Railway Association of Canada

SYNTHETIC WEBBING AND ASSEMBLIES:

Corresponding AAR Open Top Loading Rule 20

Scope and Definitions

Working load limit (WLL). The stated capacity of a web strap specified as a fraction or ratio of the minimum breaking strength (MBS). Example: If the MBS is three times the WLL (or the WLL is one-third of the MBS value), then the design (safety) factor is said to be a ratio of 3:1 or

MBS to WLL = 15,000 lb to 5,000 lb = 3 to 1

Assembly or system. Any items making up the tie-down assembly between each ultimate point of attachment, including all components such as webbing, winches, hooks, links, rings, swivels, shackles, turnbuckles, ratchets, binders, compression units, etc., as well as the method of securing anchorage devices to the railcar. When a working load limit is specified in a figure, all components of the assembly must meet the minimum requirements. It should be noted that the actual WLL of a tie-down assembly is likely to be less when individual components of comparable rating are combined in a system.

Polyester Webbing

Woven polyester webbing may be used for open top loading when permitted in a specific figure.

The use of polyester webbing is permitted as load securement on a General Rule load, but its application is subject to the limitations detailed in Rule 20.5.

Polyester webbing used in the securement of cargo on open top cars, trailers, or containers must have a minimum design (safety) factor of 3:1.

When designing a load restraint system, the MBS of the assembly, including the webbing, must be used to calculate the number of straps to be used.

Nylon or any material other than the material specified herein for web strapping is not approved for use as securement for open top loading.

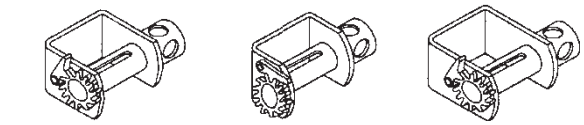
The use of nylon sleeves and/or corner protectors is permissible when used with polyester webbing, unless otherwise specified in a figure.

Winches and Other Components

Unless otherwise specified, all web assembly components, including ratchets, winches, hooks, eyes, connecting chain, etc., must be at least equal in minimum breaking strength to the component webbing.

A winch bar such as the one shown in Fig. 20.1, made of steel or other suitable alloy and specifically designed for use with web winches of the type illustrated in Fig. 20.2, is to be used for tensioning web strapping. A typical winch bar, as shown, is to be 30 to 40 in. long. Devices such as “cheater bars,” pipe extensions, etc., must not be used when tensioning web strapping. Tensioning must be performed in accordance with the winch and winch bar manufacturer’s instructions and safety guidelines.

Fig. 20.1 Winch bar



STANDARD LOW PROFILE STORABLE

Fig. 20.2 Fixed winch styles

The illustrations in Fig. 20.2 depict three types of permanent-mounted winches. When applied to railcars or trailers, winches must be installed with the car or trailer owner's permission and the attachment must be performed in accordance with Rule 14.13 and the winch manufacturer's recommendations. Installation of winches or other tie-down apparatus must not alter the clearance profile of the car without the car owner's written permission.

Fig. 20.3 illustrates a typical portable web assembly with ratchet buckle and end hook.

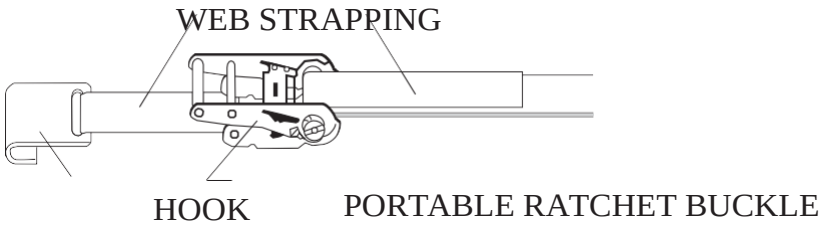


Fig. 20.3 Portable web ratchet assembly

Fig. 20.4 illustrates one type of edge protection that may be made of rubber, plastic, vinyl, metal, or other materials that are highly resistant to abrasion. Slip-on sleeve protectors made of nylon, polyester, and other materials may be effective as well.

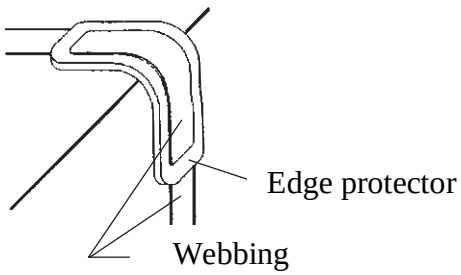


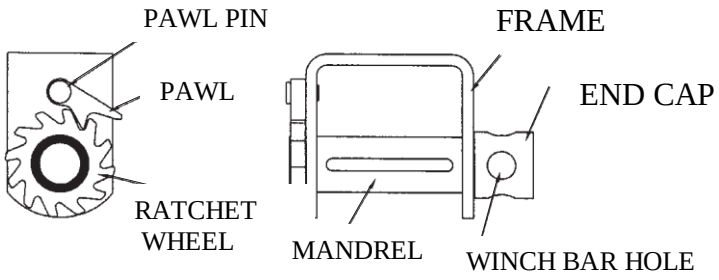
Fig. 20.4 Typical slide-on edge protector

APPLICATION OF WEBBING

During load planning, layout, and web application, sufficient distance must be allowed between the webbing and other securement items such as steel bands, separators, bearing pieces, etc., to avoid interference with and/or damage to webbing should the load shift during transit.

To avoid degrading the yield strength of the webbing, it must be applied flat and uniformly on the winch mandrel, avoiding folds, creases, etc. Webbing that has kinks, overlaps (except on winch mandrels), or folding (unless by design) throughout its length must not be applied.

When secured and/or tensioned using a winch or ratchet buckle, at least 6 in. of webbing is to be inserted into the mandrel or drum slot (see Fig. 20.5). A minimum of two rotations must then be made of the mandrel, resulting in at least two wraps of the webbing on the mandrel when tensioned.



At origin, straps must not be applied at a lateral angle greater than 5° to the point of attachment. Refer to the illustration in Fig. 20.6.

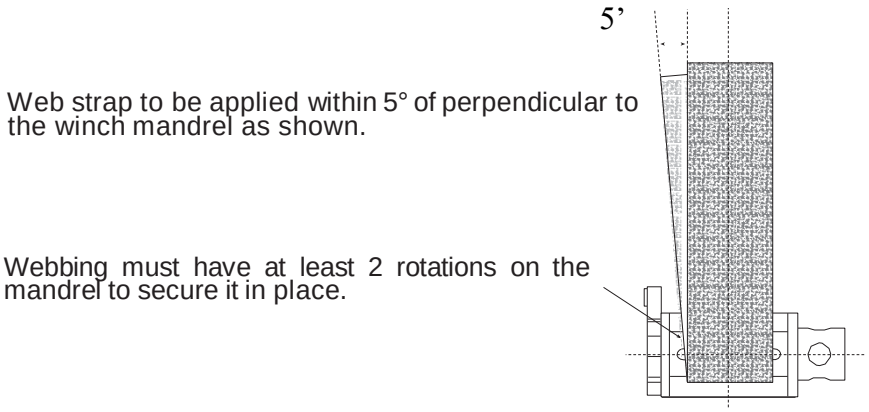


Fig. 20.6 Proper strap application

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TENSIONING WEB TIE-DOWNS

When manually tensioning a permanently mounted winch, a winch bar should be used in accordance with Rule 20.3.2. Tension should be applied to the webbing or assembly with reasonable pressure. It is intended that tension be applied by no more than one person using a winch bar until the webbing is taut. To the extent possible, tension should be equalized across the load, over the full length of the tie-down, keeping in mind that the webbing will encounter resistance over every angle it passes.

A power tensioning device may be used on permanently mounted winches provided it is capable of applying smooth and continuous tension. When using a power tensioning device to tension webbing and assemblies, a torque value of **350 to 525 ft·lb** at the mandrel is recommended. Impact or hammer wrenches and the like must not be used.

No knots, splices, or other repairs are permitted to webbing, fittings, or stitching.

Webbing may not be secured or anchored by tying, knotting, or clamping other than when lapped as intended on a winch or ratchet device.

Ensure that ratchet pawls or other positive locking systems are properly and completely engaged to prevent inadvertent or unintentional release.

Unused webbing is to be secured or stored in accordance with applicable instructions to prevent webbing from coming loose and hanging from the railcar.

APPLICATION OF WEBBING IN GENERAL RULES LOADS

On General Rules loads, webbing may not be used to provide the required longitudinal or lateral restraint. Approved web tie-down systems may be used to provide only the vertical load restraint. **Note:** An object must be secured with a minimum of two tie-downs.

On a General Rules load, the load must be restrained against longitudinal and lateral movement using blocking and/or securement systems consistent with these rules. The presence of web tie-down systems, applied for vertical securement per Rule 20.5.1, does not constitute lateral and/or longitudinal restraint. The web tie-down systems may not be factored into the calculation of the required lateral or longitudinal restraint. The load must be restrained to meet the requirements of Rule 5.3.1.

Cars used must be equipped with permanently mounted winches on both sides of the car, aligned to allow application of webbing over the top of the load at an approximate right angle (90°) to the side of the car. Webbing may not encircle the lading.

Tension webbing from both sides of a railcar after loading is complete.

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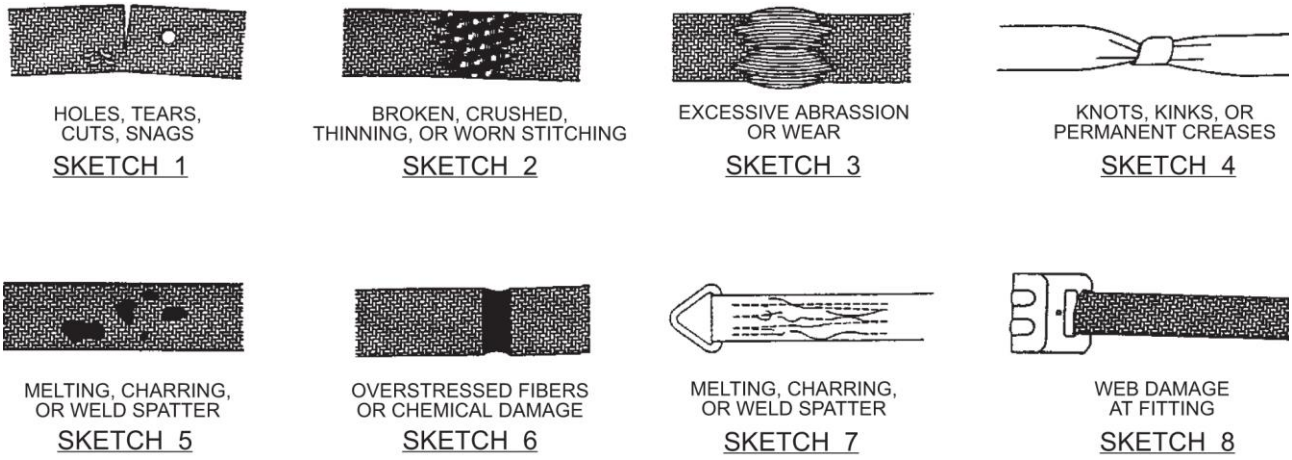
INSPECTION OF WEBBING AND TIE-DOWNS

Before any synthetic web tie-down assembly is applied or placed in service, it must be inspected to ensure that the correct assembly is being used and to determine that the assembly meets the requirements of these rules.

A synthetic webbing and/or tie-down assembly must be removed from service if any of the following conditions are present. (Refer to Fig. 20.7 for illustrations of some sample defect conditions.)



Sample web defects

Holes, tears, cuts, snags, or embedded particles in the webbing.

Broken, crushed, thinning, or worn stitching in the load-bearing stitch patterns.

Excessive abrasion or wear.

Degradation due to ultraviolet radiation as indicated by excessive fading in conjunction with evidence of overall frayed yarn fibers or other detectable fabric deterioration.

Knots in any part of the webbing.

Melting, charring, or weld spatter on any part of the webbing.

Acid or alkali burns or other chemical contamination that inhibits or may inhibit the performance of the webbing.

Any other condition that appears to degrade the strength of the webbing or other component of the tie-down assembly (e.g., crushed areas, severe abrasions, etc.).

When a tie-down assembly contains broken or nonfunctioning fittings, tensioning devices, or hardware.

An AAR-assigned identification mark will be issued to a company that receives webbing approval or approval as an assembler. This mark will identify and correspond to the name of the manufacturer, weaver, and/or final assembling company. The applied AAR marking is in addition to any other labeling, marking, warning notices, etc., that may be required by other regulatory bodies or jurisdictions.

In accordance with WSTDA-T4, a high-contrast colored marker or thread, either solid or broken, centered on at least one face of the webbing, shall indicate the strength of the webbing. A single-line colored marker, as pictured in Sketch 1 of Fig. 20.8, indicates a minimum breaking strength of 5,000 lb/in. of web width. A double-line colored marker, as pictured in Sketch 2 of Fig. 20.8, indicates a minimum breaking strength of 6,000 lb/in. of web width. The marker(s) on the webbing is for the purpose of identifying the web strength for renewal purposes and is not to imply the maximum strength or the WLL of the entire assembly, which will likely be less.

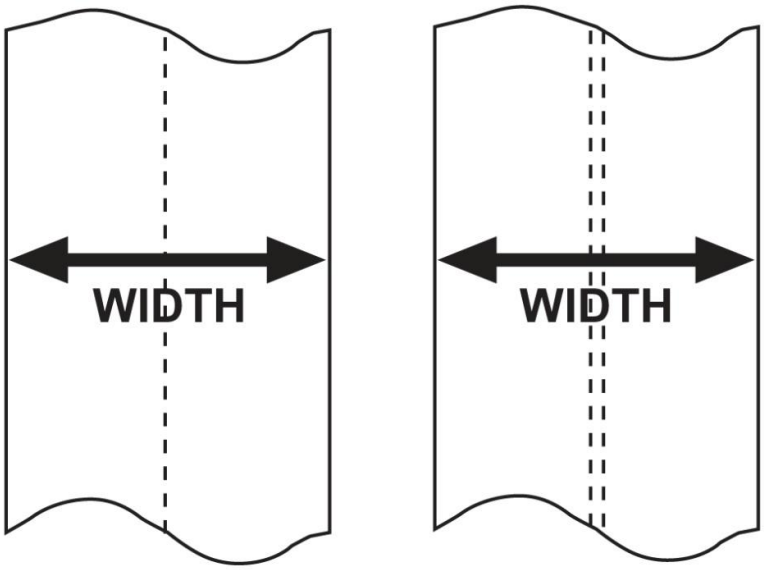


Fig. 20.8 Web-strength-identifying colored markers

All AAR-approved webbing is to be identified with the weaver's AAR-assigned marking at intervals not more than every 10 ft with the following exception: for webbing that is fabricated to customer-specified lengths, the AAR marking is to be located within 18 in. of the finished end of the strap after assembly of any attachments and must be clearly visible.

All AAR-approved web tie-down assemblies are to be identified with the assembler's AAR-

assigned marking and must include the working load limit of the assembly.

The AAR identification marking must be applied at the time of production and may be accomplished by printing, stenciling, attaching a metal tag permanently to an assembly fixture, or affixing a label located within 18 in. from one end of the assembly.

All required identification markings must be clearly and indelibly applied in such a way as to provide permanent identification for the useful life of the component. The company's marking must be preceded by the letters *AAR*, and separated by a hyphen (e.g., AAR-xxM) as shown in Fig. 20.9.

Legend for AAR Marking, AAR-xxMA:
AAR = AAR issued approval
xx = AAR-assigned number to identify ABC Mfg. Corp. M = AAR-approved as a manufacturer
A = AAR-approved as an assembler

Fig. 20.9 Example of AAR marking

Approved Companies and Components

Table 20.1 lists companies that have received AAR approval of their webbing in accordance with these rules.

Table 20.1 Approved webbing companies
(For the latest update to this table, go to the TTCI Web site at
http://www.aar.com/standards/OpenTop.html

Company	Ref. Part No.	Type and Width of Webbing	Web MBS lb (kg)	AAR Marking*	Approved Through (mm/yy)
Oppermann Webbing Inc.	P/N 6624102-93	4-in.-wide woven polyester, resin coated	20,000 (9072)	AAR-76M	09/14
Spanset, Inc.	P/N 141534	LoadGard™ woven polyester, uncoated, 4.0 in.	20,000 (9092)	AAR-72MA	12/13
Spanset, Inc.	P/N 152622	LoadGard™ woven polyester, coated, 4.0 in.	20,000 (9092)	AAR-72MA	12/13
Southern Weaving Co.	P/N 1257LP0200	2-in. wide woven yellow dyed 40148 polyester	12,000 (5443)	AAR-73M	01/15
Southern Weaving Co.	P/N 1257LP0300	3-in. wide woven yellow dyed 40148 polyester	18,000 (8165)	AAR-73M	01/15
Southern Weaving Co.	P/N 1257LP0400	4-in. wide woven yellow dyed 40148 polyester	24,000 (10886)	AAR-73M	01/15
Southern Weaving Co.	P/N 1527XP0200	2-in. wide woven yellow dyed 40148 polyester	10,000 (4536)	AAR-73M	01/15
Southern Weaving Co.	P/N 1527XP0300	3-in. wide woven yellow dyed 40148 polyester	15,000 (6804)	AAR-73M	01/15

Southern Weaving Co.	P/N 1527XP0400	4-in. wide woven yellow dyed 40148 polyester	20,000 (9072)	AAR-73M	01/15
American Webbing Inc.	P/N 05004TPT	4-in. wide woven yellow dyed polyester	20,000 (9072)	AAR-77M	06/12
Ribbon Webbing Corp.	P/N P6000-2-314	2-in. wide woven yellow dyed polyester	12,000 (5443)	AAR-81MA	01/15
Ribbon Webbing Corp.	P/N P5000-4-314	4-in. wide woven yellow dyed polyester	20,000 (9072)	AAR-81MA	01/15
Ribbon Webbing Corp.	P/N P6000-4-314	4-in. wide woven yellow dyed polyester	24,000 (10886)	AAR-81MA	01/15

*M = Approved weaver/manufacturer
MA = Approved weaver and assembler

Table 20.2 lists those companies that have received AAR approval of their tie-down web assemblies in accordance with these rules.

Table 20.2 Approved web assemblies and/or tensioning devices
(For the latest update to this table, go to the TTCI Web site
http://www.aar.com/standards/OpenTop.html

Company	Model or Ref. Part No.	Type or Description	Assy. WLL lb (kg)	AAR Marking*	Approved Through (mm/yy)
SpanSet, Inc.	P/N 152622 P/N WS4xxP	4-in.-wide Weargard™ orange premium polyester, PVC impregnated with SY-8110 permanent-mount winch assembly	5,000 (2268)	AAR-72MA	09/13
Pacific Cargo	P/N 45XX-FH-AAR	4-in. Web Assy. with 4-in. Flat Hook	5,500 (2495)	AAR-75A	12/14
Pacific Cargo	P/N 46XX-VR-AAR	4-in. Web Assy. with 4-in. V-ring ends	6,600 (2994)	AAR-75A	12/14
Pacific Cargo	P/N 20521120	2-in. Ratchet Webbing Assy.4-in. x 48-ft. strap with 1-in. Formed Eye.	3,335 (1513)	AAR-75A	09/14
Pacific Cargo	P/N 20521140	2-in. Web Assy. w/ Twisted Snap Hooks.	3,335 (1513)	AAR-75A	09/14
Pacific Cargo	P/N 20521130	4-in. Ratchet Webbing Assembly.	5,000 (2268)	AAR-75A	09/14
Pacific Cargo	P/N 20521090	4-in. Web Assy. Blade Tie-down Cradle.	5,000 (2268)	AAR-75A	09/14
Holland/Portec Railway Products	P/N 20189790	2-in. Polyester Web Assy., Looped w/ Sewn Loop Ends and 3 Sleeve Protectors (a.k.a. Axle Strap)	12,500 (5670)	AAR-70A	05/15
Holland/Portec Railway Products	P/N 20520900	4-in. Polyester Web Assy. w/ Sewn Loop Ends and “D” rings.	5,000 (2268)	AAR-70A	05/15
Holland/Portec Railway Products	P/N 20993910	2-in. Polyester Web Assy. w/ Sewn Loop Ends, one having a “D” ring w/ Keyhole.	5,500 (2495)	AAR-70A	05/14
Ribbon Webbing Corp.	P/N S-4 X (length) FH18	4-in. Polyester Web Tie-down Assy. w/ Flat Hook.	5,400 (2449)	AAR-81MA	01/15
Ancra Int’l	P/N 41660-18-xxxR	3-in. Polyester Web Tie-down Assy. w/ Wire Hook # 43120-20 End Hardware.	5,400 (2449)	AAR-74A	01/15

Ancra Int'l	P/N 43795-10-xxxR	4-in. Polyester Web Tie-down Assy. w/ Flat Hook # 41766-18 End Hardware.	5,400 (2449)	AAR-74A	01/15
Ancra Int'l	P/N 43795-11-xxxR	4-in. Polyester Web Tie-down Assy. w/ Forged Delta Ring # 41632-12 End Hardware.	5,400 (2449)	AAR-74A	01/15
Ancra Int'l	P/N 43795-90-xxxR	4-in. Heavy Duty "X-treme" Polyester Web Tie-down Assy. w/ Flat Hook # 41766-18 End Hardware.	5,400 (2449)	AAR-74A	04/15

*M = Approvedweaver/manufacturer MA
MA = Approved weaver and assembler
A = Approved assembler, finisher, or distributor