Application

Exterior hangers generally utilize two different types of end clips, a 90° end to support the interior formwork and a 45° end to support the overhang forming on the exterior side. Dayton Superior offers several exterior hangers that are especially designed to support bridge deck formwork loads, consisting of a live load, dead load, formwork load and usually on the exterior overhang a concrete conveyor and/or a finishing machine load.

Occasionally, 45° half hangers may be required, especially for use in situations where prestressed concrete or steel stay-in-place forms are used to form the interior bays of a bridge deck.

Exterior bridge deck hangers are designed for use on rolled structural steel beams, fabricated steel plate girders or precast/prestressed concrete girders. Hangers are designed to be used with full bearing under the end clips. It is essential to check the exact beam width dimensions before ordering.

For safety reasons, a qualified person must accurately calculate the loads induced into an overhang bracket and exterior hanger. Calculated loads must be equal to or less than the hanger safe working load as well as the overhang bracket’s safe working load. The user is encouraged to contact the closest Dayton Superior Technical Service Department for assistance if they are not qualified to determine the applied loads and the resulting hanger and overhang bracket spacing.
Exterior Hangers

C-60 Type 1-A Pres-Steel Hanger

The Type 1-A Pres-Steel Hangers are especially designed to be used when there is a fillet, on the interior side of the beam. This hanger consists of a 90° end clip and 45° end clip electrically resistance welded to a single 0.375” diameter wire strut.

Both end clips are designed to work with 1/2” diameter coil bolts or coil rods. The design allows installation and adjustment from the top of the formwork.

**SAFETY NOTE:**
This hanger should be used to support overhang brackets only when the weight of concrete finishing machine and/or conveyor machine is supported directly on the exterior bridge beam.

**To Order:**
Specify: (1) quantity, (2) name, and (3) flange width.
**Example:**
750 pcs. C-60 Type 1-A Pres-Steel Hanger for 12” flange.

C-60 Type 2-A Pres-Steel Hanger

The Type 2-A hanger is similar in design to the Type 1-A hanger above, except it is designed to provide a 1” haunch relief on the interior side.

Both end clips are designed to work with 1/2” diameter coil bolts or coil rods.

**SAFETY NOTE:**
This hanger should be used to support overhang brackets only when the weight of concrete finishing machine and/or conveyor machine is supported directly on the exterior bridge beam.

**To Order:**
Specify: (1) quantity, (2) name, (3) flange width.
**Example:**
1,250 pcs. C-60 Type 2-A Pres-Steel Hanger for 24” flange.

**Safe Working Load**
3,500 lbs. per Side

S.W.L. provides a factor of safety of approximately 2 to 1.

**Safe Working Load**
2,375 lbs. per Side

S.W.L. provides a factor of safety of approximately 2 to 1.
Exterior Hangers

C-62 Type 6-A Pres-Steel Hanger

This is an excellent hanger to use when a higher haunch is required on the interior side of the exterior beam and a finishing and/or concrete conveyor is to be supported on the exterior overhang formwork. Designed to work with a haunch height of up to 2 1/2".

End clips accept 1/2" diameter coil rod or coil bolts.

Safe Working Load
4,000 lbs. on 45° Side
2,800 lbs. on 90° Side

S.W.L. provides a factor of safety of approximately 2 to 1.

SAFETY NOTE:
To develop the safe working load of this hanger requires the use of a 1/2" E-7 Cut Washer be used between the top of the 90° end clip and the 1/2" Coil Nut.

To Order:
Specify: (1) quantity, (2) name, and (3) flange width.

Example:
25 pcs. C-62 Type 6-A Pres-Steel Hanger for 16" flange.

C-60 Type 7-A Pres-Steel Hanger

The Type 7-A hanger is similar to the Type 1-A but can accommodate haunch heights up to 1-1/2". Use with 1/2" diameter coil rod or bolts.

Safe Working Load
2,375 lbs. per Side

S.W.L. provides a factor of safety of approximately 2 to 1.

To Order:
Specify: (1) quantity, (2) name, and (3) flange width.

Example:
1,850 pcs. C-60 Type 7-A Pres-Steel Hanger for 12" flange.

SAFETY NOTE:
This hanger should be used to support overhang brackets only when the weight of concrete finishing machine and/or conveyor machine is supported directly on the exterior bridge beam.
Exterior Hangers

C-60 Type 8-A Pres-Steel Hanger

The Type 8-A hanger consists of a 15° end clip and a 45° end clip, both designed to accept ½" diameter coil rods or bolts. The 15° end supports the interior formwork while the 45° end supports the overhang bracket and the exterior formwork.

Available in two styles, standard and heavy, with the heavy unit having a higher safe working load.

Typically used on precast/prestressed concrete beams and girders as the 15° interior end clip allows additional clearance below the formwork to support the ledgers. A B-42 Batter Washer is recommended for use beneath the ledgers, to allow for proper bearing of the head of the ½" diameter coil bolt.

The 15° end clip has a separate interlock welded to it, which resists the lateral loads induced into the hanger due to the overhang bracket loads.

As with other types of pres-steel hangers, installation and adjustment to grade is from the top of the beams.

To Order:
Specify: (1) quantity, (2) name, style and (3) flange width.

Example:
275 pcs. C-60 Type 8-A Pres-Steel Hanger for 12" flange.

Safe Working Load
4,500 lbs. per Side - Standard
6,000 lbs. per side - Heavy

S.W.L. provides a factor of safety of approximately 2 to 1.
Exterior Hangers

C-60 Type 4-A and 9-A Pres-Steel Hangers

The Type 4-A Pres-Steel Hanger is fabricated with a 90° interlock type end clip and a 45° end clip, both of which are electric resistance welded to a 0.440" diameter wire strut. Both end clips are designed to accept ½” diameter coil bolts and/or coil rods and nuts.

Type 9-A hanger is similar to the 4-A, except it is fabricated from ¾” diameter strut wire and heavier end clips designed to accept ¾” diameter coil rods and/or bolts.

The Type 9-A hanger is intended for use with the C-89-L Heavy Duty Bridge Overhang Brackets, which requires the use of a ¾” diameter coil bolt.

The 90° end on both hangers has an interlock end clip which resist lateral forces from the loads applied at the 45° end.

<table>
<thead>
<tr>
<th>Type</th>
<th>Safe Working Load</th>
<th>Bolt Diameter</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-A</td>
<td>6,000 lbs. per Side</td>
<td>1/2&quot; 1/2&quot;</td>
<td>3&quot;</td>
<td>.440&quot;</td>
<td>1/2&quot;</td>
<td>2&quot;</td>
</tr>
<tr>
<td>9-A</td>
<td>11,300 lbs. per Side</td>
<td>3/4&quot; 3/4&quot;</td>
<td>4-1/2&quot;</td>
<td>.750&quot;</td>
<td>3/4&quot;</td>
<td>3-1/2&quot;</td>
</tr>
</tbody>
</table>

S.W.L. provides a factor of safety of approximately 2 to 1.

SAFETY NOTE:
To develop the safe working load of the Type 9-A requires the use of 3/4" B-13-H (Heavy Hex) Coil Nuts or two 3/4" B-13 Coil Nuts with a 3/4"E-7 Cut Washer.

To Order:
Specify: (1) quantity, (2) name, and (3) flange width.
Example:
150 pcs. C-60 Type 9-A Pres-Steel Hanger for 18" flange.

C-67 Tie Bar Beam Clip Pre-stress Hanger

C-67 Tie Bar Beam Clip Pre-stress Hanger is an ideal half hanger for supporting overhang formwork over stay-in-place decking. These half hangers are fabricated with the strut wire formed into a “J” shape so it engages the edge of the flange. A 90 degree interlock end clip is welded to the strut wire to provide increase capacity. This hanger is furnished with a 90 degree end clip that accepts a ½” diameter coil rod or bolt.

<table>
<thead>
<tr>
<th>Flange Thickness</th>
<th>0.75</th>
<th>1.00</th>
<th>1.25</th>
<th>1.50</th>
<th>1.75</th>
<th>2.00</th>
<th>2.25</th>
<th>2.50</th>
<th>2.75</th>
<th>3.00</th>
</tr>
</thead>
</table>

To Order:
Specify: (1) quantity, (2) name, and (3) flange thickness, (4) anti-tip plate, if needed
Example:
150 pcs. C-67 Tie bar Beam Clip Pres-Stress Hanger, 1.00 Flange Thickness
Exterior Hangers

C-68 Type 4-AB and 9-AB Pres-Steel Ty-Down Half Hangers

The C-68 is an ideal half hanger for supporting overhang formwork when stay-in-place metal decking is used on the interior bays of a bridge deck.

These half hangers are fabricated with the strut wire formed into a “J” shape so it engages the edge of the flange. A 90° interlock end clip is welded to the strut wire to provide increased capacity.

The Type 4-AB half hanger is furnished with a 45° end clip that accepts a 1/2” diameter coil rod or bolt.

Type 9-AB hanger has a heavier strut wire and end clips and is designed to accept a 3/4” diameter coil rod or bolt. It is intended for used with the C-89-L Heavy Duty Bridge Overhang Brackets.

SAFETY NOTE:
To develop the safe working load of the Type 9-AB half hanger requires the use of a 3/4” B-13-H (Heavy Hex) Coil Nut or 3/4” B-13 Coil Nut with two 3/4” E-7 cut washer.

To Order:
Specify: (1) quantity, (2) name, and (3) flange width and (4) flange thickness.

Example:
150 pcs. C-60 Type 9-AB Pres-Steel Ty-Down Half Hanger for 18” wide x 1 1/2” thick flange.

Metal Deck Application

<table>
<thead>
<tr>
<th>Type</th>
<th>Safe Working Load</th>
<th>Bolt Diameter</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-AB</td>
<td>6,000 lbs.</td>
<td>1/2”</td>
<td>3”</td>
</tr>
<tr>
<td>9-AB</td>
<td>11,300 lbs.</td>
<td>3/4”</td>
<td>4-1/2”</td>
</tr>
</tbody>
</table>

S.W.L. provides a factor of safety of approximately 2 to 1.
Exterior Hangers

C-41 Type 4-A Coil Rod Hanger

This hanger is fabricated with a 45° end clip electrically resistance welded to the end of a 0.444" diameter wire strut that is bent an angle. The opposite end is threaded with a length of 1/2" coil threads. The user must specify the required length of threads.

The threaded end of the hanger supports the interior formwork while the 45° end clip supports the overhang bracket and the applied formwork loads. When used on steel beams or girders, legs formed at 90° to the top flange are recommended. For concrete girders or box beams, legs formed at 15° to vertical are suggested.

The interior formwork is adjusted to grade, after the ledgers are installed, by the worker reaching under the ledgers and adjusting the coil nut – raising or lowering the ledgers as required.

Designed to accommodate haunch heights of 1/2" or greater and comes equipped with a 1" breakback.

After the deck has been placed and the formwork has been stripped, a length of pipe is placed over the exposed end of the hanger, rotated back and forth until the end “breaks off” at the breakback.

Safe Working Load
4,500 lbs. per Side

S.W.L. provides a factor of safety of approximately 2 to 1.

To Order:
Specify: (1) quantity, (2) name, (3) flange width, (4) total drop, and (5) thread length.

Example:
500 pcs. C-41 Type 4-A Coil Rod Hanger for 12" flange, with 14" total drop, provide 8" thread.

Optional for Concrete Beams
Exterior Hangers

C-63 Type 4-AB Pres-Steel Hook Half Hanger

Used when one-sided forming is required and field welding to the beam is prohibited. Can be furnished electro-plated or hot dip galvanized after fabrication for corrosion resistance, if specified.

Type 4-AB hanger is designed for use with 1/2” diameter coil bolts. Manufactured using a 45° end clip welded to formed wire strut. The interior end of the wire strut is wrapped-around and welded to a 1/4” thick steel beam clamp. The wrapped-around wire strut reinforces and strengthens the beam clamp which slips over the flange of a steel beam anchoring the hanger.

<table>
<thead>
<tr>
<th>Type</th>
<th>Maximum Safe Working Load</th>
<th>Bolt Diameter</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>End</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-A</td>
<td>6,000 lbs.</td>
<td>1/2” 1/2” 5”</td>
<td>.440”</td>
<td>2”</td>
<td></td>
</tr>
<tr>
<td>4-AN</td>
<td>6,000 lbs.</td>
<td>1/2” 3/4” 5”</td>
<td>.440”</td>
<td>2”</td>
<td></td>
</tr>
<tr>
<td>9-AN</td>
<td>11,300 lbs.</td>
<td>3/4” 3/4” 7”</td>
<td>.750”</td>
<td>3-1/2”</td>
<td></td>
</tr>
</tbody>
</table>

To Order:
Specify: (1) quantity, (2) name, (3) “A” dimension
Example:
100 pcs. C-64 Type 4-AN Pres-Steel Half Hanger, “A” = 12”.

SAFETY NOTE: The safe working load of the Type 9-A hanger requires ¾” B-13-H (Heavy Hex) Coil Nuts or two ¾” B-13 Coil Nuts with a ¾” E-7 Cut Washer.
Exterior Hangers

C-24 Type 4-AP, 4-APR and 9 APR Pres-Steel Precast Half Hanger

The Dayton Superior C-24 Pres-Steel Precast Half Hangers are available in three styles and capacities and are designed to be cast into the top portion of a precast/prestressed concrete girder. At the bridge site, these hangers are used to support the bridge overhang bracket, formwork, live load and dead load as well as the weight of a bridge deck finishing machine and/or concrete conveyer.

The bridge contractor must be certain of his bridge overhang bracket spacing before advising the precaster of the centers at which to install these hangers.

Install the C-24 half hangers into the concrete maintaining the proper 1/8" setback from the edge of the girder. After the end of the strut wire is pushed into the fresh concrete, slightly vibrate the surrounding concrete so the strut wire is completely and solidly embedded into the concrete. The legs of the end clip must rest solidly on the top surface of the concrete.

An optional Bearing Plate can be welded beneath the end clip on Type 4-AP and 4-APR half hangers which will aid in spreading the hanger load to a wider area of concrete. Bearing Plates are generally required on half hangers used in girders having a flange thickness less than 5". For hanger modifications required for use with a flange thickness less than 5", please contact our nearest Technical Service Department for assistance. A Bearing Plate is standard on Type 9-APR half hangers.

To Order:
Specify: (1) quantity, (2) name, (3) type.
Example:
715 C-24 Type 4-APR Pres-Steel Precast Half Hanger

Safe Working Load
3,300 lbs. for 4-AP
6,000 lbs. for 4-APR
11,300 lbs. for 9-APR

SWL of hanger provides a factor of safety of approximately 2 to 1.
Exterior Hangers

C-25 45° Adjustable Half Hanger

This adjustable half hanger consists of a 45° end clip welded to a length of 1/2" diameter coil rod, two stirrup clips and five 1/2" coil nuts. The standard length is 8". Other lengths, additional stirrup clips and coil nuts are available on request.

These half hangers are used to support overhang brackets for exterior deck formwork where one-sided forming is required, welding is not permitted and rebar or headed stud shear connectors are available to connect the hanger to.

Stirrup clips are available in #3 thru #8 and #11 rebar sizes or 3/8", 1/2", 5/8", 3/4", 7/8" and 1-3/8" stud diameters as required

End clip accepts a 1/2" diameter coil bolt or coil rod.

SAFETY NOTE:
In order to develop the safe working load, two coil nuts must compress each stirrup clip securely to the rebar stirrup or shear stud. Failure to accomplish a secure connection will greatly reduce the safe working load of the hanger.

To Order:
Specify: (1) quantity, (2) name, (3) type, (4) length, (5) number of clips and (6) clip size.

Example:
125 pcs. C-25 Pres-Steel Adjustable Half Hanger, 18" long with 3 clips for #6 Rebar

Safe Working Load
3,000 lbs. with 2 clips

SWL of hanger provides a factor of safety of approximately 2 to 1.
C-25 45° Heavy Duty Adjustable Half Hanger

This adjustable half hanger consists of a 45° end clip welded to two 1/2" diameter coil rods, two connection bars and five 1/2" coil nuts. The standard length is 12". Other lengths are available on request.

These half hangers are used to support overhang brackets for exterior deck formwork where one-sided forming is required, welding is not permitted and rebar or headed stud shear connectors are available to connect the hanger to.

To Order:
Specify: (1) quantity, (2) name, (3) type, (4) length, (5) and number of connection bars.

Example:
125 pcs. C-25 Heavy Duty Adjustable Half Hanger, 12" long with 2 connection bars.

Safe Working Load
6,000 lbs.

SWL of hanger provides a factor of safety of approximately 2 to 1.
Exterior Hangers

C-24 Pres-Steel Steel Beam Half Hangers

C-24 Pres-Steel Steel Beam Half Hangers are produced using a single end clip welded to a formed wire strut and are used where conditions prevent the use of regular exterior hangers.

Type S Half Hangers are designed for use on steel beams. The standard Type S Half Hanger uses a wire strut that measure 6” from the centerline of the bolt to the end of the strut.

C-24 Pres-Steel Concrete Beam Half Hangers

The Type C Pres-Steel Half Hanger used on concrete beams are the same as the above Half Hangers with the exception of the standard wire strut length.

These concrete beam half hangers are designed to be welded to the rebar shear connectors that extend from the top surface of a precast concrete girder.

More weld and hanger capacity can be achieved by welding a suitably sized steel plate to the rebar shear connectors, using four vertical fillet welds, to weld the plate to the share connectors. Then weld the strut wire to the steel plate. May be applied to steel beams by welding to the shear connector studs.

This application is shown in the Special Precast Concrete Girder Application to the right.

Please see the General and Technical Section of this handbook for additional information on field welding of half hangers.
Exterior Hangers

C-24 Pres-Steel Half Hanger

C-24 45° Pres-Steel Half Hangers are manufactured with a single 1/2" end section welded to a jogged wire strut and are used where conditions prevent the use of standard double-ended hangers.

Standard Style AC hangers measure 12" from the centerline of the bolt to the end of the strut. This style hanger is designed to be welded to the rebar stirrups of precast concrete bridge beams.

Standard Style AS hangers measure 6" from the centerline of the bolt to the end of the strut. These hangers are designed to be welded to the top surface of steel girders.

Lengths other than standard are available. Contact Dayton Superior for additional information.

Caution: Care must be exercised when welding hangers. Field welding may alter the strength of the wire strut and may limit the hanger to a much lower safe working load than that shown in the chart. Field tests should be conducted to verify actual safe working loads. See related notes on welding in the General and Technical Information Section

Proper welding procedures must be used when welding half hangers, as field welding may limit the safe working load of a hanger to less than the maximum SWL listed. Field tests should be conducted to establish the actual safe working load of the hanger.

<table>
<thead>
<tr>
<th>Hanger Type</th>
<th>Hanger Shape</th>
<th>Standard Length</th>
<th>Maximum SWL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-AC</td>
<td></td>
<td>12&quot;</td>
<td>3,500 lbs.</td>
</tr>
<tr>
<td>1-AS</td>
<td></td>
<td>6&quot;</td>
<td>3,500 lbs.</td>
</tr>
<tr>
<td>4-AC</td>
<td></td>
<td>12&quot;</td>
<td>6,000 lbs.</td>
</tr>
<tr>
<td>4-AS</td>
<td></td>
<td>6&quot;</td>
<td>6,000 lbs.</td>
</tr>
</tbody>
</table>

Notes:

- Safe working load provides a factor of safety of approximately 2 to 1.
- Coil bolt or coil rod must penetrate through the coil nut a minimum of one bolt diameter.
- When used on concrete beams, the safe working load shown is based on normal weight concrete having reached a minimum compressive strength of 5,000 psi.
- Requires a minimum concrete flange thickness of 5".
- For hangers used on concrete beams with conditions not meeting above requirements please contact Dayton Superior Technical Service.
- Longer length strut wire is available on request.

To Order:
Specify: (1) quantity, (2) name, (3) strut length

Example:
75 pcs. C-24 Type 1-AC Pres-Steel Half Hanger, with 18" long strut

C-60 Type 1-4A Combination Pres-Steel Hanger with Supplemental 90° Leg Pres-Steel Half Hanger

Special overhang conditions may require the use of a 90° bolt to support the back end of a bridge overhang bracket. When this situation is encountered the C-60 Type 4-A Pres-Steel Hanger may be ordered with a supplemental 90° end clip and strut wire electrically resistance welded to the main support hanger as shown in the sketch.

SWL of Supplemental 90° End
Is 1,000 lbs. with an approximate factor of safety of 2 to 1
Exterior Hangers

C-61 Combination Exterior Hanger

Ideal hanger to have on-hand to minimize down time from hanger shortages, unexpected beam sizes and etc. Hanger consists of three individual parts, a 90° Interior End Section with an integral interlock, a length of 3/4” diameter coil rod and a Combination Exterior End Section.

The 3/4” diameter coil rod and the two End Sections are assembled in the field to make up a complete hanger. The length of the 3/4” diameter coil rod that connects the two End Sections is equal to the beam’s flange width.

Designed specifically for use with bridge overhang brackets that utilize a horizontal member and diagonal leg only and no vertical leg. The Combination End Section is used with a 1/2” diameter coil rod/bolt that can be used at any angle from 5° to 45°. In addition, this End Section is also designed to accept a 1/2” diameter coil rod/bolt installed at 90° to the top of the flange.

<table>
<thead>
<tr>
<th>End Section</th>
<th>Angle</th>
<th>Safe Working Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exterior</td>
<td>5° to 45°</td>
<td>6,000 lbs.</td>
</tr>
<tr>
<td>Exterior</td>
<td>90°</td>
<td>3,000 lbs.</td>
</tr>
<tr>
<td>Interior</td>
<td>90°</td>
<td>6,000 lbs.</td>
</tr>
</tbody>
</table>

C-61 Combination Interior Hanger

Two of the above 90° End Sections and a length of 3/4” diameter coil rod may be used to field assembly a 90° interior hanger.

<table>
<thead>
<tr>
<th>End Section</th>
<th>Angle</th>
<th>Safe Working Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior</td>
<td>90°</td>
<td>6,000 lbs. per side</td>
</tr>
</tbody>
</table>
Exterior Hangers

Shown below are several ideas for supporting the overhang formwork when the bridge design will not allow the use of conventional bridge overhang brackets.

**Wide Overhang on a Shallow Steel Beam**

**Short Overhang on a Shallow Steel Beam**

**Short Overhang on a Shallow Concrete Beam**
P-154 Bridge Girder Magnet

The P-154 Bridge Girder Magnet provides an easy method for precasters to form a void for the coil rod used to hang bridge overhang brackets. The magnet is designed to be used for AASHTO Type V and Type VI Bulb-Tee Girders.

PRODUCT FEATURES AND BENEFITS

- Magnet is reusable and eliminates the need for bridge hangers or drilling the precast beam.
- Magnet provides a strong connection with the precast form to provide precise placement of PVC sleeves.
- Magnet is fabricated to provide a void that is compatible with C-49 and C-89 type overhang brackets.
- Magnet attraction only on bottom of magnet.
- Shaft of magnet is 1" diameter to allow compatibility with standard PVC pipe.
- Base of magnet is molded with urethane material to provide a uniform void in the bottom of bridge girders and to eliminate any patch work required by precaster.

C-90 Clamp for Falsework

PRODUCT DESCRIPTION:

The C90 Clamp is designed as a longitudinal holding device for components in a falsework assembly. They are typically used to clamp angle iron to the bottom flange of a steel beam as a way to mount it on timber or other temporary supporting elements.

PRODUCT FEATURES AND BENEFITS:

The C90 Clamp is an engineered product that is manufactured from Forged Alloy Steel. It meets or exceeds all requirements for the clamp listed in California Office of Structure Construction, Falsework Memo No. 4 and 5.

PRODUCT SPECIFICATIONS:

- Rated Clamping force of up to 10 tons
- Proof tested to 52 kips for over 2.5:1 Factor of Safety at full rated load
- Made with 3/4-10 NC Grade 8 Bolt with Cup Point Hardened to Rc 45-53.
- Clamping Force (lbs) = 80 x Bolt Torque (ftlbs)
- Remains in Elastic Range at 90 ft-lbs Torque
- Rated Bolt Torque is 250 ft-lbs (650 ft-lbs max)
- It’s use should be restricted to beams with non-sloping flanges or flat angles and plates.
- Holding force is dependent on the actual friction coefficient of the surfaces being clamped.