

Recommended Standard Specification

For

Load Binders Used With Chain Tie Downs

WSTDA-T-6



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\$25.00

This recommended standard specification has been formulated as a guide to users, industry and government to ensure the proper use, maintenance and inspection of Load Binders designed to accommodate chain tie downs for the purpose of securing cargo. The existence of this recommended standard specification does not, however, prevent members of the Web Sling & Tie Down Association, Inc. and other manufacturers from manufacturing or selling products not conforming to this standard.

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FOREWORD

This Recommended Standard Specification applies to load binders designed to accommodate chain tie downs for the purpose of securing cargo. This standard recommends construction as well as identification and marking of these load binders. In addition, it gives important practical advice on the use, maintenance and inspection of these binders.

The exclusion from this Recommended Standard Specification of load binders, designed to accommodate chain tie downs of different grades and capacities, is not intended to preclude their use and shall not be interpreted in this manner.

Load binders made from materials or construction other than those detailed in this Recommended Standard Specification shall be used in accordance with the recommendations of the load binder manufacturer or qualified person. The specifications contained in this Recommended Standard Specification for Load Binders used with Chain Tie Downs were compiled under the auspices of the Web Sling & Tie Down Association, Inc. This Recommended Standard Specification is intended to assist users in specifying the proper load binder for their particular requirements and to serve as a guide to the industry in the construction and use of load binders, and also to serve as a guide to governmental and other regulatory bodies responsible for the proper use and inspection of load binders used with chain tie downs. Illustrations included in this document are for reference only and are not intended to depict or recommend any specific usage practice(s), design or manufacturing process(s).

Safety is the paramount consideration involved in the use of any load binder designed to accommodate chain tie downs for the purpose of securing cargo. This standard does not purport to address all safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of the regulatory limitations prior to use. The appropriate load binder shall be selected by the user for their specific application. Users of load binders designed to accommodate chain tie downs for the purpose of securing cargo shall have knowledge on the proper method of cargo securement. Also users shall be knowledgeable about Federal, State, Provincial, local and industry regulations applicable to cargo securement.

MANDATORY AND ADVISORY RULES

Mandatory rules of this Recommended Standard Specification are characterized by the use of the word "shall" If a rule is of an advisory nature, it is indicated by the use of the word "should", or is stated as a recommendation.

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Section 1.1 Purpose

1.1.1 This chapter provides terms and definitions as well as descriptions of binders which are devices designed to be used with chain for the purpose of securing cargo.

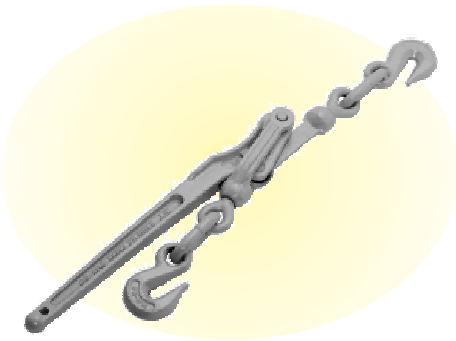
Section 1.2 Types of Binders

1.2.1 **Lever Binders** – A mechanical lever device designed to tighten chain for securing a load. This device is such that it stores kinetic energy in the handle.

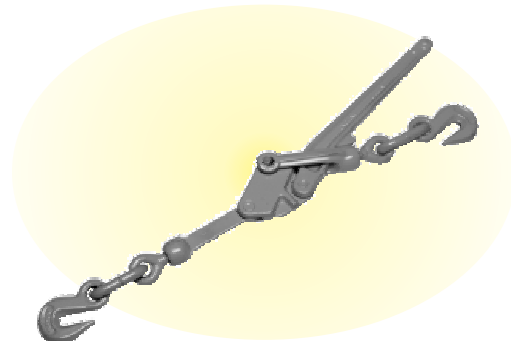
1.2.2 **Low Energy Release Lever Binders** - A mechanical lever device designed to tighten chain for securing a load. This device is such that it stores kinetic energy in the body of the binder, such as a cam, so that the handle does not store and release kinetic energy.

1.2.3 **Ratchet Binders** - A mechanical device designed to tighten chain for securing a load. Due to having a gear, pawl, handle, and end fittings that screw in or out, it does not store as much energy in the handle as a lever binder does.

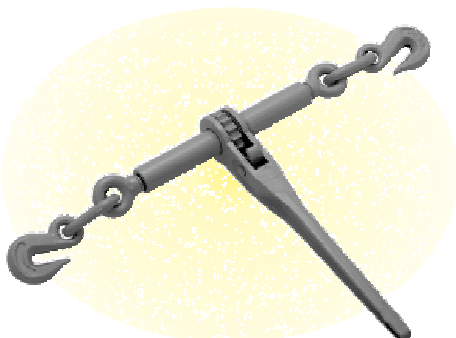
1.2.4 **Compression Binder** – A metal or rubber spring device that is used with a lever or ratchet binder to maintain tightness of chain. Specifically recommended when transporting equipment with tires which can compress due to bumps in the road resulting in the chain becoming slack and thus the potential for disengagement.



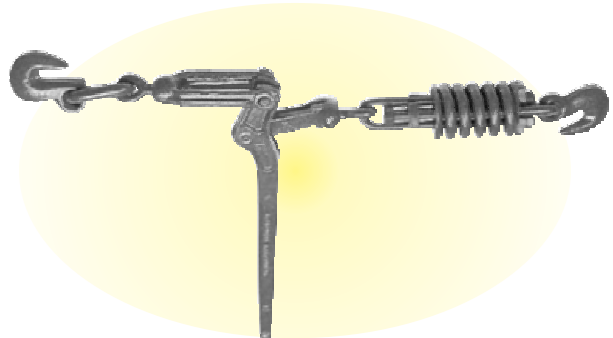
1.2.1 Ref: Lever Binder



1.2.2 Ref: Low Energy Binder



1.2.3 Ref: Ratchet Binder



1.2.4 Ref: Compression Binder

Section 1.3 Definition of Terms

Assembly Working Load Limit (WLL) - The total working load limit of a load securement system or assembly, consisting of hooks, chain, and a binder. The assembly WLL is determined by the lowest WLL of the three components.

Alloy Steel – steel to which one or more of the following alloying elements other than carbon (i.e.: chromium, nickel, molybdenum, etc.) have been added to improve mechanical properties.

ASME – The American Society of Mechanical Engineers - One of the oldest standards-developing organizations in the world, founded in 1880. As of 2006, it had 120,000 members. It produces approximately 600 codes and standards, covering many technical areas, such as boiler components, elevators, measurement of fluid flow in closed conduits, cranes, hand tools, fasteners, and machine tools.

ASTM – (Formerly “American Society for Testing and Materials”) - ASTM International is one of the largest voluntary standards development organizations in the world, a trusted source for technical standards for materials, products, systems, and services. Known for their high technical quality and market relevancy, ASTM International standards have an important role in the information infrastructure that guides design, manufacturing and trade in the global economy.

Binders – Binders referred to in this document are load binders. This would include lever style binders, low energy binders, ratchet style binders & compression style binders (see section 1.2). They are not meant to designate chain or any other component of a binding assembly.

Cast (or Die Cast) - Metal that has been heated to a melting point and formed by pouring the liquefied metal into a mold. Gravity cast metal parts generally may be weaker and less ductile than forged parts of an equivalent material.

Commercial Vehicle Safety Alliance (CVSA) – Organization comprised of trucking companies, DOT enforcement officials, and manufacturers that works with Canada, USA, and Mexico to harmonize regulations and make recommendations on load securement procedures. CVSA out of service criteria is used by all state and provincial enforcement officials to determine what is allowed and what is not allowed.

Compression Spring – A device used to absorb energy and keep chain from momentarily becoming slack.

Deformation – Visible damage, distortion or misshaping of any component part.

Design Factor – The ratio of the minimum breaking strength (MBS) to the working load limit (WLL) for each binder which shall meet or exceed the design factor of the chain being used as per NACM and ASTM.

EG Plating – A plating process of electrogalvanizing or electroplating that applies a zinc finish to metal parts in order to inhibit rust and improve appearance. The plating may be treated to produce different colored finishes.

End Fittings – Types of attachments on the ends of a lever or ratchet binder. Standard end fitting is a grab hook, but other fittings such as a clevis jaw, claw hook or eye bolts can be used.

Failure – A breakdown in any binder component whereby additional load may not be applied.

Federal Motor Carrier Safety Administration (FMCSA) - The U.S. government regulatory authority that is the clearing house for all interstate trucking regulations and practices on the public highways, including cargo securement specifically listed in 29 CFR Section 393.100 of the FMCSA regulation handbook.

Forged – (or Drop Forged) The process where steel is heated and shaped via a forging hammer and a die. The high pressures typical in forging result in a fine grain structure without the voids that can occur in castings. Forging produces a product that will tend to yield or bend further before breaking compared to an equivalent cast material. This provides an important notice to the user that the part has been loaded well past the WLL and should be taken out of service.

Gear – The part of a ratchet binder that is engaged to the pawl.

Handle – The part of a binder by which it is held, moved, or operated to apply and release tension.

Hooks – The part of the binder that is used to attach the binder to the chain, trailer, or load. It may be a clevis grab hook, a claw hook, an eye grab hook, a slip hook or any combination thereof.

Markings – Letters or numbers indented or raised on a cast or forged part.

Malleable - A metal or other material that can typically be shaped or bent at ambient temperatures without breaking.

Medium Carbon Steel (MC) – Steel with carbon content that is approximately in the range of 0.30% ~ 0.59% containing less than 1.65% manganese and 0.60% silicon with no other specified alloying elements.

Minimum Breaking Strength (MBS) - The load or force in pounds or kilograms at which point any load bearing part of the binders fails.

The National Association of Chain Manufacturers (NACM) – An organization representing North American manufacturers of welded and weldless chain since 1933.

Pawl – The component that engages and releases the gear on a ratchet binder to reverse direction of travel on the end fittings.

Proof Testing – Continuous testing procedure during production to identify quality issues.

Tensile Load – The pulling force being applied expressed in pounds or kilograms.

Trace Code – Mark that allows the manufacturer to identify information on specific binder for quality and testing results.

Vehicle – Any conveyance for carrying goods or equipment, such as a truck, trailer, van, container or otherwise.

Working Load Limit (WLL) – The maximum allowable load assigned to each binder by the manufacturer which shall meet or exceed the WLL of the applicable trade size of chain, based on the design factor of the chain being used as per NACM and/or ASTM.

Wrap – One or more revolution of the non-load bearing portion of the chain around the binder.

Section 2.1 Purpose

2.1.1 This chapter provides an outline of materials and construction characteristics of binders designed to accommodate chain tie downs for the purpose of securing cargo. Binders must be designed, constructed, and maintained so they can be tightened in transit.

2.1.2 Basic load binder construction consists of a body, connecting eyes, connecting links, hooks and a handle.

2.1.3 This standard lists minimum requirements for construction and strength of binders used to secure chain; it does not exclude the use of other designs or materials being used as long as they exceed the minimum strength requirements.

Section 2.2 Lever Binder Components

The requirements for materials used to manufacture load binder component parts should be at least functionally equivalent as listed below:

2.2.1 Operating lever shall be of forged steel or cast MC steel, should not exceed 18½ inches (47cm) in length and should have a hole or knob in the lever end to be used to secure the lever when in use.

2.2.2 Swivels shall be either malleable, upset forged alloy steel or drop forged MC steel.

2.2.3 Hooks shall be of high strength drop forged MC or alloy steel.

2.2.4 Clevis and tongue shall be of forged or cast MC or alloy steel.

2.2.5 Links shall be formed of either MC or alloy steel and welded with minimal flash.

2.2.6 Pins shall be of hardened MC or alloy steel.

Section 2.3 Low Energy Lever Binders Components

The minimum requirements for materials used to manufacture load binder component parts should be as listed below:

2.3.1 Operating lever shall be of forged steel or cast MC steel, should not exceed 18½ inches (47cm) in length and should have a hole or knob in the lever end to be used to secure the lever when in use.

2.3.2 Swivels shall be either malleable, upset forged alloy or drop forged MC steel.

2.3.3 Hooks shall be of high strength drop forged MC or alloy steel.

2.3.4 Clevis and tongue shall be of forged or cast MC or alloy steel.

2.3.5 Links shall be formed of either MC or alloy steel and welded with minimal flash.

2.3.6 Cam may be of malleable iron, forged steel, or cast steel.

2.3.7 Pins shall be of hardened MC or alloy steel.

Section 2.4 Ratchet Binders Components

The minimum requirements for materials used to manufacture load binder component parts should be as listed below:

2.4.1 Operating lever shall be of forged steel or cast MC steel, should not exceed 18½ inches (47cm) in length, and should have a hole in the lever to be used to secure the lever when in use.

2.4.2 Hooks shall be of high strength, drop forged MC or alloy steel.

2.4.3 Links shall be formed of either MC or alloy steel and welded with minimal flash.

2.4.4 Pins shall be of hardened MC or alloy steel.

2.4.5 Pawl shall be of either die cast alloy or drop forged steel.

2.4.6 Gear shall be of either die cast alloy or drop forged steel.

2.4.7 Pawl shall be retained in place by either a spring, ball bearing or both.

Section 2.5 Compression Binders - Compression Units Components

(All other components of this binder shall remain the same as a lever binder, as per 2.2.)

2.5.1 Compression spring shall be made of spring steel

2.5.2 Compression unit shall be made of molded rubber.

Section 2.6 Markings

2.6.1 Each binder shall be plainly marked with the manufacturer's designation of such known character that the source of manufacture may be readily determined.

2.6.2 Each binder shall be plainly marked with the WLL in pounds and/or kilograms. Load binders may also be marked with the applicable grade designation which would match the WLL of the chain being used as per the chain manufacturer. Chain grade designations that may be referenced on the binders are:

Grade 30 (Proof Coil Chain) identified by PC, 3, 30, or 300;

Grade 43 (High Test Chain) identified by HT, 4, 43, or 430;

Grade 70 (Transport Chain) identified by 7, 70, or 700;

Grade 80 (Alloy Chain) identified by 8, 80 or 800;

Grade 100 (Alloy Chain) identified by 10, 100 or 1000.

There may be a G for Grade, preceding the number. Binder hooks should be identified (stamped or embossed) with the appropriate chain size(s) they are intended to be used with.

2.6.3 Each binder shall be plainly marked with the Manufacturer's Name or Trademark.

2.6.4 Each binder shall have a manufacturer's trace code or user identifiable date for traceability.

2.6.5 Warning label (see example below for minimum suggested warning text) shall be attached to each binder.

WARNING

Never exceed the working load limit (WLL) of any load binder. Subjecting any load binder to loads beyond its WLL can result in severe personal injury or death. The Working Load Limit is based on destructive laboratory controlled testing conditions, which will not be exactly duplicated during actual loading & use.

Section 2.7 Coatings

2.7.1 Binders should be coated to inhibit corrosion. When painted, the color shall be in accordance with the manufacturer's standard practice or those specified by the customer and should not interfere with the normal operation of the binder.

Chapter 3.0

Standard Procedures for Testing Binders

Section 3.1 Purpose

3.1.1 This chapter provides standard procedures for testing binders designed to accommodate chain for the purpose of securing cargo.

Section 3.2 Types of Tests

3.2.1 Testing shall be conducted after any and all electro or hot dip galvanizing or plating.

3.2.2 **Qualification Test** – Testing of preproduction binders shall be performed to establish the minimum breaking strength (MBS) prior to production.

3.2.2.1 **Destructive Test** – A minimum of three (3) samples shall be tested to establish the breaking strength of a load binder. The lowest test result shall be used to determine the minimum breaking strength of the binder.

3.2.3 **Acceptance Test** – Testing of production binders shall be performed for the purpose of verifying the MBS.

3.2.3.1 **Destructive Test** - Destructive testing of two (2) production binders from each lot of two thousand (2,000) or any part thereof. The MBS shall be equal to or exceed the MBS as determined by the qualification tests and shall meet or exceed the manufacturers MBS for the size(s) and grade(s) of chain intended for use with the binder. If one of the two binders fails the test, test two more. If those two pass then the production lot shall be accepted. If either of the second set of two binders fails the test the lot shall be rejected.

3.2.3.2 All test machines shall be certified annually to ASTM E4 or equivalent standards.

3.2.4 **Proof Testing** – Every binder shall be proof tested during the manufacturing process to a minimum of 50% of the MBS.

Section 3.3 Test Procedures to Determine Breaking Strength

3.3.1 The only time the WLL should be exceeded is during testing.

3.3.2 Testing should be done with fixtures that simulate the load path and direction of the load application.

3.3.3 Testing of binders should be made with chain or fixtures that have a higher MBS than the ultimate strength of the binder being tested.

3.3.4 The tensile load shall be applied at a rate of 2 to 10 inches (50 to 250mm) per minute or 100 to 1,000 lbs (45 to 450 kgs) per second until failure. The tensile load at failure is the breaking strength. Failure is the point at which additional load cannot be applied.

3.3.5 Test results shall be kept on file by the manufacturer for a minimum of 7 years from test date.

3.3.6 The binder manufacturer or an independent testing laboratory shall perform the testing.

3.3.7 All test machines shall be certified annually to ASTM E4 or equivalent standards.

Section 4.1 Purpose

4.1.1 The purpose of this chapter is to provide guidelines to end users and enforcement personnel for the proper selection, use, and care, environmental considerations, and inspection of binders used in and for load securement.

Section 4.2 Proper Selection

4.2.1 All users must be trained in proper tie down selection, use and inspection, cautions to personnel, environmental effects, all applicable standards, regulations and tie down practices.

4.2.2 Select a binder having suitable characteristics for the specific load and the securement required. In order to achieve the required assembly working load limit (WLL), the hook, chain, load binder and the anchor point must be evaluated. The component with the lowest "WLL" shall be used to determine the assembly WLL for the entire tie down assembly.

4.2.3 If the WLL or grade identifier of any of the three tie-down assembly components (excluding anchor points) is worn off, illegible, or missing, that product shall be removed from service.

Section 4.3 Use and Care

4.3.1 Binders shall not be loaded in excess of the WLL as provided by the manufacturer.

4.3.2 Handle extensions (cheater bars) should not be used on any binders. Binders develop approximate WLL tension with hand effort.

4.3.3 Before operating any binder the user shall secure their footing on the ground to prevent slipping or falling. In adverse weather conditions, including freezing temperatures, additional caution should be exercised.

4.3.4 Binders should be matched with the equivalent grade of chain. Using the wrong grade of binder or chain may reduce the assembly WLL of the securement system.

4.3.5 Lever binders shall always be released using an open hand with all body parts completely out of the path that the handle travels.

4.3.6 Binders should be periodically checked and adjusted during transit to maintain proper tension. See 393.9 in FMCSA regulations.

4.3.7 Binders designed for load securement are not approved for overhead lifting applications. Products for lifting require certification.

4.3.8 Handle extensions (cheater bars) shall not be used on any binders.

4.3.9 Regulations require each tie down to be attached and secured in a manner that prevents it from becoming loose, unfastened, opened, or released while vehicle is in transit. Latches, chain wrap and/or other means should be used to secure binders and chain.

Section 4.4 Environmental Considerations

4.4.1 Binders are subject to dirt, mud, snow, ice, road salt, cleaning solutions, etc. Binders should be periodically inspected, cleaned, and lubricated as needed to insure proper operation.

4.4.2 Binders not in use should be stored in a clean, dry location.

4.4.3 If binders have mud, snow, ice, etc in the gear or pivot points, drop forged binders may be struck with a hammer to break loose and remove any foreign material. Care should be taken with binders manufactured with cast parts as striking with a hammer, especially in sub-freezing temperatures, may cause breakage.

Section 4.5 Inspection

4.5.1 Type of Inspection

4.5.1.1 Initial Inspection shall be made before a binder is placed into service to insure the binder is being used for the application and that it matches the chain grade being used.

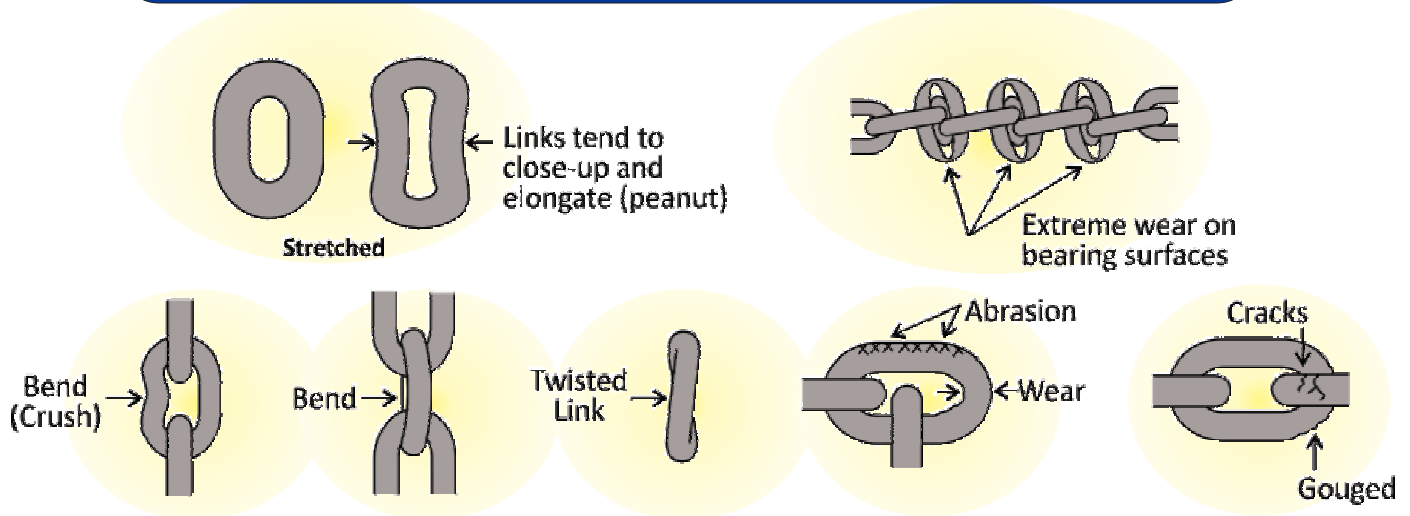
4.5.1.2 Each time a binder is used it shall be inspected.

Section 4.6 Removal from Service

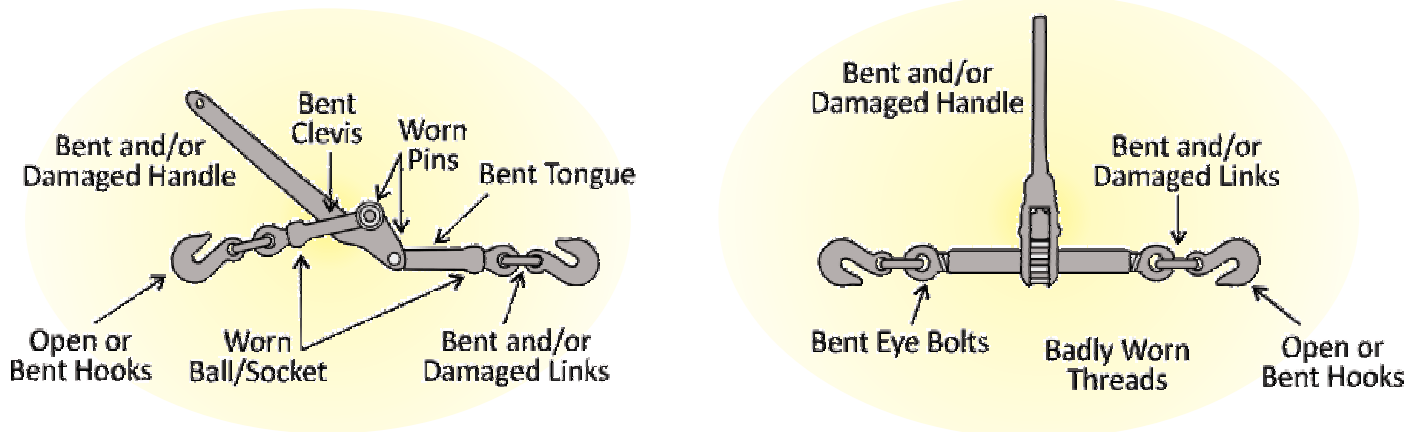
4.6.1 A binder shall be removed from service if any of the following conditions exist (and as per any and all CVSA removal from service criteria):

- a. Hooks are worn, bent, distorted, twisted, stretched or cracked (ref. ASME B30.10)
- b. Links are bent, gouged, distorted, stretched, cracked or worn ((see wear allowances per manufacturer, also specifications for wear on chain (links) and hooks can be found in ASME B30.9 section 9-1.9.4, (Table 6) and the NACM Welded Steel Chain Specifications Table XVI. These and all manufacturer's specifications shall be followed.
- c. No welding on any component is allowed with the exception of the initial factory production welds on the components during assembly.
- d. Clevis on pivot is worn, bent, distorted, or cracked.
- e. Pawl does not engage.
- f. Gear is worn, chipped, or cracked.
- g. Markings are missing, incomplete, illegible, or incorrect.
- h. Excessive rust.
- i. End fitting threads are worn, bent, distorted or will not turn.
- j. Bent or deformed handle.
- k. Swivel sockets and or ball worn or deformed.

North American Uniform Out-of-Service Criteria for Chain Links and Load Binders



Obviously Distorted or Stretched Load Binders and Fittings



Section 4.7 Repair of Binders

4.7.1 No repairs of binders or components shall be permitted.

Chapter 5.0

Standards Reference

Section 5.1 Chain National Association of Chain Manufacturers' Welded Steel Chain Specifications, November 15, 1999, Amended: April 11, 2010.

Section 5.2 Binder Federal Specification , Binder, Load GGG-B-00325C (ME) Dated 7 July 1987 (Canceled 28 May, 1999)

Section 5.3 FHWA Federal Highway Administration FHWA-MCRT-98-005 October 1998

Section 5.4 FMCSA Federal Motor Carrier Safety Administration Section 393.100 of the FMCSA regulation handbook.

Section 5.5 ASME The American Society of Mechanical Engineers B30.9 –2010 (section 9-1.9.4, (Table 6)

Section 5.6 CVSA Commercial Vehicle Safety Alliance - North American Standard Out of Service Criteria April 1, 2006

ADDITIONAL RESOURCES

U.S. Department of Transportation

Federal Highway Administration (FHWA)
Federal Motor Carrier Safety Regulations
(FMCSR's, Title 49 of the Code of
Federal Regulations (CFR): Sections
392.9, Safe Loading; Part 393, Subpart 1
Protection Against Shifting or Falling Cargo).
Copies of 49 CFR Parts 200-399 may be
purchased from the U.S. Government Printing
Office, (202) 512-1800.
For questions concerning specific requirements
you can contact the Federal Highway
Administration, Office of Motor Carrier Research
and Standards (HCS-10),
400 Seventh Street, SW
Washington, D.C., 20590
Phone (202) 366-4009
Fax (202) 366-8842

Commercial Vehicle Safety Alliance

(CVSA) Cargo Securement Tie Down
Guidelines. Commercial Vehicle Safety
Alliance, 1101 17th Street NW, Suite 803
Washington, DC 20036
Phone (202) 775-1623
Fax (202) 775-1624

Specialized Carriers & Rigging Association

Cargo Securement on Motor Vehicles;
Steel Specialized Carriers & Rigging Assoc.,
2750 Prosperity Avenue, Suite 620,
Fairfax, VA 22031-4312
Phone (703) 698-0291
Fax (703) 698-0297

California Administrative Code:

California Highway Patrol (CHP)
Title 13: Barclays Lay Publisher,
50 California St. 18th Floor
San Francisco, CA 94111-4624
Phone (800) 888-3600
Fax (415) 732-8861

In Canada Contact:

The Ministry of Transportation
in each Province.

In Mexico Contact:

Director General de Transporte
Terreste Sub-Director de Inspeccion del Transporte
(Rep. En el C.V.S.A.)
Calzada de las Bombas Number 411-11- Piso
Col. San Bartolo Coapa
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OTHER WEB SLING & TIE DOWN ASSOCIATION PUBLICATIONS

Recommended Standard Specifications:

Printed Books

Synthetic Web Slings	WSTDA-WS-1
(Spanish) Synthetic Web Slings	WSTDA-WS-1S
Synthetic Polyester Roundslings	WSTDA-RS-1
High Performance Yarn (HPY) Roundslings	WSTDA-RS-1HP
Webbing for Synthetic Web Slings	WSTDA-WB-1
Sewing Threads for Slings & Tie Downs	WSTDA-TH-1
Synthetic Web Tie Downs	WSTDA-T-1
(Spanish) Synthetic Web Tie Downs	WSTDA-T-1S
Winches Used With Web Tie Downs	WSTDA-T-3
Synthetic Webbing Used for Tie Downs	WSTDA-T-4
Load Binders Used with Chain Tie Downs	WSTDA-T-6
All Standards In A Three-Ring Binder	WSTDA-ASB

Recommended Standard Specifications:

PDF Files On CD

All Standards CD - (All Standards on CD) WSTDA-ASCD

Recommended Test Methods:

Strength & Elongation Test Method for Sling & Tie Down Webbing WSTDA-TM-1

Operating & Inspection Manuals

Synthetic Web Slings	WSTDA-WS-2	Synthetic Web Slings	WSTDA-WS-2PS (pocket sized)
(Spanish) Synthetic Web Slings	WSTDA-WS-2S	Synthetic Polyester Roundslings	WSTDA-RS-2PS (pocket sized)
Synthetic Polyester Roundslings	WSTDA-RS-2		
Synthetic Web Tie Downs	WSTDA-T-2		

Illustrated Wall Chart

Inspection of Web Slings & Roundslings WSTDA-WSWC-1

UV Degradation Reports

Summary Report UV Degradation	WSTDA-UV-Sling-2003
UV Degradation Mini Manual	WSTDA-UV-MM-2005
UV Degradation Report	WSTDA-UVDR-1981 (Revised 2005)

Training CD-Rom

North America Cargo Securement Standard WSTDA-CD-TP-2003

Warning Labels

Web Slings	WSWT-1
Tie Downs	TDWT-1
Roundslings	RSWT-1

Safety Bulletins

Web Slings	WSSB-1
Roundslings	RSSB-1
Tie Downs	TDSB-1

All WARNING LABELS and SAFETY BULLETINS are available in three languages; English, Spanish and French

For ordering information and prices, contact the association office or visit our website:

Web Sling & Tie Down Association, Inc.

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Phone (443) 640-1070

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