

## Chapter 26-3

# Compression Hardware – Selection, Use, and Maintenance

### SECTION 26-3.0: SCOPE

This Chapter applies to compression hardware, including forged wire rope clips and wedge sockets.

### SECTION 26-3.1: TYPES, MATERIALS, AND ASSEMBLY

#### 26-3.1.1 Types

(a) Wire rope clip types covered are U-bolt and double saddle (see Fig. 26-3.1.1-1).

(b) Wedge sockets (see Fig. 26-3.1.1-2).

(c) Compression hardware other than those detailed in this Chapter shall be used only in accordance with recommendations of the manufacturer or a qualified person.

#### (15) 26-3.1.2 Materials

(a) Wire rope clip materials shall be of sufficient strength such that failure of the wire rope will occur before failure of the wire rope clip at the temperatures the manufacturer has specified for use. Saddles shall be forged steel.

(b) Wedge socket materials shall be of sufficient strength such that failure of the wire rope will occur before failure of the wedge socket at the temperatures the manufacturer has specified for use.

#### 26-3.1.3 Assembly – Wire Rope Clips

(a) Before installing a wire rope clip on plastic coated or plastic impregnated wire rope, consult the wire rope clip manufacturer, wire rope manufacturer, or a qualified person.

(b) For U-bolt clips used to create end terminations, the saddle shall be placed on the live end of the wire rope, with the U-bolt on the dead-end side (see Fig. 26-3.1.1-1).

(c) At least the minimum number of clips as recommended by the manufacturer or a qualified person shall be used.

(d) The spacing and turn-back should be as recommended by the manufacturer or a qualified person.

(e) The wire rope clip shall be tightened to the torque recommended by the manufacturer or a qualified person.

(f) After assembly, the connection shall be loaded to at least the expected working load. After unloading, wire rope clips shall then be retightened to the torque

recommended by the manufacturer or a qualified person.

#### 26-3.1.4 Assembly – Wedge Sockets

(a) The wedge socket shall be assembled as recommended by the manufacturer or a qualified person.

(b) Before installing a wedge socket on plastic coated or plastic impregnated wire rope, consult the wedge socket manufacturer, wire rope manufacturer, or a qualified person.

(c) The live end of the wire rope in the wedge socket cavity shall be in alignment with the socket's pin (see Fig. 26-3.1.1-2).

(d) The assembler shall match the proper wedge with the socket for the wire rope to be installed.

NOTE: Wedges shall not be interchanged between different manufacturers' sockets or models.

(e) The length of the dead-end tail of the wire rope shall be as required by the manufacturer or a qualified person.

(f) The dead-end tail of the wire rope extending beyond the wedge socket shall be secured in a manner recommended by the wedge socket manufacturer or a qualified person (see Fig. 26-3.1.1-2).

(g) The dead end of the wire rope shall not be secured to the live end of the wire rope such that it restricts the movement of the live end (see Fig. 26-3.1.1-2).

(h) After assembly, the connection shall be loaded to fully seat the wedge before use.

### SECTION 26-3.2: DESIGN FACTOR (15)

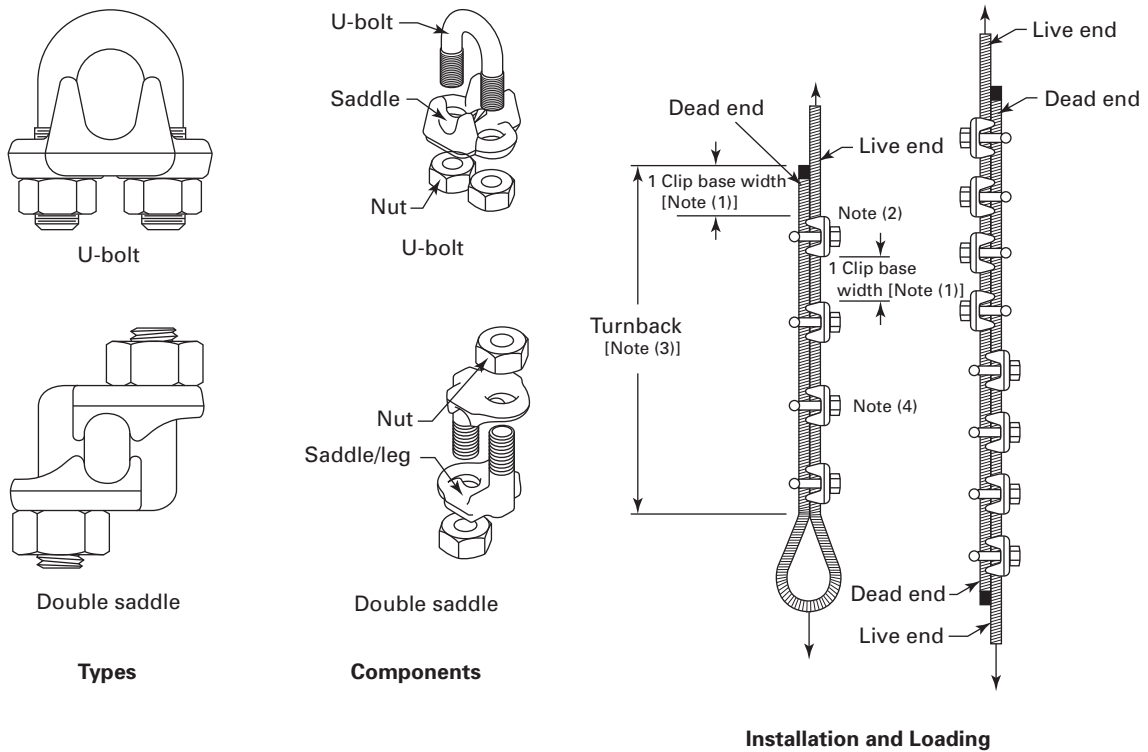
Due to the nature of the design and use, wire rope clips and wedge sockets do not have a conventional design factor. Wire rope clips and wedge sockets shall be designed to have an 80% minimum termination efficiency based on the wire rope published minimum breaking force with which they are used.

### SECTION 26-3.3: RATED LOADS (15)

The rated load for wire rope assemblies using compression hardware is based on the following factors:

- (a) wire rope minimum breaking force
- (b) 80% minimum termination efficiency
- (c) design factor of the wire rope application

**Fig. 26-3.1.1-1 Wire Rope Clips**

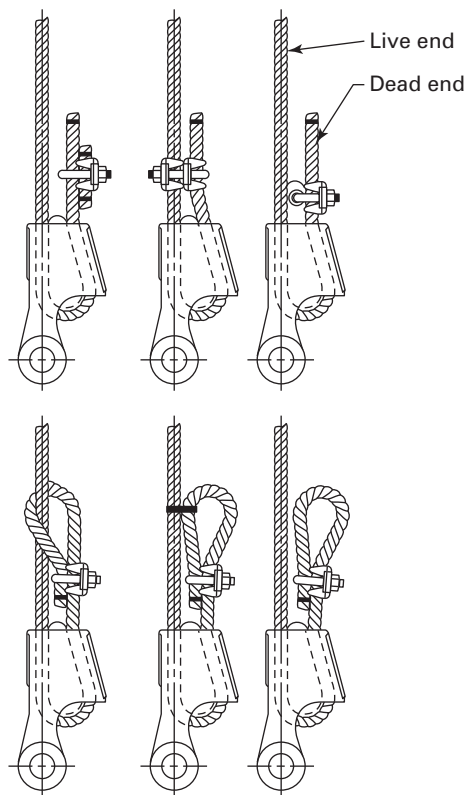
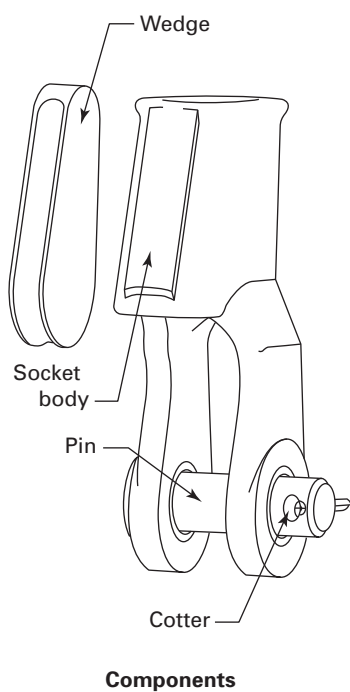


GENERAL NOTE: Correct number of clips for wire rope size shall be used.

NOTES:

- (1) Correct spacing of clips should be used.
- (2) Correct orientation of saddle on live end shall be observed.
- (3) Correct turnback length should be used.
- (4) Correct torque on nuts shall be applied.

Fig. 26-3.1.1-2 Wedge Sockets



**SECTION 26-3.4: PROOF TEST****(15) 26-3.4.1 Proof Test Requirements**

(a) Compression hardware is not required to be proof tested unless specified by the purchaser.

(b) If required, the proof test shall be applied to the wedge socket or the connection made by the wire rope clips after the assembly is complete.

(c) After proof testing, wire rope clips on a finished assembly shall be retightened to the torque recommended by the wire rope clip manufacturer or a qualified person.

(d) Proof tested compression hardware shall be inspected after the test for the conditions stated in para. 26-3.8.5.

**26-3.4.2 Proof Load Requirements**

The proof load shall be a minimum of 40%, but not exceed 50%, of the wire rope minimum breaking force, unless approved by the compression hardware manufacturer or a qualified person.

**SECTION 26-3.5: IDENTIFICATION****(15) 26-3.5.1 Wire Rope Clip Saddle Identification**

Each wire rope clip saddle shall have durable markings by the manufacturer to show

- (a) name or trademark of manufacturer
- (b) size

**(15) 26-3.5.2 Wedge Socket Identification**

Each wedge socket body and wedge shall have durable markings by the manufacturer to show

- (a) name or trademark of manufacturer
- (b) size
- (c) model, if required to match wedge to body

**26-3.5.3 Maintenance of Identification**

Compression hardware identification should be maintained by the user so as to be legible throughout the life of the hardware.

**SECTION 26-3.6: EFFECTS OF ENVIRONMENT****26-3.6.1 Temperature**

(a) When wire rope clips are to be used at temperatures above 400°F (204°C) or below -40°F (-4°C), the wire rope clip manufacturer or a qualified person should be consulted.

(b) When wedge sockets are to be used at temperatures above 400°F (204°C) or below -4°F (-20°C), the wedge socket manufacturer or a qualified person should be consulted.

**26-3.6.2 Chemically Active Environments**

The strength of compression hardware can be affected by chemically active environments, such as caustic or

acidic substances or fumes. The compression hardware manufacturer or a qualified person should be consulted before compression hardware is used in chemically active environments.

**SECTION 26-3.7: TRAINING**

Compression hardware users shall be trained in the selection, inspection, cautions to personnel, effects of environment, and rigging practices as covered by this Chapter.

**SECTION 26-3.8: INSPECTION, REPAIR, AND REMOVAL**

(15)

**26-3.8.1 General**

All inspections shall be performed by a designated person. Any deficiencies identified shall be examined and a determination made by a qualified person as to whether they constitute a hazard.

**26-3.8.2 Initial Inspection**

Prior to use, all new, altered, modified, or repaired compression hardware shall be inspected to verify compliance with the applicable provisions of this Chapter. Written records are not required.

**26-3.8.3 Frequent Inspection**

(a) A visual inspection shall be performed each shift before the compression hardware is used. Rigging hardware in semi-permanent and inaccessible locations where frequent inspections are not feasible shall have periodic inspections performed.

(b) Conditions such as those listed in para. 26-3.8.5, or any other condition that may result in a hazard, shall cause the compression hardware to be removed from service. Compression hardware shall not be returned to service until approved by a qualified person.

(c) Written records are not required.

**26-3.8.4 Periodic Inspection**

(a) A complete inspection of the compression hardware shall be performed. The compression hardware shall be examined for conditions such as those listed in para. 26-3.8.5 and a determination made as to whether they constitute a hazard.

(b) *Periodic Inspection Frequency*

(1) Periodic inspection intervals shall not exceed 1 yr. The frequency of periodic inspections should be based on

- (-a) frequency of use
- (-b) severity of service conditions
- (-c) nature of lifting or load handling activities
- (-d) experience gained on the service life of compression hardware used in similar circumstances

(2) Guidelines for the time intervals are

- (-a) normal service — yearly
- (-b) severe service — monthly to quarterly
- (-c) special service — as recommended by a qualified person

ified person

(c) Written records are not required.

#### 26-3.8.5 Removal Criteria

Compression hardware shall be removed from service if conditions such as the following are present and shall only be returned to service when approved by a qualified person:

- (a) missing or illegible identification
- (b) indications of heat damage, including weld spatter or arc strikes
- (c) excessive pitting or corrosion
- (d) bent, twisted, distorted, stretched, elongated, cracked, or broken components
- (e) excessive nicks or gouges
- (f) a 10% reduction of the original or catalog dimension at any point
- (g) evidence of unauthorized welding or modification
- (h) unauthorized replacement components
- (i) insufficient number of wire rope clips
- (j) improperly tightened wire rope clips
- (k) indications of damaged wire rope
- (l) indications of wire rope slippage
- (m) improper assembly or other conditions, including visible damage, that cause doubt as to continued use

#### 26-3.8.6 Repairs and Modifications

(a) Repairs, alterations, or modifications shall be as specified by the compression hardware manufacturer or a qualified person.

(b) Replacement parts shall meet or exceed the original compression hardware manufacturer's specifications.

### SECTION 26-3.9: OPERATING PRACTICES

#### 26-3.9.1 Compression Hardware Selection

(a) Compression hardware having suitable characteristics for the type of application and environment shall be selected in accordance with the recommendations of the compression hardware manufacturer or a qualified person.

(b) The rated load shall not be exceeded (see Section 26-3.3).

(c) Compression hardware that appears to be damaged shall not be used until inspected and accepted as usable under Section 26-3.8.

#### 26-3.9.2 Cautions to Personnel

(a) All portions of the human body shall be kept from between the load and any other rigging during lifting or load handling activities.

(b) Personnel should stand clear of the suspended load.

(c) Personnel should stand clear of rigging when it is under tension.

(d) Personnel shall not ride rigging hardware.

#### 26-3.9.3 Storage and Work Environments

(a) Compression hardware should be stored in an area where it will not be subjected to damage, corrosive action, or extreme heat.

(b) If extreme temperatures or chemically active environments are involved, the guidance provided in para. 26-3.6.1 or 26-3.6.2 shall be followed.

#### 26-3.9.4 Rigging Practices

##### 26-3.9.4.1 Wire Rope Clips

(15)

(a) Assemble wire rope clips in accordance with para. 26-3.1.3.

(b) Wire rope clips should not be in contact with the load or any obstruction during lifting or load handling activities.

(c) Shock loading should be avoided.

(d) Rigging using wire rope clips should not be dragged on an abrasive surface.

(e) When wire rope clips are applied to join two lengths of wire rope in an in-line splice, the requirements of para. 26-3.1.3 shall be followed (see Fig. 26-3.1.1-1).

(f) Wire rope clips should not be used to fabricate slings. See ASME B30.9 for specific exceptions.

##### 26-3.9.4.2 Wedge Sockets

(a) Assemble wedge sockets in accordance with para. 26-3.1.4.

(b) The wedge sockets should not be side loaded.

(c) Contact with sharp edges that could damage the wedge socket should be avoided.

(d) Shock loading should be avoided.

(e) Impacts can dislodge the wedge from the body and should be avoided.

(f) Rigging using wedge sockets should not be dragged on an abrasive surface.