



BUILDING STRENGTH™

PRESTRESS HANDBOOK

**CONCRETE
CONSTRUCTION
PRODUCTS**

 **DAYTON[®]
SUPERIOR**



General and Safety Information

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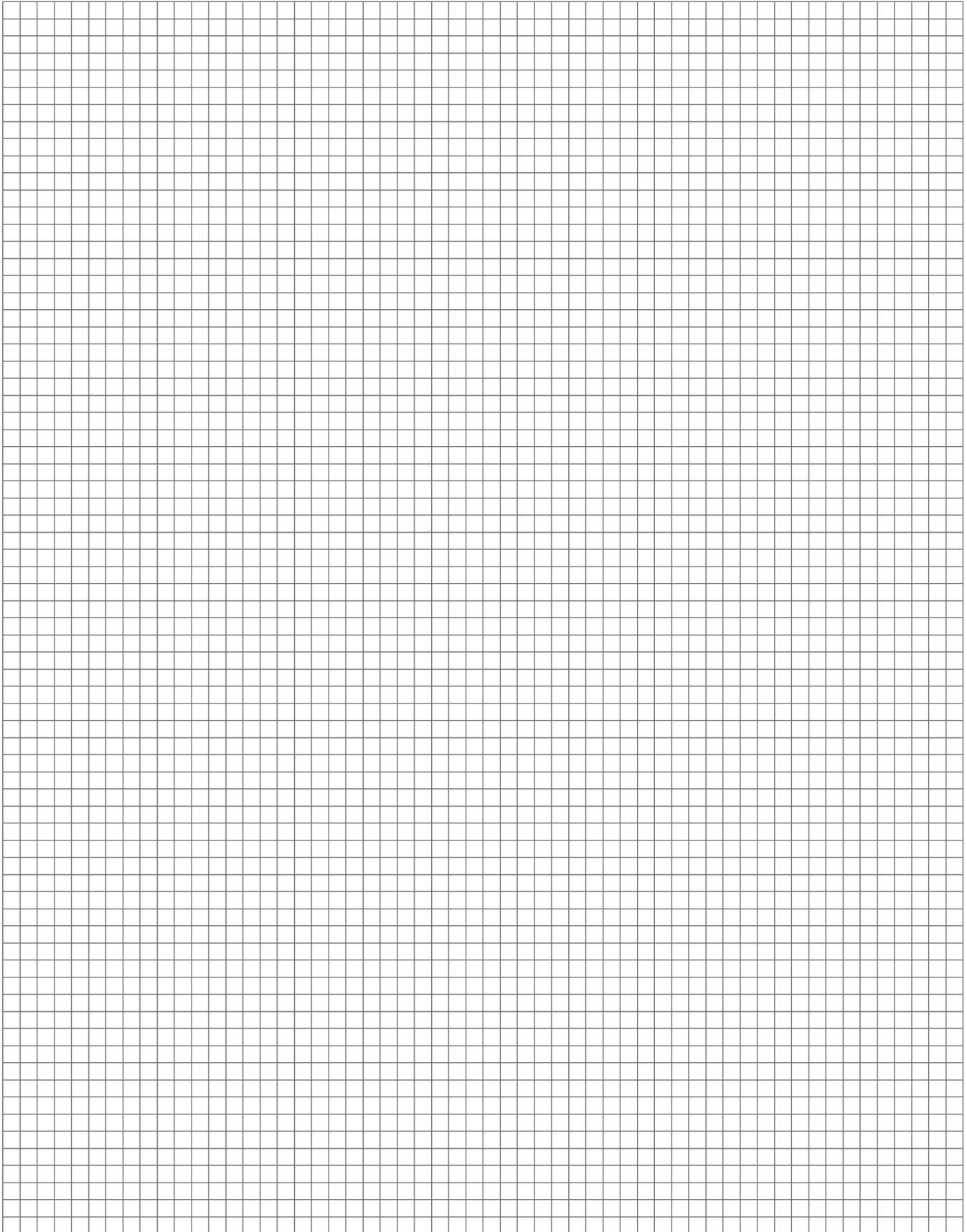
Prestress Strand Restraining Devices

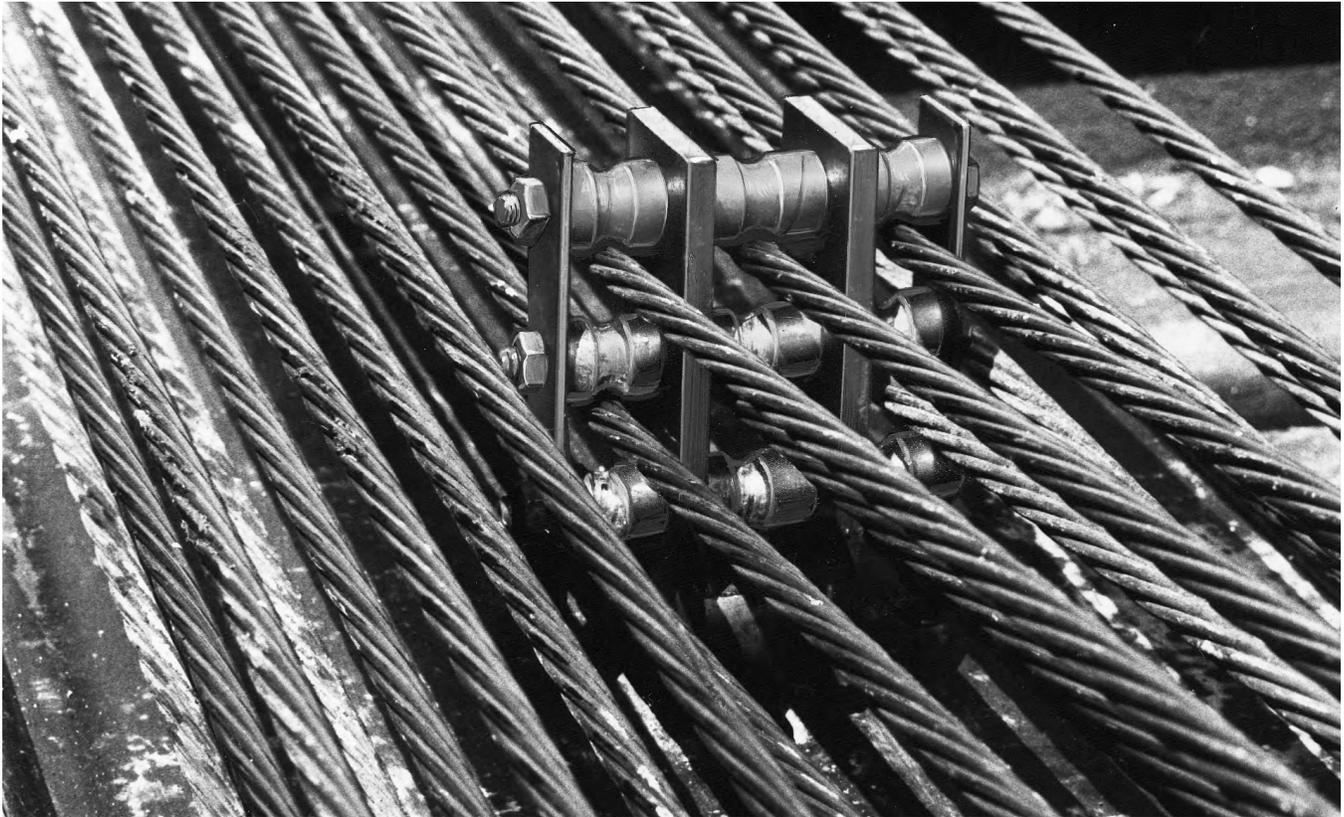
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Prestress Strand Restraining Devices

The following is taken from the Prestressed Concrete Institute Manual for Quality Control for Plants and Production of Precast/Prestressed Concrete Products, and relates to certain safety requirements. Precast/prestressers are urged to refer to the manual for a thorough understanding of all aspects of quality control during the prestressing process.

Section 2 — Safety

4.2.1 — General Considerations

The large tensioning forces which are necessary in all prestressing operations inevitably result in such construction being very hazardous. The Prestressed Concrete Institute has an in-depth PCI Safety and Loss Prevention Manual program. It outlines general safety practices as it relates to the prestressing industry and existing Federal regulations. Each prestressing plant and each employee in the plant shall be required to comply with the PCI safety and Loss Prevention Manual.

The purpose of this section is to outline some of the more important safety measures particularly applicable to prestressing plants. The potential hazards discussed in this section are generally understood by producers and workmen alike; however, it is human nature that people who are constantly exposed to potentially dangerous situations tend over a period of time to lose their conscious fear unless they are constantly reminded of the danger. It shall be the responsibility of the supervisory personnel to insure safety is never subordinated to personal apathy or production expediency. Any employee who will not abide by prescribed safety rules shall not be permitted to work in a prestressing plant.

The most important consideration, which should be kept in mind by all levels of personnel in prestressed concrete plants, is tendons under tension as high as 190,000 psi (1,300 MPa) represent energy which, upon sudden release, can have serious results. This is a condition peculiar to the manufacture of prestressed concrete and must be constantly recognized and planned for if a good safety record is to be established.

This section is intended to outline safety practices for prestressed concrete plants in a broad manner and cannot be considered to include every conceivable hazard that may be present in a prestressed concrete plant; however, the recognition of hazards, the establishment of good safety practices and the requirement that all personnel abide by safety rules will result in a more efficient and safer operation in any plant.

4.2.2 — Safety Measures for All Tensioning Operations

The operation of tensioning has more potential for serious accidents than all other phases of prestressed concrete production combined. The following basic rules applicable to tensioning shall be included in the safety requirements of all plants:

1. Prior to tensioning any bed, a visible and audible signal shall be given and all personnel not required to perform the tensioning shall leave the area adjacent to the bed.
2. Jacks shall be held by means preventing the jack from flying longitudinally or laterally in case of tendon failure.
3. Personnel shall never be permitted to stand at either end of the bed, directly in line with the tendon being tensioned.
4. Personnel shall not stand over tendons being tensioned to make elongation measurements. Such measurements shall be preferably made by jigs or templates from the side or from behind shields.
5. For personnel engaged in the tensioning operation, protection shall be provided by means of effective shields adequate to stop a flying tendon. These shields should be provided at both ends of the bed and should be of reinforced concrete or heavy timbers. Shields of wire mesh are not satisfactory as broken strands often fly end first and may penetrate the wire openings.
6. Eye protection shall be provided for personnel engaged in wedging and anchoring operations as a protection from flying pieces of steel.

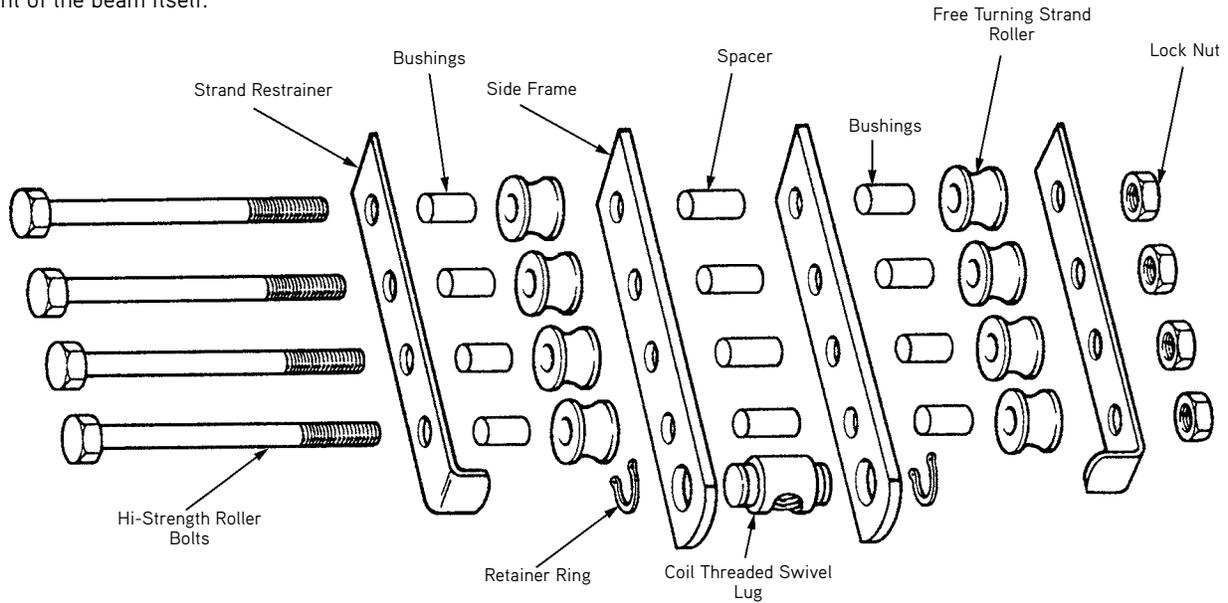
4.2.3 — Safety Measures for Pretensioning

Principal causes and remedies for tendon failure during pretensioning include the following:

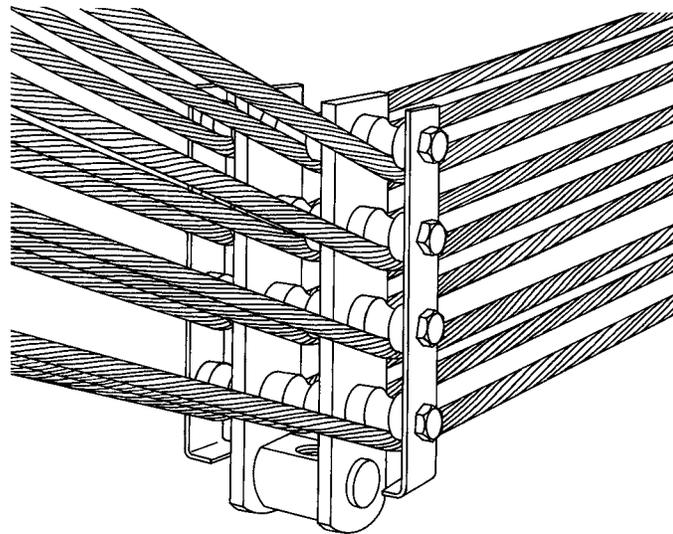
1. Defective or improper strand vises: Clean, inspect and lubricate strand vises between each use. Use of at least a three-power illuminated magnifying glass for inspecting strand vises is recommended. Discard any worn or distorted chucks. A small amount of sand or dirt between chucks and the barrel can cause failure or slippage of the strand.
2. Improper alignment of strand vises: See that vises are in line with pull and are seated normally.
3. Overstressing: Check elongation and keep tension-indicating devices properly calibrated.
4. Kinks or nicks in strand: Use care in handling strand to avoid damage. Do not begin tensioning if a strand has been nicked.
5. Failure of individual wires in strand: These often occur in factory welds and cannot be avoided. Do not tension any strand with a broken wire.
6. Heating of a tensioned strand: Keep all torches and welding equipment away from tensioned strand.
7. Sudden multiple revolutions of strand being pulled from a coil: Use approved swivel grips or other effective methods.
8. Local overstress due to friction in tensioning of draped strands: For strands tensioned in the draped position, use roller bearings at all hold-down and support points. Before placing concrete, the bearings within the members can be replaced with less expensive devices. For strands tensioned in a straight line and subsequently deflected, do all deflecting simultaneously or on a predetermined schedule symmetrically about the center of the bed.

Prestress Strand Restraining Devices

Since 1958 Dayton Superior has been working closely with prestressed concrete producers to develop and patent a most comprehensive line of restraining devices. The various designs are available to meet the many applications found in today's prestressed concrete industry. With Dayton Superior quality engineered and manufactured strand restraining devices deflecting part of the prestressing tendons, a more favorable distribution of stresses within the prestressed beam can be obtained. The reduced tensile stresses at the concrete beam's ends can increase the load carrying capacity of the beam by amounts equal to the weight of the beam itself.



Exploded View of a Typical Strand Restraining Device



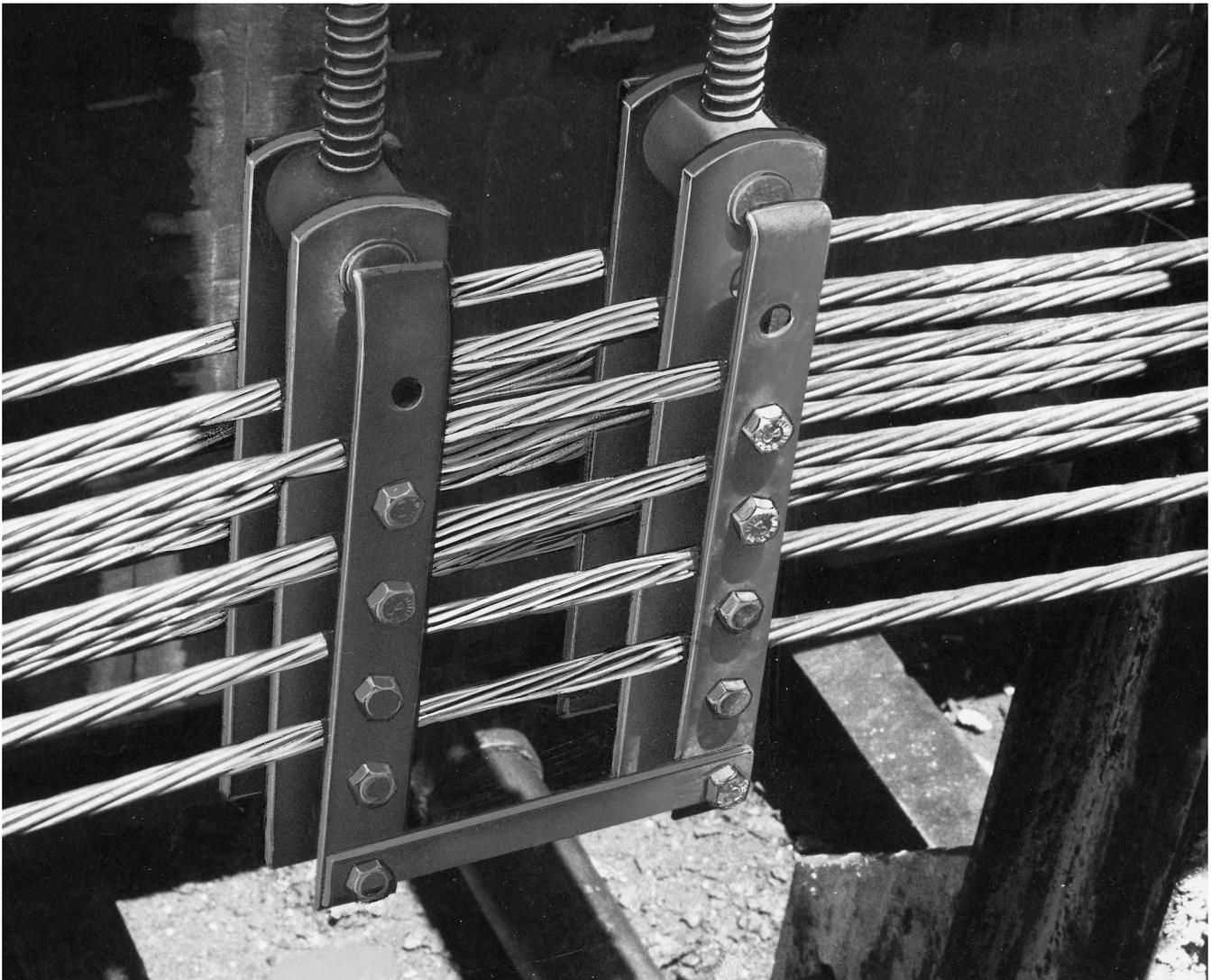
Typical Application of a Strand Restraining Device

Warning: Safe construction practice requires that all strand retaining device instructions, safe working loads and warnings/cautions be followed. Strand retaining devices are designed for a one-time use only. Using a unit as a hold-up and then reusing it as either a hold-up or hold-down may result in an unexpected failure.

Hold-up Applications

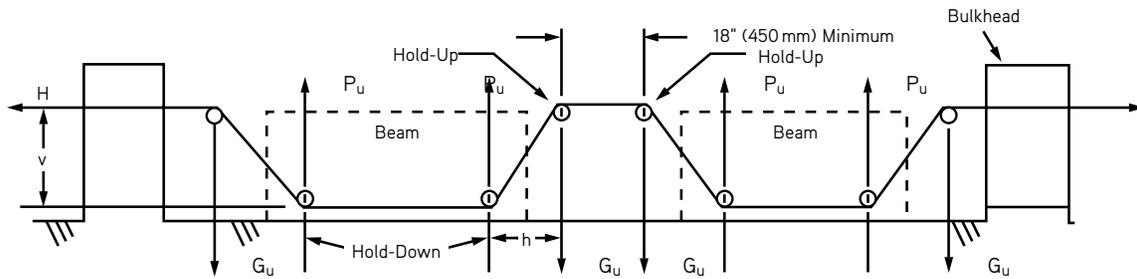
When strand retaining devices are to be used as 'hold-up' units, it is critical that a qualified person verify the loads that will be applied. Generally, the loads at hold-up points will be twice the loads that are to be applied to the hold-down units and require the use of two strand retaining devices to meet the safe working load requirements. Dayton Superior recommends that hold-up units be spaced at least 18" (450 mm) apart.

Warning: When strand retaining devices are used as a hold-up unit, they should be used only one time and then discarded. Reuse can result in fatigue and wear and result in unexpected failures. Dayton Superior does not recommend using a strand restraining device more than one time.



Typical 'Hold-up' Restraining Application

How To Calculate Uplift Loads On Strand Restraining Devices



$$P_u = H \frac{v}{h} \quad \text{or} \quad G_u = H \frac{v}{h}$$

1.0 Lbsf = 0.0045kN
1.0 kN = 224.8 Lbsf

- P_u = Uplift load per strand
- G_u = Load per strand at intermediate hold-up point
- H = Horizontal pull
- v = Amount of strand deflection
- h = Distance from hold-up to hold-down
- HDF = Total hold-down force (P_u) x (Number of strands)
- HDF = Total hold-up force (G_u) x (Number of strands)

Example:

$$P_u = H \frac{v}{h}$$

- H = 28,900 lbs. (128.5 kN)
- v = 3'-0" (914 mm)
- h = 30'-0" (9,000 mm)

$$P_u = 28,900 \text{ (128.5 kN)} \times \frac{3'-0" \text{ (914 mm)}}{30'-0" \text{ (9,000 mm)}}$$

Example:

Assume 6 strands at hold-down and hold-up positions and that swivel units will be used.

$$\text{HDF} = (6 \text{ strands}) \times [2,890 \text{ lbs. (12.8 kN) per strand} \times 1.05 \text{ friction loss}]$$

$$\text{HDF} = 18,207 \text{ lbs. (80.9 kN)}$$

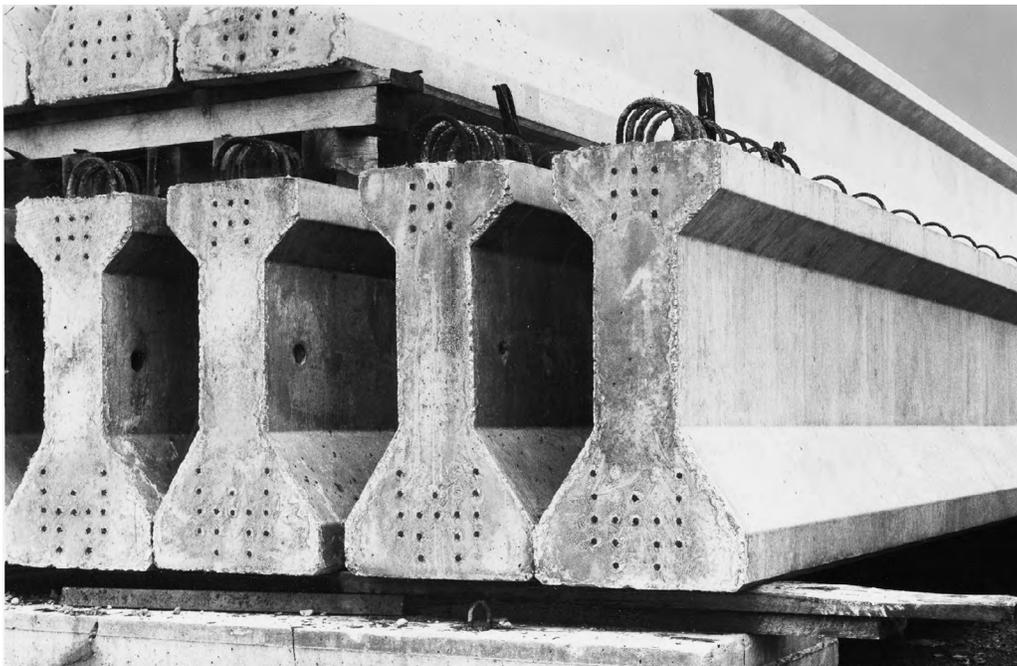
Use any swivel unit that satisfies strand pattern, individual SWL per strand and SWL for unit.

* P_u = 2,890 lbs. (12.8 kN) per strand

* G_u = 2,890 lbs. (12.8 kN) per strand

*Total uplift load per strand should be determined by adding a percentage increase for friction losses (Add 5% friction loss for swivel units and 15% friction loss for nonswivel units).

Warning: Safe construction practice requires that all strand retaining device instructions, safe working loads and warnings/cautions be followed. Strand retaining devices are designed for a one-time use only. Using a unit as a hold-up and then reusing it as either a hold-up or hold-down may result in an unexpected failure.

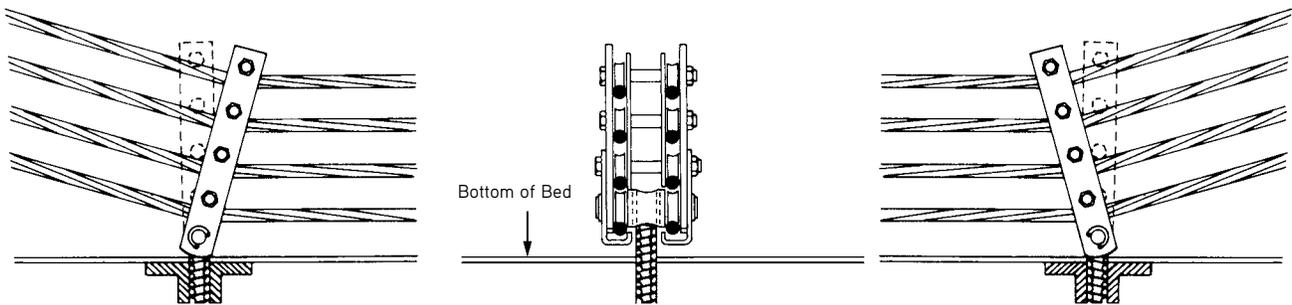


General Strand Restraining Device Notes:

1. Safe working loads shown in this publication provide a factor of safety of approximately 1.5:1.
 2. Safe working loads should be determined by calculating the upward forces and adding a percentage increase for friction losses. (Add 5% friction for swivel units and 15% for non-swivel units).
 3. Strand restraining devices are rated by uplift per strand as well as total uplift per unit. Care must be taken to see that neither rating is exceeded.
 4. Maximum number of strands per unit is determined by dividing the maximum safe working load per unit by the actual strand load plus friction losses.
 5. Any unit with a 'B' dimension of 6" (150 mm) or greater will be supplied with a Spacer Bolt and Nut above the swivel lug.
-

Stressing Notes:

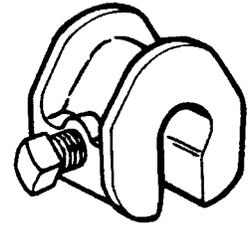
- A. All strand restraining devices should be loaded (stressed) in descending order from top strand(s) down to lower strand(s).
- B. Two vertical strand restraining devices should be loaded by stressing alternating strands. Loading more than one strand per side at one time will cause unbalanced loading that may result in premature failure of the unit.
- C. Three vertical row strand restraining devices should be loaded by stressing the center row first, then alternating the outside rows in a symmetrical manner. Failure to do so may result in a premature failure of the unit.



H65R Unit

H2 Strand Clamp

- Used to position and hold bulkheads during concrete placement.
- For use with 1/2" (13 mm) and 0.6" (15 mm) diameter strands.
- Special thread is not affected by vibrating operations.
- Replacement screws are available on request.



H2 Strand Clamp

To Order:

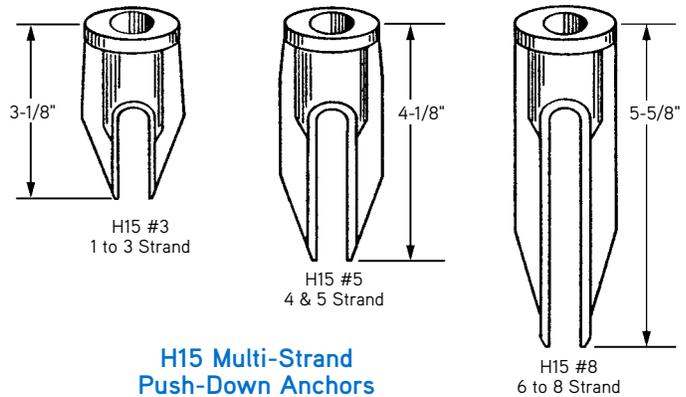
Specify: (1) quantity, (2) name

Example:

50, H2 Strand Clamps.

H15 Multi-Strand Push-Down Anchor

- Used to depress 1/2" (13 mm) diameter strand in a single row.
- For double tees, channel slabs and similar prestressed elements requiring moderate strand deflection.
- Through hole in casting accepts a 3/4" (19 mm) diameter stem pin that must protrude through the hole and be in contact with the strand. The stem pin end is chamfered to prevent strand damage.



H15 Multi-Strand Push-Down Anchors

Notes:

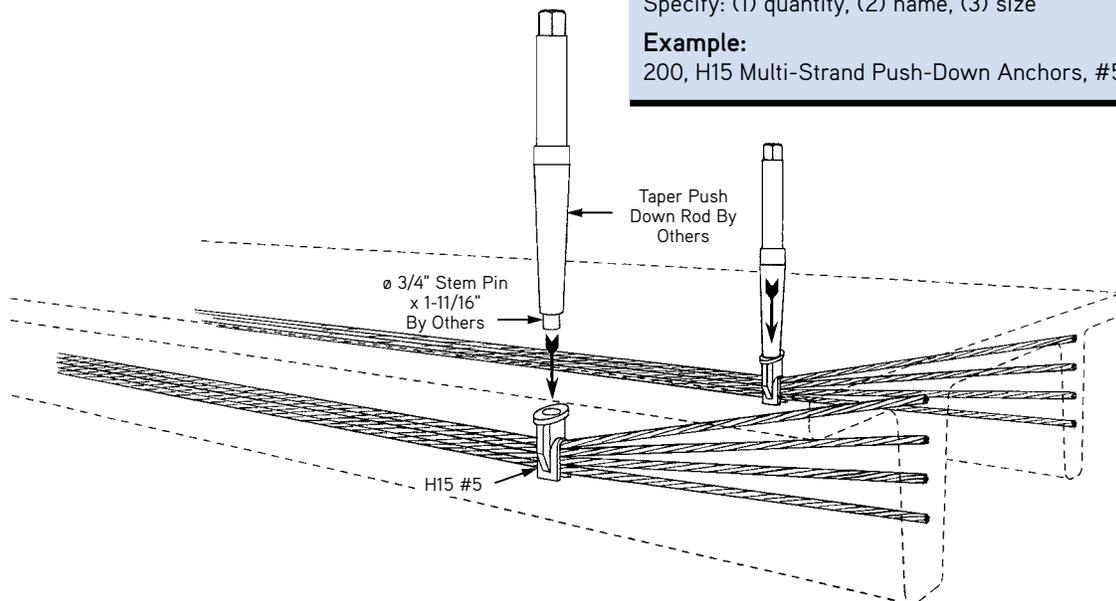
- Safe working loads have not been assigned to this product due to the variable methods used to depress the strands.
- Tests indicate that high vertical loads are maintained when the strands remain vertical and do not override one another. Overriding strands may cause the open end of the anchor to spread.
- Effective use of the H15 anchor depends on proper pin diameter, maintaining vertical plumb and having minimal strand override.
- The H15 anchor is not recommended for use with threaded pushdown rods.
- Stem pins longer than 1-11/16" may damage cables.

To Order:

Specify: (1) quantity, (2) name, (3) size

Example:

200, H15 Multi-Strand Push-Down Anchors, #5 size.

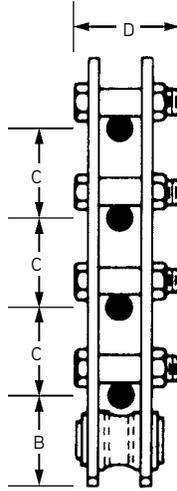


H15 Multi-Strand Push-Down Anchor Typical Application

H21 Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 3/4" (19 mm).
- Max. safe working load per strand — 3,000 lbs. (13.3 kN) See Note 3 on Page 6.
- Max. safe working load per unit — 24,000 lbs. (106.0 kN) See Note 3 on Page 6.
- (A) Horizontal spacing — Not applicable.
- (B) Min. vertical spacing (form to centerline of first strand) — 2.0" (50 mm).
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 2-3/8" (60 mm).



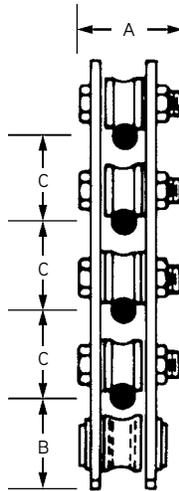
Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.

Maximum safe working load based on a safety factor of approximately 1.5:1.

H23 Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 3/4" (19 mm).
- Max. safe working load per strand — 8,000 lbs. (35.4 kN) See Note 3 on Page 6.
- Max. safe working load per unit — 24,000 lbs. (106.0 kN) See Note 3 on Page 6.
- (A) Horizontal spacing — Not applicable.
- (B) Min. vertical spacing (form to centerline of first strand) — 2.0" (50 mm).
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 2-3/8" (60 mm).



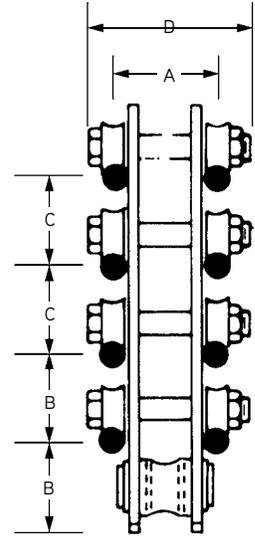
Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.

Maximum safe working load based on a safety factor of approximately 1.5:1.

H24 Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 3/4" (19 mm).
- Max. safe working load per strand — 6,000 lbs. (26.6 kN) See Note 3 on Page 6.
- Max. safe working load per unit — 24,000 lbs. (106.0 kN) See Note 3 on Page 6.
- (A) Horizontal spacing — 2.0" (50 mm).
- (B) Min. vertical spacing (form to centerline of first strand) — 2.0" (50 mm).
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 3-7/8" (98 mm).



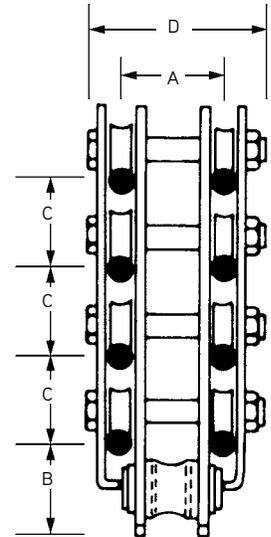
Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.

Maximum safe working load based on a safety factor of approximately 1.5:1.

H24R Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 3/4" (19 mm).
- Max. safe working load per strand — 6,000 lbs. (26.6 kN) See Note 3 on Page 6.
- Max. safe working load per unit — 24,000 lbs. (106.0 kN) See Note 3 on Page 6.
- (A) Horizontal spacing — 2.0" (50 mm).
- (B) Min. vertical spacing (form to centerline of first strand) — 2.0" (50 mm).
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 3-7/8" (98 mm).



Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.

Maximum safe working load based on a safety factor of approximately 1.5:1.

To Order Strand Restraining Devices:

Specify: (1) quantity, (2) name

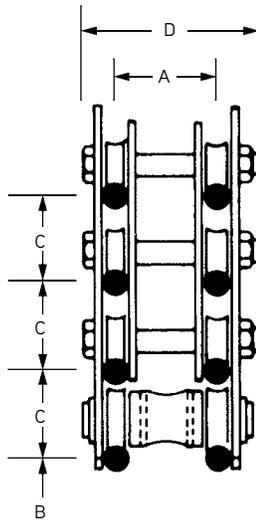
Example:

500, H21 Strand Restraining Devices.

H25* Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 3/4" (19mm).
- Max. safe working load per strand — 7,500 lbs. (33.3kN) See Note 3 on Page 6.
- Max. safe working load per unit — 24,000 lbs. (106.0 kN) See Note 3 on Page 6.
- (A) Horizontal spacing — 2.0" (50 mm).
- (B) Min. vertical spacing (form to centerline of first strand) — Not applicable.
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 3-7/8" (98 mm).



Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.

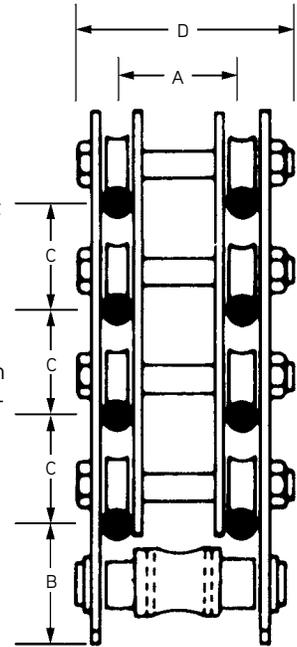
*Patented unit.

Maximum safe working load based on a safety factor of approximately 1.5:1.

H25S Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 3/4" (19mm).
- Max. safe working load per strand — 7,500 lbs. (33.3kN) See Note 3, Page 6.
- Max. safe working load per unit — 24,000 lbs. (106.0 kN) See Note 3, Page 6.
- (A) Horizontal spacing — 2.0" (50 mm).
- (B) Min. vertical spacing (form to centerline of first strand) — 2.0" (50 mm).
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 3-7/8" (98 mm).



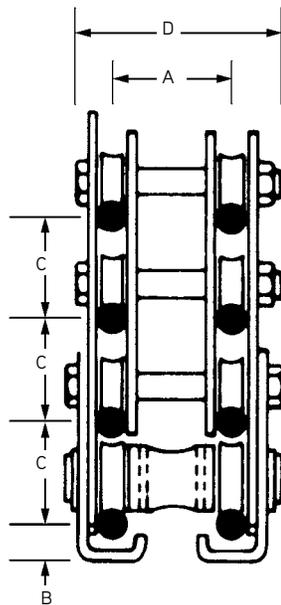
Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.

Maximum safe working load based on a safety factor of approximately 1.5:1.

H25R* Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 3/4" (19mm).
- Max. safe working load per strand — 7,500 lbs. (33.3kN) See Note 3 on Page 6.
- Max. safe working load per unit — 24,000 lbs. (106.0 kN) See Note 3 on Page 6.
- (A) Horizontal spacing — 2.0" (50 mm).
- (B) Min. vertical spacing (form to centerline of first strand) — Not applicable.
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 3-7/8" (98 mm).



Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.

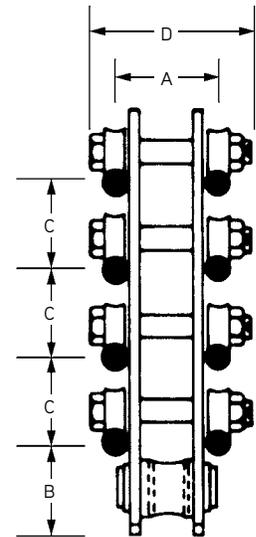
*Patented unit.

Maximum safe working load based on a safety factor of approximately 1.5:1.

H26 Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 1.0" (25 mm).
- Max. safe working load per strand — 6,000 lbs. (26.6 kN) See Note 3 on Page 6.
- Max. safe working load per unit — 24,000 lbs. (106.0 kN) See Note 3 on Page 6.
- (A) Horizontal spacing — 2-3/16" (55 mm).
- (B) Min. vertical spacing (form to centerline of first strand) — 2.0" (50 mm).
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 3-7/8" (98 mm).



Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.

Maximum safe working load based on a safety factor of approximately 1.5:1.

To Order Strand Restraining Devices:

Specify: (1) quantity, (2) name

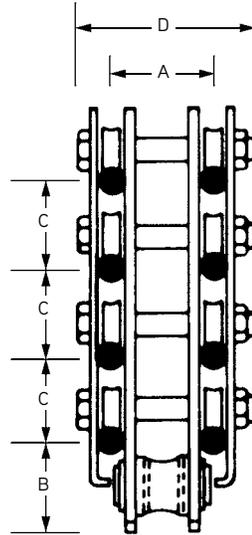
Example:

500, H25-S Strand Restraining Devices.

H26R Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 1.0" (25 mm).
- Max. safe working load per strand — 6,000 lbs. (26.6 kN) See Note 3 on Page 6.
- Max. safe working load per unit — 24,000 lbs. (106.0 kN) See Note 3 on Page 6.
- (A) Horizontal spacing — 2-3/16" (55 mm).
- (B) Min. vertical spacing (form to centerline of first strand) — 2.0" (50 mm).
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 3-7/8" (98 mm).

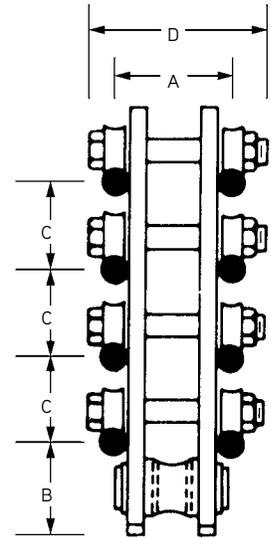


Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.
Maximum safe working load based on a safety factor of approximately 1.5:1.

H41 Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 1.0" (25 mm).
- Max. safe working load per strand — 6,000 lbs. (26.6 kN) See Note 3 on Page 6.
- Max. safe working load per unit — 40,000 lbs. (177.9 kN) See Note 7 on Page 6.
- (A) Horizontal spacing — 2-1/2" (63 mm).
- (B) Min. vertical spacing (form to centerline of first strand) — 2.0" (50 mm).
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 4-3/8" (111 mm).

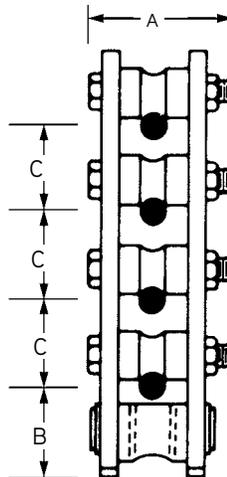


Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.
Maximum safe working load based on a safety factor of approximately 1.5:1.

H40 Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 1.0" (25 mm).
- Max. safe working load per strand — 8,000 lbs. (35.4 kN) See Note 3 on Page 6.
- (A) Horizontal spacing — Not applicable.
- (B) Min. vertical spacing (form to centerline of first strand) — 2.0" (50 mm).
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 2-7/8" (73 mm).



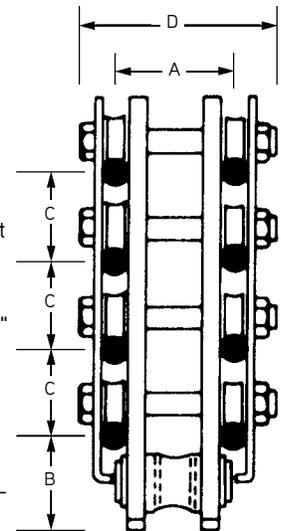
Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.

Maximum safe working load based on a safety factor of approximately 1.5:1.
Maximum safe working load per unit - 40,000 lbs. (177.9kN)

H41R Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 1.0" (25 mm).
- Max. safe working load per strand — 6,500 lbs. (28.8 kN) See Note 3 on Page 6.
- Max. safe working load per unit — 40,000 lbs. (177.9 kN) See Note 7 on Page 6.
- (A) Horizontal spacing — 2-1/2" (63 mm).
- (B) Min. vertical spacing (form to centerline of first strand) — 2.0" (50 mm).
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 4-3/8" (111 mm).



Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.
Maximum safe working load based on a safety factor of approximately 1.5:1.

To Order Strand Restraining Devices:

Specify: (1) quantity, (2) name

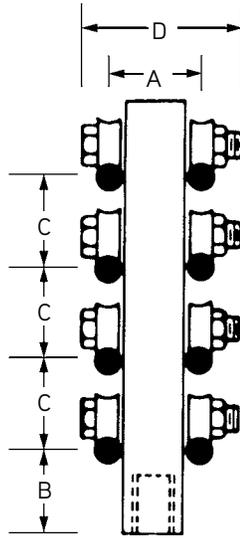
Example:

500, H41 Strand Restraining Devices.

H42 Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 1.0" (25 mm).
- Max. safe working load per strand — 8,000 lbs. (35.4 kN) See Note 3 on Page 6.
- Max. safe working load per unit — 42,000 lbs. (186.8 kN) See Note 3 on Page 6.
- (A) Horizontal spacing — 2.0" (50 mm).
- (B) Min. vertical spacing (form to centerline of first strand) — 2.0" (50 mm).
- (C) Standard vertical spacing — 2/0" (50 mm).
- (D) Overall width — 3-7/8" (98 mm).

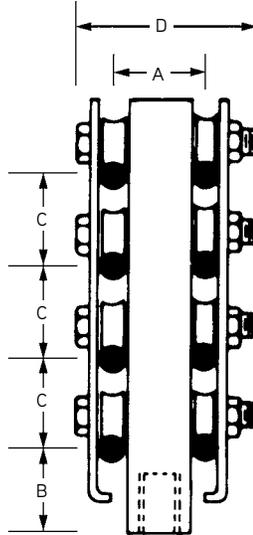


Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.
Maximum safe working load based on a safety factor of approximately 1.5:1.

H42R Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 1.0" (25 mm).
- Max. safe working load per strand — 8,000 lbs. (35.4 kN) See Note 3 on Page 6.
- Max. safe working load per unit — 42,000 lbs. (186.8 kN) See Note 3 on Page 6.
- (A) Horizontal spacing — 2.0" (50).
- (B) Min. vertical spacing (form to centerline of first strand) — 2.0" (50 mm).
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 3-7/8" (98 mm).



Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.
Maximum safe working load based on a safety factor of approximately 1.5:1.

To Order Strand Restraining Devices:

Specify: (1) quantity, (2) name

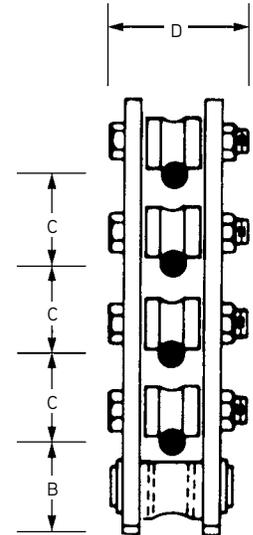
Example:

500, H55 Strand Restraining Devices.

H53 Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 1.0" (25 mm).
- Max. safe working load per strand — 6,000 lbs. (26.6 kN) See Note 3 on Page 6.
- Max. safe working load per unit — 24,000 lbs. (106.0 kN) or 48,000 lbs. (212.0 kN) *When H53 Strand Restraining Devices are required:*
- *A. With one through four strands, the device will be supplied with single side frames.*
- *B. With five or more strands, the device will be supplied with double side frames and heat treated lugs.*
- (A) Horizontal spacing — Not applicable.
- (B) Min. vertical spacing (form to centerline of first strand) — 2.0" (50 mm).
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 3-3/8" (92 mm).

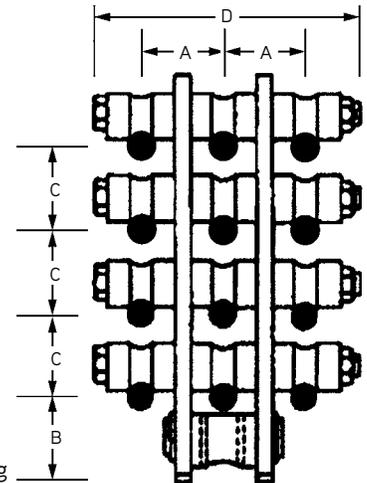


Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.
Maximum safe working load based on a safety factor of approximately 1.5:1.

H55 Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 1.0" (25 mm).
- Max. safe working load per strand — 4,000 lbs. (17.7 kN) See Note 3 on Page 6.
- Max. safe working load per unit — 48,000 lbs. (212.0 kN) See Note 3 on Page 6.
- (A) Horizontal spacing — 2.0" (50 mm).
- (B) Min. vertical spacing (form to centerline of first strand) — 2.0" (50 mm).
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 6-7/8" (174.6 mm).

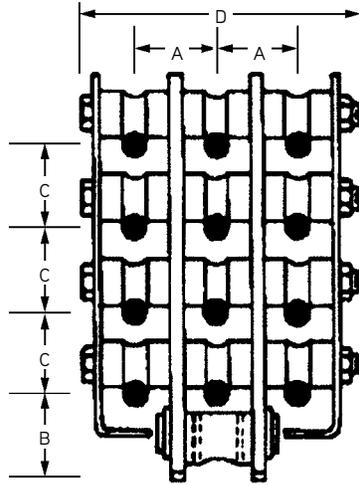


Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.
Maximum safe working load based on a safety factor of approximately 1.5:1.

H55R Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 1.0" (25 mm).
- Max. safe working load per strand — 4,000 lbs. (17.7 kN) See Note 3 on Page 6.
- Max. safe working load per unit — 48,000 lbs. (212.0 kN) See Note 3 on Page 6.
- (A) Horizontal spacing — 2.0" (50 mm).
- (B) Min. vertical spacing (form to centerline of first strand) — 2.0" (50 mm).
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 6-7/8" (174.6 mm).



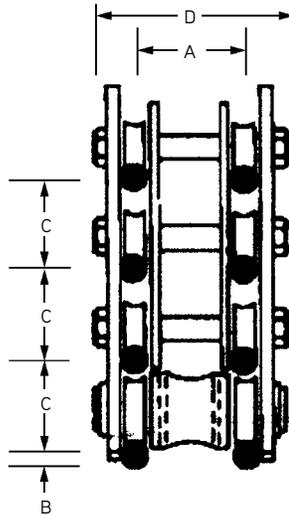
Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.

Maximum safe working load based on a safety factor of approximately 1.5:1.

H56 Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 1.0" (25 mm).
- Max. safe working load per strand — 7,500 lbs. (33.3 kN) See Note 3 on Page 6.
- (A) Horizontal spacing — 2.0" (50 mm).
- (B) Min. vertical spacing (form to centerline of first strand) — Not applicable.
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 4-3/8" (111 mm).



Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.

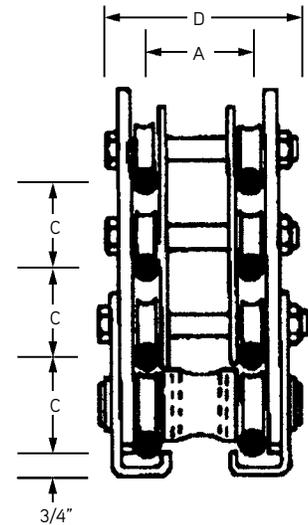
Maximum safe working load based on a safety factor of approximately 1.5:1.

Maximum safe working load per unit - 48,000 lbs. (212kN)

H56R Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 1.0" (25 mm).
- Max. safe working load per strand — 7,500 lbs. (33.3 kN) See Note 3 on Page 6.
- (A) Horizontal spacing — 2.0" (50 mm).
- (B) Min. vertical spacing (form to centerline of first strand) — Not applicable.
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 4-3/8" (111 mm).



Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.

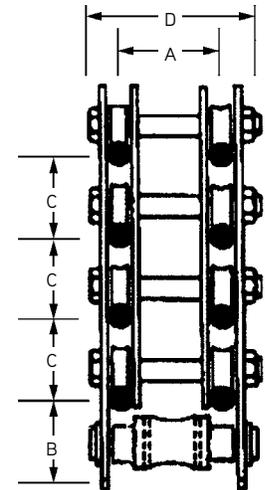
Maximum safe working load based on a safety factor of approximately 1.5:1.

Maximum safe working load per unit - 48,000 lbs. (212kN)

H56S Strand Restraining Device

Specifications:

- High Strength Coil Rod Diameter — 1.0" (25 mm).
- Max. safe working load per strand — 7,500 lbs. (33.3 kN) See Note 3 on Page 6.
- (A) Horizontal spacing — 2.0" (50 mm).
- (B) Min. vertical spacing (form to centerline of first strand) — 2.0" (50 mm).
- (C) Standard vertical spacing — 2.0" (50 mm).
- (D) Overall width — 4-3/8" (111 mm).



Warning: Safe working load displayed can only be achieved by utilizing Dayton Superior B12 High Strength Coil Rod and B25 Heavy Coil Nuts.

Maximum safe working load based on a safety factor of approximately 1.5:1.

Maximum safe working load per unit - 48,000 lbs. (212kN)

To Order:

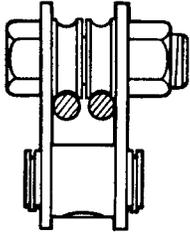
Specify: (1) quantity, (2) name

Example:

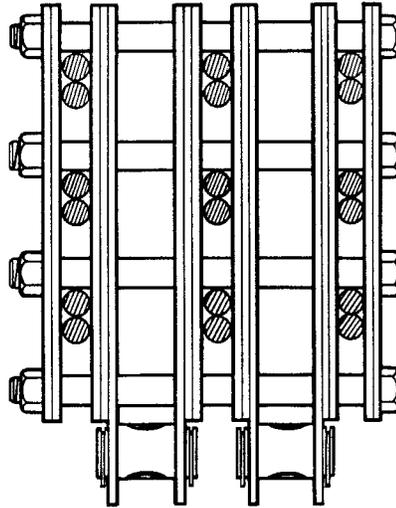
500, H56R Strand Strand Restraining Devices

Special Custom Units

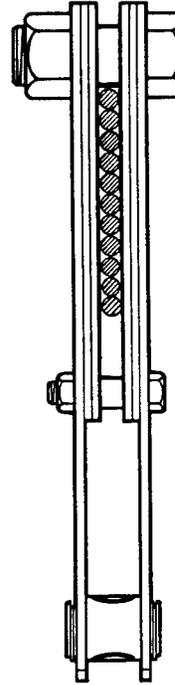
Many special or custom variations of strand restraining devices are available. The interchangeability of Dayton Superior designs and individual parts allow for great flexibility and economy in the fabrication of "specials".



Special Heavy
Duty Unit



Special Triple Row Unit



Special Stacked
Strand Unit

Kodi Klip® K-Klips

Application:

Use wherever rebar connections are required, specifically on site-pour, precast, tilt-up, concrete applications, pre-stress and pools.

Features:

- Saves time, money and provides stronger rebar connections using the patented four-point grip system that gives more consistent and stable connections
- Dramatically reduces wracking and eliminates unwanted motion
- K-KLIPS are made of high-strength and temperature resistant polycarbonate material
- Works with black, epoxy, stainless, galvanized & composite rebar

Sizes:

- Available in imperial & metric sizes for #3 [6mm] to #6 [20mm] rebar

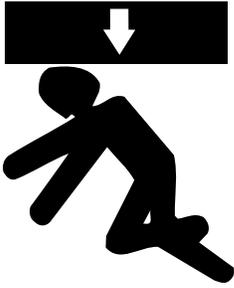
How To Order:

- Choose the size K-KLIP you need. Within product numbering system, the first number = TOP rebar size and second number = BOTTOM rebar size.

Example: Part # KCS324 - Violet color

- Imperial - #3 to #4 Rebar
- #3 is the top rebar size and
- #4 is the bottom rebar size



	<div data-bbox="539 237 1448 357" style="background-color: red; color: white; text-align: center; padding: 5px;"> WARNING</div> <div data-bbox="539 357 1448 625" style="text-align: center; padding: 10px;"><h3>Improper Use of Concrete Accessories Can Cause Severe Injury or Death</h3><p>Read, understand and follow the information and instructions in this publication before using any of the Dayton Superior concrete accessories displayed herein. When in doubt about the proper use or installation of any Dayton Superior concrete accessory, immediately contact the nearest Dayton Superior Service Center or Technical Service Department for clarification. See back cover for your nearest location.</p></div>
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Dayton Superior products are intended for use by trained, qualified and experienced workers only. Misuse or lack of supervision and/or inspection can contribute to serious accidents or deaths. Any application other than those shown in this publication should be carefully tested before use.

The user of Dayton Superior products must evaluate the product application, determine the safe working load and control all field conditions to prevent applications of loads in excess of a product's safe working load. Safety factors shown in this publication are approximate minimum values. The data used to develop safe working loads for products displayed in this publication are a combination of actual testing and/or other industry sources. Recommended safe working loads given for the products in this publication must never be exceeded.

Worn Working Parts

For safety, concrete accessories must be properly used and maintained. Concrete accessories shown in this publication may be subject to wear, overloading, corrosion, deformation, intentional alteration and other factors that may affect the device's performance. All reusable accessories must be inspected regularly by the user to determine if they may be used at the rated safe working load or should be removed from service. The frequency of inspections depends upon factors such as (but not limited to) the amount of use, period of service and environment. It is the responsibility of the user to schedule accessory hardware inspections for wear and remove the hardware from service when wear is noted.

Shop or Field Modification

Welding can compromise a product's safe working load value and cause hazardous situations. Knowledge of materials, heat treating and welding procedures is necessary for proper welding. Consult a local welding supply dealer for assistance in determining required welding procedures.

Since Dayton Superior cannot control workmanship or conditions in which modifications are done, Dayton Superior cannot be responsible for any product

Interchangeability

Many concrete accessory products that Dayton Superior manufactures are designed as part of a system. Dayton Superior strongly discourages efforts to interchange products supplied by other manufacturers with components supplied by Dayton Superior. When used properly, and in accordance with published instructions, Dayton Superior products have proven to be among the best designed and safest in the industry. Used improperly or with incompatible components supplied by other manufacturers, Dayton Superior products or systems may be rendered unsafe.

Installation

WARNING

1. Dayton Superior Corporation products shall be installed and used only as indicated on the Dayton Superior Corporation installation guidelines and training materials.
2. Dayton Superior Corporation products must never be used for a purpose other than the purpose for which they were designed or in a manner that exceeds specific load ratings.
3. All instructions are to be completely followed to ensure proper and safe installation and performance.
4. Any improper misuse, misapplication, installation, or other failure to follow Dayton Superior Corporation's instruction may cause product malfunction, property damage, serious bodily injury and death.

THE CUSTOMER IS RESPONSIBLE FOR THE FOLLOWING:

1. Conformance to all governing codes
2. Use of appropriate industry standard hardware
3. The integrity of structures to which the products are attached, including their capability to safely accept the loads imposed, as evaluated by a qualified engineer.

SAFETY INSTRUCTIONS:

All governing codes and regulations and those required by the job site must be observed. Always use appropriate safety equipment

Design Changes

Dayton Superior reserves the right to change product designs, rated loads and product dimensions at any time without prior notice.



DAYTON[®]
SUPERIOR

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888-977-9600

**BUILDING
STRENGTH™**

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