obtained from the manufacturer.

5.4 End connections The eyes or end fittings of slings shall be compatible with any hooks or other lifting devices to which they are connected.

Metallic end fittings that are susceptible to attack from acids or alkalis shall not be selected for use on slings that are intended for use in acidic or alkaline environments respectively.

Where attached to components such as links, pins and shackles, slings shall be terminated by thimble reinforced eyes.

5.5 Length of sling Slings shall have a length that is adequate for the mode of connection and the use.

6 USE

6.1 Precautions Unless given adequate care during use, the service life of slings may be considerably shortened. The following precautions shall be taken while using slings:

(a) All personnel using slings shall be trained in the correct method of use.

(b) Avoid contact with hot surfaces and exposure to hot gases, such as those from blow-lamps or welding torches.

(c) Avoid exposure to damaging conditions, such as biological attack or prolonged exposure to sunlight, dusts or chemicals (may be as spray, mist or fume).

(d) Whenever a lifting sling comes into contact with acids or alkalis, immediately wash with water and where available use a neutralizing agent. Very dilute solutions that may be harmless will concentrate while drying and may then cause damage. If neutralization cannot be assured, immediately discard the sling.

(e) Slings that have become wet in use, or as the result of cleaning, should be hung up and allowed to dry naturally. Under no circumstances should slings be heated or otherwise force dried. Slings shall never be dried near a source of heat (such as in front of a fire) or stored near a stove or other source of heat. Depending on the material of the lifting sling and on the chemicals, it may be necessary in some cases to request from the supplier additional recommendations on the cleaning procedure to be followed after the sling has been used in the presence of chemicals.

6.2 Connecting to a load The following practice shall be observed when connecting to a load:

(a) Before commencing a lift, plan the slinging, lifting and lowering operations.

(b) Consider the manner of connecting to the load (e.g. by direct connection, by basket hitch, by choke hitch, by specific lifting device) and follow any manufacturer's advice. Each component should readily connect onto each adjacent component.

(c) Follow safe and recommended rigging practices.

(d) Do not apply any loading to the latch mechanism of a hook.

(e) For every eye at the end of a sling, the included angle between the legs of the eye shall be not more than 20° while supporting a load.

(f) The saddle of a hook shall not support more than two sling legs.

(g) Where the angle between two sling legs that are supported by a hook exceeds 60 degrees, attach the sling legs to the hook by means of a single suitable component (e.g. lifting link, shackle).

(h) Where slings have more than two legs and are connected to a crane hook, they should be connected by an intermediate component so that the load is supported axially through the crane hook.

(i) Never use knotted slings.

(j) Take care that the sling is not damaged by the lifting appliance to which it is connected or by the load.

(k) Protect the sling from sharp edges by using protective sleeves or corner pieces. Do not pass a sling over sharp corners or edges without adequate protection from abrasion or cutting. Corners with a radius of less than a half of the diameter of the sling material are deemed to be sharp (see Figure 1 and Note 2 to Table 1).

(l) Ensure that any splice in the sling is not bent around a corner of a load, or in the bight of a choke or over a hook.

(m) Place the sling around the load so that the sling is not crossed or twisted.

(n) Prevent damage to labels or tags by keeping the labels away from the load, the hook and the bight of any choke.

(o) Sling the load in such a manner that it is balanced and stable, so that it cannot topple or fall out during the lift. If possible, have the point of lift located directly above the centre of gravity of the load. For symmetrical loads, the angles between the vertical and each leg of the sling should be approximately the same. (See Figure 2.)

(p) Avoid snatch or shock loading.

(q) Do not allow the load to rest on the sling where this could cause damage. Avoid trapping the sling when lowering the load and do not attempt to pull the sling from beneath the load while the load is resting on it.

(r) Protect the sling against friction and abrasion damage. Local abrasion will cause a loss of strength.

(s) Do not drag a load that is slung or allow a sling to be dragged over the ground or over rough surfaces.

6.3 Connecting to a hook Where two sling legs or two eyes of a basket sling are attached to a hook so that the included angle between the legs or eyes is more than 60°, the working load of the hook with such a configuration shall be considered.

NOTE: Some manufacturers may allow hooks to support angles greater than 60° without a deration.

6.4 Multileg slings The included angle between the legs of multileg slings should be symmetrically orientated about the vertical centre-line, and shall not exceed 120°. The angle between adjacent legs of three-leg slings shall not exceed 90°.

6.5 Choke hitches Do not tighten the bight of slings that are reeved with a choke hitch by force or hammering.

6.6 Basket hitches The following additional requirements apply to the use of slings with a basket hitch:

(a) Where the included angle between the legs of a basket hitch exceeds 90°, the sling shall be attached to the hook by means of a single shackle or a similar component, except where special hooks or hooks with safety devices are used to effectively retain the parts of the sling on the hook.

(b) The included angle between the legs of a basket hitch shall be not more than 120°.

(c) Ensure that the load is balanced, as unlike in a choke hitch there is no gripping action and the sling may roll through the lifting point. Where slings are used in pairs, a spreader bar is recommended.

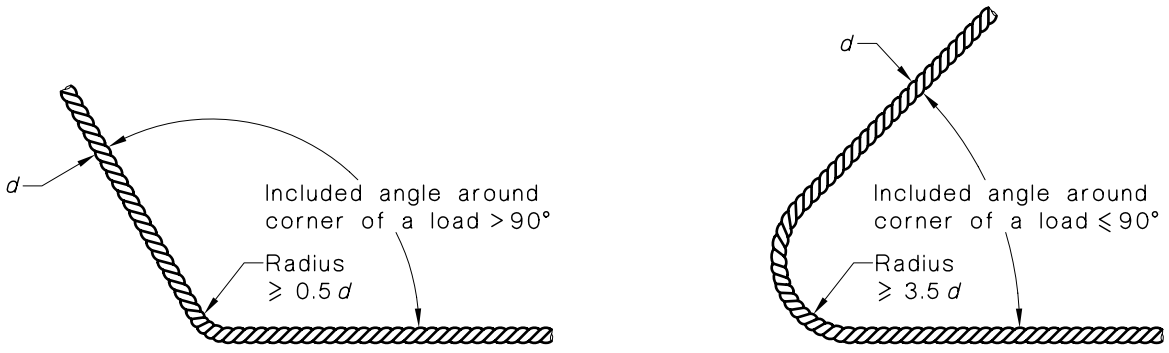
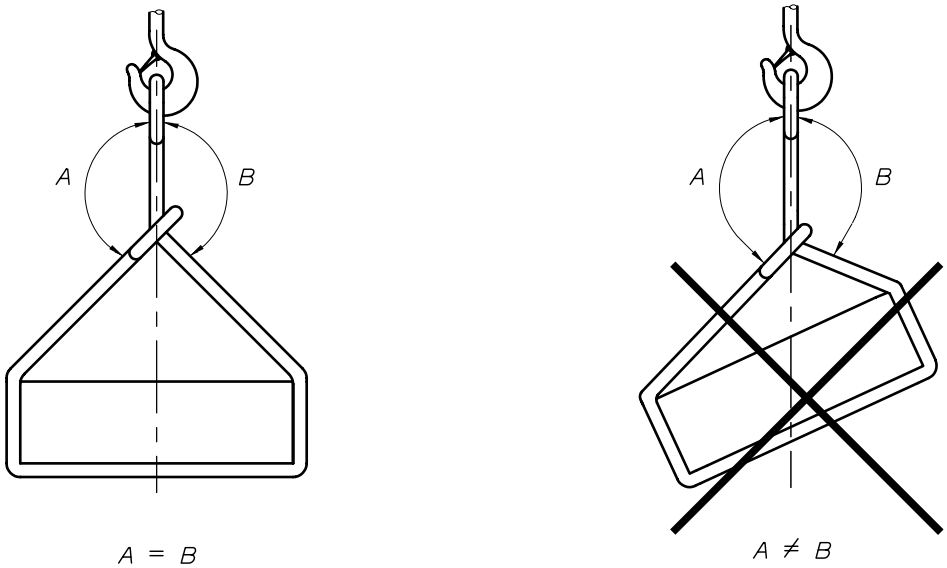
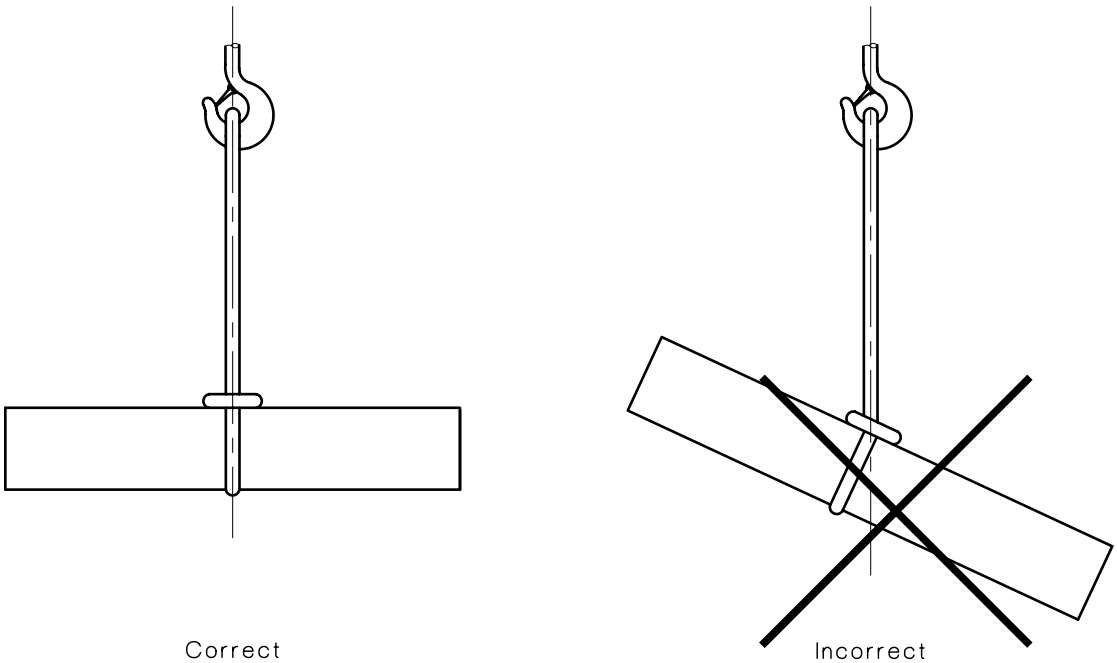


FIGURE 1 MINIMUM INSIDE RADII OF FIBRE ROPES



(a) Angle between the vertical and each leg of the sling



(b) Centring of the sling on the load

FIGURE 2 POSITIONING OF CHOKE HITCHED SLINGS

7 SAFE WORKING LOAD (SWL) Do not use a sling to lift a load that exceeds the SWL of the sling for the particular conditions of use.

The appropriate loading factor for the manner of attachment of the sling to the load shall be used. The SWL of the sling shall be consistent with the method of lift and reeving and allow for the shape of the load, the corners of the load, any excessive dynamic load effects and any abnormal or severe working conditions.

Where the configuration used is not covered by the label, users shall always consult a sling load chart. Sling load charts are given in Appendix B.

The SWL for each application of a fibre-rope sling shall comply with the following:

(a) *General use* General conditions of use are equivalent to a group classification of crane mechanisms of M3 as specified by AS 1418.1. Under general conditions of use, the SWL of a sling in tension is normally equal to the WLL (see Figure 3(a)).

(b) *Non-general use* Under other than general conditions of use (e.g. severe conditions, hazardous conditions, directly supporting personnel), the SWL shall be determined by the group classification of crane mechanisms as specified in AS 1418.1 for the conditions of use that apply.

(c) *Choke-hitched slings* The SWL of choke-hitched fibre-rope slings shall be not more than x times the WLL of the fibre rope (see Figure 3(b)), where—

(i) for round load, $x = 0.75$; and

(ii) for other than round loads, $x = 0.5$.

(d) *Basket-hitched slings* The SWL of basket-hitched slings shall be not more than twice the WLL multiplied by the cosine of half the included angle between the legs of the sling (see Figure 3(c)).

(e) *Non-vertically oriented leg of a sling* The SWL of a non-vertically oriented leg of a sling shall allow for its inclination to the vertical.

(f) *Multileg slings* The SWL of a general purpose multileg sling (i.e. a sling assembly comprising two of more legs) shall be not more than the lesser of that stated on the tag attached to the master link and that calculated for only two of its legs to support a load having a symmetrical configuration with an included angle between the two legs of 60°. This applies even where the included angle between the legs is less than 60°.

The effects of any divergent angle that may exist between the legs of a multileg sling shall be allowed for in the determination of the SWL.

The included angle between the legs of a multileg sling shall not exceed 120°.

Where a sling is lifting a load that causes any unevenness of loading between the parts, the user shall apply a further derating to allow for the unevenness.

The user may also need to apply a further derating to allow for any excessive angle between the legs of the sling (see Figures 3(c) and 3(d)).

(g) *Sling assemblies* Where components are attached to slings to make up a sling assembly, the SWL of the sling assembly shall be derived from the WLL of each component and each sling leg.

(h) *Grommet and double-part sling legs* The SWL of each grommet and each double-part sling leg shall be not more than 1.5 times the WLL of a single-part sling. Where such slings are attached by a choke hitch, the following factors apply:

(i) Where carrying a round load . . . . . 1.5.

(ii) Where carrying an other than round load . . . . . 1.0.

(i) *Configuration* Table 1 gives the factors, R_c, that shall be used to allow for particular configurations.

(j) *Dynamic loading* Dynamic loading shall be considered when determining the safe working load.

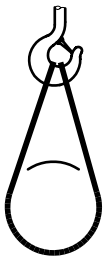
Loading factor = 1.00

(a) Straight loaded slings

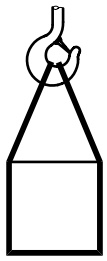
Loading factor:
For round load = 0.75
For non-round load = 0.5

(b) Choke hitched slings

Included angle between legs degrees	Loading factors	
	Round load	Rectangular load
0	2.0	1.0
> 0 ⩽ 60	1.73	0.86
> 60 ⩽ 90	1.41	0.7
> 90 ⩽ 120	1.0	0.5



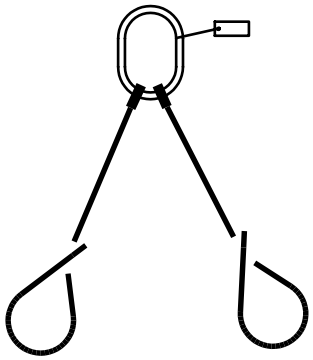
(i) Round load



(ii) Square load

(c) Basket hitched slings

Included angle between legs degrees	Loading factor
> 0 ⩽ 60	1.38



(d) Two-leg choke hitched slings

FIGURE 3 LOADING FACTORS UNDER GENERAL CONDITIONS OF USE

TABLE 1

FACTORS FOR CONFIGURATIONS (R_c) USING A GIVEN SIZE AND TYPE OF ROPE

1	2	3	4	5
Type of sling	**Method of reeving (see Note 1)**	**Factor R_c**		
		Directly loaded	**Indirectly loaded (see Note 2)**	
			Large round load (see Note 3)	**Other than large round load**
Single-part single leg	Directly loaded (i.e. unreeved)	1		
	Choke hitched		0.75	0.5
	Basket hitched with an included angle between the legs of— 0°		2	1
	60°		1.73	0.87
	90°		1.41	0.71
	12 0°		1	0.5
Endless or double-part single leg	Directly loaded (i.e. unreeved)	1.5		
	Choke hitched		1.5	1
	Basket hitched with an included angle between the legs of— 0°		3	2
	60°		2.6	1.73
	90°		2.12	1.41
	120°		1.5	1
Assembly with 2 or 3 legs, with an included angle between the legs; or with 4 legs, with an included angle between opposite legs of—	Directly loaded 60°	1.73		
	90°	1.41		
	120°	1		
	Choke hitched (see Note 4)		1.3	0.87

1 No part of a splice may be bent around an edge or a corner, whether sharp or curved.

2 The inside radii of bends around corners of the load shall be not less than—

(a) where the included angle of the bend is more than 90°, 0.5 times the diameter of the sling (see Figure 1(a)); and

(b) where the included angle of the bend is not more than 90°, 3.5 times the diameter of the sling (see Figure 1(b)).

3 Round loads with a diameter of less than 7 rope diameters and rectangular loads shall use the factors in Column 5.

4 The angle between the legs of choke hitched slings shall be not more than—

(a) for single wrap hitches, 45°; and

(b) for double wrap hitches, 60°.

8 STORAGE Proper storage is essential for the prevention of deterioration and damage to slings.

Wet slings shall be allowed to dry naturally before being stored. Under no circumstances should slings be heated or otherwise force dried (see also Item (e) of Clause 6.1).

Slings shall be stored in locations that have the following conditions:

(a) Clean and free from dirt and grit.

(b) Dry and ventilated, to prevent condensation (i.e. never in receptacles that do not permit air circulation).

(c) Off the ground, off the floor, and without contact with any surface that may corrode during use; preferably on gratings, racks, stands or special coil pegs.

(d) Away from the following:

  (i) Direct sunlight and ultraviolet rays.

  (ii) Sources of heat (e.g. steam pipes, furnaces).

  (iii) Sparks from any source.

  (iv) Chemically degrading atmospheres, including damaging fumes.

  (v) Chemically degrading materials, including liquids that may leak from containers.

  (vi) Locations where mechanical damage is likely to occur, such as on or underneath racks containing heavy objects that could inadvertently damage the slings.

9 INSPECTION

9.1 Signs of damage The following signs of damage should be looked for during inspections, particularly during periodic inspections:

(a) *Severe overloading* Damage caused to natural fibre slings due to overloading is evidenced by powdering and fracture of the central yarns in the strands.

Damage caused to synthetic slings due to severe overloading is evidence by hardening, loss of extensibility or opening of the lay.

Slings showing such faults should be discarded.

(b) *External wear* External wear caused by dragging over rough surfaces causes an opening out of surface fibres (with a furry appearance). This is the most noticeable cause of weakness, particularly when a sling is being compared with a new sling. The outer faces of the strands may become so worn that they are flattened and the outer yarns are severed. Also, the tag may become damaged.

(c) *Local abrasion* Any substantial local abrasion has to be viewed critically. Local abrasion will be caused by movement over sharp edges while the sling is under tension, which will result in a loss of strength.

(d) *Cuts and contusions* Cuts and contusions can be internal or external, and may be indicated by local rupturing or loosening of the yarns or strands.

(e) *Internal wear* Internal wear will be caused by repeated flexing, particularly when wet and by particles of grit that may have penetrated into the fibres. Internal wear may be indicated by thickening of the sling, the presence of grit or dirt, excessive looseness of strands or yarns and the presence of powdered fibre.

(f) *Damage from high temperatures* High temperatures can result from a hot environment, radiation or friction. High enough temperatures will cause fusing or shrinkage of synthetic fibres. Fusion is able to occur at temperatures approximately equal to the melting point of the polymer from which the fibres have been made. The melting point of polypropylene is 165°C. The melting points of nylon or polyester are in the range 260°C to 265°C. Aramid polyamide does not melt.

(g) *Sunlight degradation* Prolonged exposure to ultraviolet radiation (including sunlight) of any textile fibres will weaken the fibres. Degradation may be indicated by a hairy appearance of fibres, which can be plucked or rubbed off (in extreme cases as a powder).

(h) *Mildew* Mildew and the growth of other microorganisms can occur on manila and sisal fibres under damp or humid conditions. Storage of fibres under excessively humid conditions should be avoided and, if a sling becomes wet, it should be carefully dried out under natural atmospheric conditions, cleaned if necessary and stored again correctly.

(i) *Chemical attack* A close watch should be kept of the following:

(i) *General* Chemical attack is usually indicated by local weakening or softening of the fibres, allowing surface fibres to be plucked or rubbed off. In some cases the sling may have stiffened. In extreme cases surface fibres are reduced to powder.

(ii) *Natural fibres* Chemical attack on fibres (e.g. exposure to acids, alkalis and other chemicals, flue gases, industrial dusts, ashes and similar substances) reduces the strength of manila and sisal slings. If any contamination is suspected, the sling should be well washed in cold water and dried under natural atmospheric conditions.

(iii) *Polyamide fibres* Chemical attack on polyamide fibres is usually indicated by local weakening or softening of the sling so that the surface fibres can be plucked or rubbed off (as a powder in instances of extreme attack). The chemical resistance of polyamide filament is generally extremely good, but solutions of mineral or formic acids cause rapid weakening. Contact with acid solutions, whether hot or cold, should therefore be avoided.

Polyamide filament is unaffected by alkalis at normal temperatures; however, it might swell in certain organic solvents. Exposure to fumes, spray or mist of acids should be avoided but, if contamination is suspected, the sling should be well washed in cold water and dried under natural atmospheric conditions.

(iv) *Polyester fibres* Chemical attack on polyester fibres is usually indicated by local weakening or softening of the sling so that surface fibres can be plucked or rubbed off (as a powder in instances of extreme attack). The chemical resistance of polyester filament is generally extremely good, but solutions of strong hot alkalis progressively dissolve polyester fibre causing gradual loss in weight and a corresponding reduction in breaking load. Exposure to alkaline conditions should be avoided.

Resistance to acids is good, particularly to sulfuric acid with concentrations of less than 80%. However, dilute solutions of sulfuric acid should not be allowed to dry on a sling, because the solution becomes concentrated as the water content evaporates. If any contamination is suspected, the sling should be well washed in cold water and dried under natural atmospheric conditions.

Resistance of polyester filaments to oils and common organic solvents is good.

(j) *Tag damage*

(k) *Damage to any eyes*

(l) *Damage at the connection to any terminal attachment*

(m) *Damage to any end fittings*

9.2 Before each use Every time a sling is to be used, the user shall be satisfied that the sling does not show any signs of damage that could affect its safe use. Particular attention should be given to circumstances, locations and atmospheres that are likely to result in accelerated damage.

Slings shall be withdrawn from service immediately they sustain any of the following faults:

(a) Any of the discard criteria listed in Clause 11 is observed.

(b) A dangerous condition of the sling is suspected.

(c) The label is illegible or missing.

(d) Any cover or sewn sleeve has been damaged.

(e) A protective coating has been damaged.

(f) An end fitting or a coupling has been damaged.

9.3 Evaluation When a sling has been withdrawn from service because of any doubt about its condition, its safety may be evaluated by a competent person. The competent person may approve of the sling being returned to service, if the concern is considered to not affect the safety of the sling.

9.4 Periodic inspection At intervals of service of not more than three months, slings shall be inspected by a competent person; however, where conditions are severe, these intervals should be shorter.

The inspection for any signs of damage shall cover all surfaces along the full length of the slings.

Weakening effects are more serious on smaller sizes than on larger sizes of sling due to a greater ratio of perimeter to cross-sectional area. Slings should be examined by being turned to reveal all sides and by the strands being untwisted slightly to allow examination between them at about 0.5 m intervals.

9.5 Inspection records For each sling, a record of every evaluation by a competent person and the details of the periodic inspections shall be kept for the life of the sling. The record shall include the date of purchase, the date of introduction to service, relevant general details of the service, the dates and details of every evaluation by a competent person and the dates and details of the periodic inspections.

10 CLEANING If a sling requires cleaning, refer to the manufacturer or supplier for suitable cleaning methods.

11 DISCARD CRITERIA It is more difficult to define a standard of acceptance or rejection than to describe the method of inspection. There can be no well-defined criteria between slings that are safe and those that are not, because the degree of safety depends upon the degree of deterioration of the sling and the severity of service to which it is to be subjected. Any decision as to whether or not to withdraw a sling from use has to be based on an assessment of its general condition. Cognizance has to be taken that the effect of wear and mechanical damage is relatively greater with smaller slings, which therefore require more rigid standards of acceptance. If after examination any doubt exists about the condition of a sling being safe, it should be withdrawn from service.

Slings shall be immediately discarded when they are found to have any of the following faults:

(a) The label for the sling is missing or is illegible, and the sling cannot be positively identified.

(b) If the sling has been subjected to a heavy impact load.

(c) Where more than 10% of fibres are damaged. If fibres are fused or glazed, it is an indication that the sling has been excessively heated (e.g. by friction in a choke hitch or by externally applied heat).

(d) Chemicals have caused damage (e.g. local weakening, softness of the cover or flaking of surface fibres), particularly where it is known or suspected that—

(i) a nylon sling has come into contact an with an acid solution;

(ii) a polyester sling has come into contact with an alkaline solution; or

(iii) a polypropylene sling has come into contact with an organic solvent (e.g. wet paint, coal tar, paint-stripping mixtures).

(e) Any coupling components or fittings are distorted, cracked, fractured or excessively worn or corroded.

(f) If any other dangerous condition is confirmed.

12 REPAIRS Slings having any of the faults listed in Clause 11 shall not be repaired, but shall be discarded.

The only repair that may be made is the replacement of the label or tag on a sling that can be identified by the manufacturer.

APPENDIX A
STANDARDS FOR COMPONENTS USED IN LIFTING SYSTEMS
(Informative)

The following is a list of Australian Standards for components that are used in lifting systems:

AS
1138 Thimbles for wire rope

1353 Flat synthetic-webbing slings
1353.1 Part 1: Product specification
1353.2 Part 2: Care and use

1380 Fibre-rope slings
1380.1 Part 1: Product specification
1380.2 Part 2: Care and use

1438 Wire-coil flat slings
1438.1 Part 1: Product specification
1438.2 Part 2: Care and use

1666 Wire-rope slings
1666.1 Part 1: Product specification
1666.2 Part 2: Care and use

2076 Wire rope grips for non-lifting applications

2089 Sheave blocks for lifting purposes

2317 Collared eyebolts

2318 Swivels for hoists

2319 Rigging screws and turnbuckles

2321 Short-link chain for lifting purposes (non-calibrated)

2740 Wedge-type sockets

2741 Shackles

2759 Steel wire rope—Application guide

2841 Galvanized steel wire strand

3569 Steel wire ropes

3585 End fittings for flat-webbing slings

3775 Chain slings—Grade T

3776 Lifting components for Grade T chain slings

3777 Shank hooks and large-eye hooks—Maximum 25 t

4142 Fibre ropes
4142.2 Part 2: Three-strand hawser-laid and eight-strand plaited

4497 Roundslings—Synthetic fibre
4497.1 Part 1: Product specification
4497.2 Part 2: Care and use

APPENDIX B
SLING LOAD CHARTS
(Normative)

This Appendix gives sling load charts for slings manufactured from the following materials:

(a) Manila rope (see Tables B1 and B2).

(b) Sisal rope (see Tables B1 and B2).

(c) Polypropylene rope (see Tables B3 and B4).

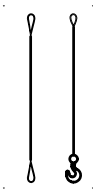
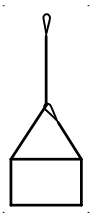
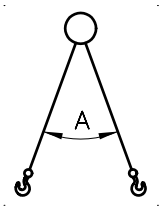
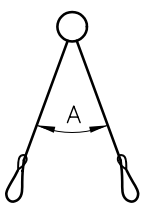
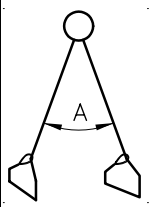
(d) Polyester rope (see Note 1 to Table B3).

(e) Polyamide rope (see Note 1 to Table B3).

NOTE: This Appendix does not apply to polyethylene rope.

TABLE B1

SAFE WORKING LOADS UNDER GENERAL CONDITIONS OF USE FOR SLINGS, CONSTRUCTED FROM THREE-STRAND HAWSER LAID MANILA OR SISAL ROPE, THAT ARE DIRECT LOADED OR CHOKE HITCHED (See Note 1)

1	2	3	4	5	6	7	8	9
	Loading method							
	Single leg			**Double leg**				
	Direct loaded	**Choke hitched**		**Direct loaded**			**Choke hitched (see Note)**	
		Round load	**Rectangular load**				**Round load**	**Rectangular load**
Rope								
	L = 1.00	L = 0.75	L = 0.50	A = 0 to 60° L = 1.73	A = 90° L = 1.41	A = 120° L = 1.00	L = 1.30	L = 0.87
Nominal diameter mm	**Safe working load t**							
12	0.11	0.08	0.05	0.20	0.16	0.11	0.15	0.10
14	0.16	0.12	0.08	0.27	0.22	0.16	0.20	0.13
16	0.22	0.16	0.11	0.39	0.31	0.22	0.29	0.19
18	0.26	0.20	0.13	0.46	0.37	0.26	0.34	0.23
20	0.35	0.26	0.17	0.61	0.50	0.35	0.46	0.30
22	0.42	0.31	0.21	0.73	0.60	0.42	0.55	0.36
24	0.50	0.38	0.25	0.88	0.71	0.50	0.66	0.44
28	0.66	0.49	0.33	1.15	0.94	0.66	0.86	0.57
32	0.85	0.64	0.42	1.48	1.21	0.85	1.11	0.74
36	1.08	0.81	0.54	1.88	1.53	1.08	1.41	0.94
40	1.31	0.98	0.65	2.2	1.85	1.31	1.70	1.13
48	1.84	1.38	0.92	3.2	2.6	1.84	2.4	1.60
56	2.4	1.86	1.24	4.3	3.5	2.4	3.2	2.1
64	3.2	2.4	1.60	5.5	4.5	3.2	4.1	2.7
72	4.0	3.0	2.0	7.0	5.7	4.0	5.3	3.5
80	4.8	3.6	2.4	8.3	6.8	4.8	6.2	4.1

NOTES:

1 This Table is based on the minimum breaking force of manila and sisal ropes, as specified in AS 4142.2 (Table 2 in the 1993 edition), using the formula SWL = (Minimum breaking force) × L/(9.806 65 × 8) and the exact (i.e non-rounded values for L.

2 The angle between legs refers to the greatest angle between the legs in a three-leg sling and the greater angle between the opposite legs in a four-part sling.

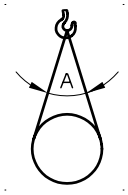
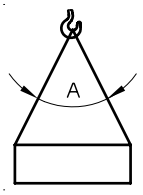
3 The angle (A) between the legs of choke hitched slings shall be not more than—

(a) for single wrap hitches, 45°; and

(b) for double wrap hitches, 60°.

TABLE B2

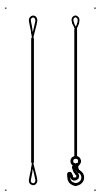
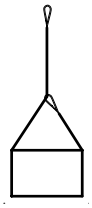
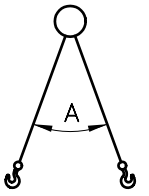
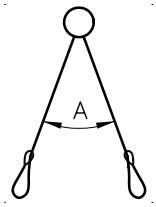
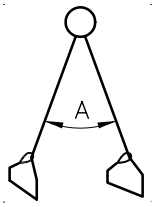
SAFE WORKING LOADS UNDER GENERAL CONDITIONS OF USE FOR SLINGS, CONSTRUCTED FROM THREE-STRAND HAWSER LAID MANILA OR SISAL ROPE, THAT ARE BASKET HITCHED
(See Note)

1	2	3	4	5	6	7	8	9
	Loading method—Basket hitched							
	Round load				**Rectangular load**			
								
	A = 0° L = 2.00	A = 60° L = 1.73	A = 90° L = 1.41	A = 120° L = 1.00	A = 0° L = 1.00	A = 60° L = 0.87	A = 90° L = 0.71	A = 120° L = 0.50
Nominal diameter mm	**Safe working load t**							
12	0.23	0.20	0.16	0.11	0.11	0.10	0.08	0.05
14	0.32	0.27	0.22	0.16	0.16	0.13	0.11	0.08
16	0.45	0.39	0.31	0.22	0.22	0.19	0.15	0.11
18	0.53	0.46	0.37	0.26	0.26	0.23	0.18	0.13
20	0.71	0.61	0.50	0.35	0.35	0.30	0.25	0.17
22	0.85	0.73	0.60	0.42	0.42	0.36	0.30	0.21
24	1.01	0.88	0.71	0.50	0.50	0.44	0.35	0.25
28	1.33	1.15	0.94	0.66	0.66	0.57	0.47	0.33
32	1.71	1.48	1.21	0.85	0.85	0.74	0.60	0.42
36	2.1	1.88	1.53	1.08	1.08	0.94	0.76	0.54
40	2.6	2.2	1.85	1.31	1.31	1.13	0.92	0.65
48	3.6	3.2	2.6	1.84	1.84	1.60	1.30	0.92
56	4.9	4.3	3.5	2.4	2.4	2.1	1.75	1.24
64	6.4	5.5	4.5	3.2	3.2	2.7	2.2	1.60
72	8.1	7.0	5.7	4.0	4.0	3.5	2.8	2.0
80	9.6	8.3	6.8	4.8	4.8	4.1	3.4	2.4

NOTE: Note 1 to Table B1 also applies to this Table, which is an extension of Table B1.

TABLE B3

SAFE WORKING LOADS UNDER GENERAL CONDITIONS OF USE FOR SLINGS, CONSTRUCTED FROM THREE-STRAND HAWSER LAID SYNTHETIC-FIBRE ROPE, THAT ARE DIRECT LOADED OR CHOKE HITCHED (See Note 1)

1	2	3	4	5	6	7	8	9
	Loading method							
	Single leg			**Double leg**				
		Choke hitched		**Direct loaded**			**Choke hitched (see Note)**	
Rope	**Direct loaded** 	**Round load** 	**Rectangular load** 				**Round load** 	**Rectangular load** 
	L = 1.00	L = 0.75	L = 0.50	A = 0 to 60° L = 1.73	A = 90° L = 1.41	A = 120° L = 1.00	L = 1.30	L = 0.87
Nominal diameter mm	**Safe working load t**							
12	0.27	0.20	0.13	0.47	0.39	0.27	0.35	0.23
14	0.38	0.28	0.19	0.66	0.53	0.38	0.49	0.33
16	0.47	0.35	0.23	0.81	0.66	0.47	0.61	0.40
18	0.60	0.45	0.30	1.04	0.85	0.60	0.78	0.52
20	0.72	0.54	0.36	1.25	1.02	0.72	0.94	0.62
22	0.86	0.65	0.43	1.50	1.22	0.86	1.12	0.75
24	1.01	0.76	0.50	1.75	1.43	1.01	1.31	0.87
28	1.33	1.00	0.66	2.3	1.89	1.33	1.73	1.15
32	1.68	1.26	0.84	2.9	2.3	1.68	2.1	1.45
36	2.1	1.58	1.05	3.6	2.9	2.1	2.7	1.83
40	2.5	1.92	1.28	4.4	3.6	2.5	3.3	2.2
48	3.5	2.6	1.78	6.1	5.0	3.5	4.6	3.0
56	4.7	3.5	2.3	8.1	6.6	4.7	6.1	4.0
64	6.1	4.5	3.0	10.5	8.6	6.1	7.9	5.2
72	7.6	5.7	3.8	13.3	10.8	7.6	9.9	6.6
80	9.4	7.0	4.7	16.3	13.3	9.4	12.2	8.1

NOTES:

1 This Table is based on the minimum breaking force of polypropylene ropes, as specified in AS 4142.2 (Table 7 in the 1993 edition), using the formula SWL = (Minimum breaking force) × L/(9.806 65 × 8) and the exact (i.e. non-rounded) values for L.

This Table does not apply to polyethylene rope, which has a lower strength.

For convenience, this Table may also be applied to ropes constructed from polyester or polyamide, which are stonger than polypropylene.

The minimum breaking force of ropes made from a number of fibre rope materials is given in AS 4142.2.

2 The angle between legs refers to the greatest angle between the legs in a three-leg sling and the greater angle between the opposite legs in a four-part sling.

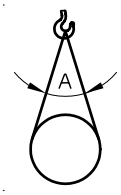
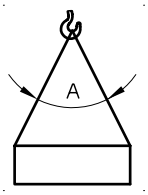
3 The angle (A) between the legs of choke hitched slings shall be not more than—

(a) for single wrap hitches, 45°; and

(b) for double wrap hitches, 60°.

TABLE B4

SAFE WORKING LOADS UNDER GENERAL CONDITIONS OF USE FOR SLINGS, CONSTRUCTED FROM THREE-STRAND HAWSER LAID SYNTHETIC-FIBRE ROPE, THAT ARE BASKET HITCHED (See Note)

1	2	3	4	5	6	7	8	9
	Loading method—Basket hitched							
	Round load				**Rectangular load**			
								
	A = 0° *L* = 2.00	*A* = 60° *L* = 1.73	*A* = 90° *L* = 1.41	*A* = 120° *L* = 1.00	*A* = 0° *L* = 1.00	*A* = 60° *L* = 0.87	*A* = 90° *L* = 0.71	*A* = 120° *L* = 0.50
Nominal diameter mm	**Safe working load t**							
12	0.55	0.47	0.39	0.27	0.27	0.23	0.19	0.13
14	0.76	0.66	0.53	0.38	0.38	0.33	0.26	0.19
16	0.94	0.81	0.66	0.47	0.47	0.40	0.33	0.23
18	1.20	1.04	0.85	0.60	0.60	0.52	0.42	0.30
20	1.45	1.25	1.02	0.72	0.72	0.62	0.51	0.36
22	1.73	1.50	1.22	0.86	0.86	0.75	0.61	0.43
24	2.0	1.75	1.43	1.01	1.01	0.87	0.71	0.50
28	2.6	2.3	1.89	1.33	1.33	1.15	0.94	0.66
32	3.3	2.9	2.3	1.68	1.68	1.45	1.18	0.84
36	4.2	3.6	2.9	2.1	2.1	1.83	1.49	1.05
40	5.1	4.4	3.6	2.5	2.5	2.2	1.81	1.28
48	7.1	6.1	5.0	3.5	3.5	3.0	2.5	1.78
56	9.4	8.1	6.6	4.7	4.7	4.0	3.3	2.3
64	12.2	10.5	8.6	6.1	6.1	5.2	4.3	3.0
72	15.3	13.3	10.8	7.6	7.6	6.6	5.4	3.8
80	18.8	16.3	13.3	9.4	9.4	8.1	6.6	4.7

NOTE: Note 1 to Table B3 also applies to this Table, which is an extension of Table B3.