

Precast
Concrete Products

Bridge Deck Forming and
Hanging Systems

Reinforcing
Bar Supports

Concrete
Anchoring Systems

Rock Anchoring
and Bolt Systems



ACROW-RICHMOND

THE HIDDEN STRENGTH™

LA FORCE CACHÉE

CONCRETE FORMING SYSTEMS

LIGHT DUTY
FORMING
MEDIUM & HEAVY
DUTY FORMING



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


















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






































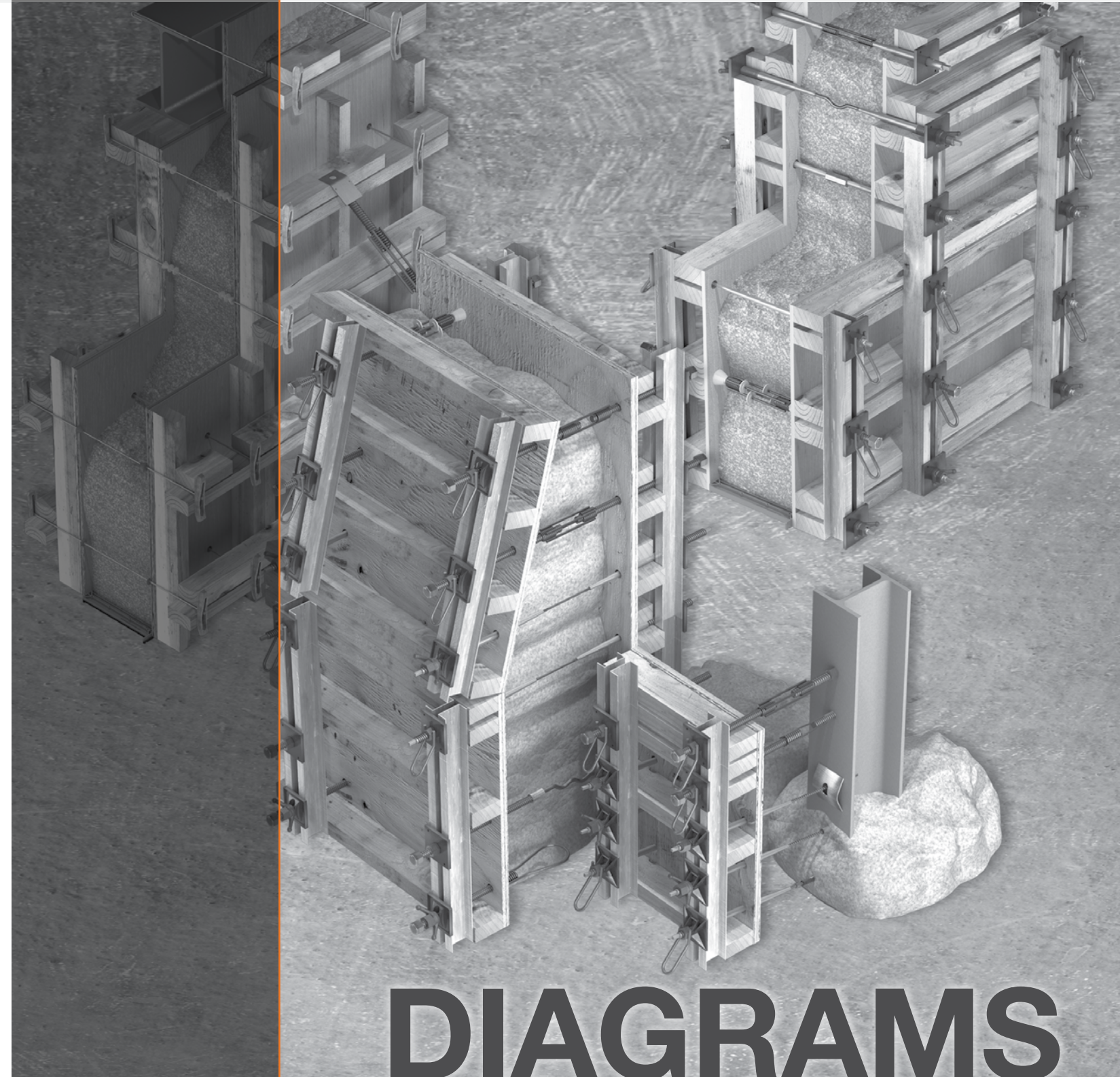
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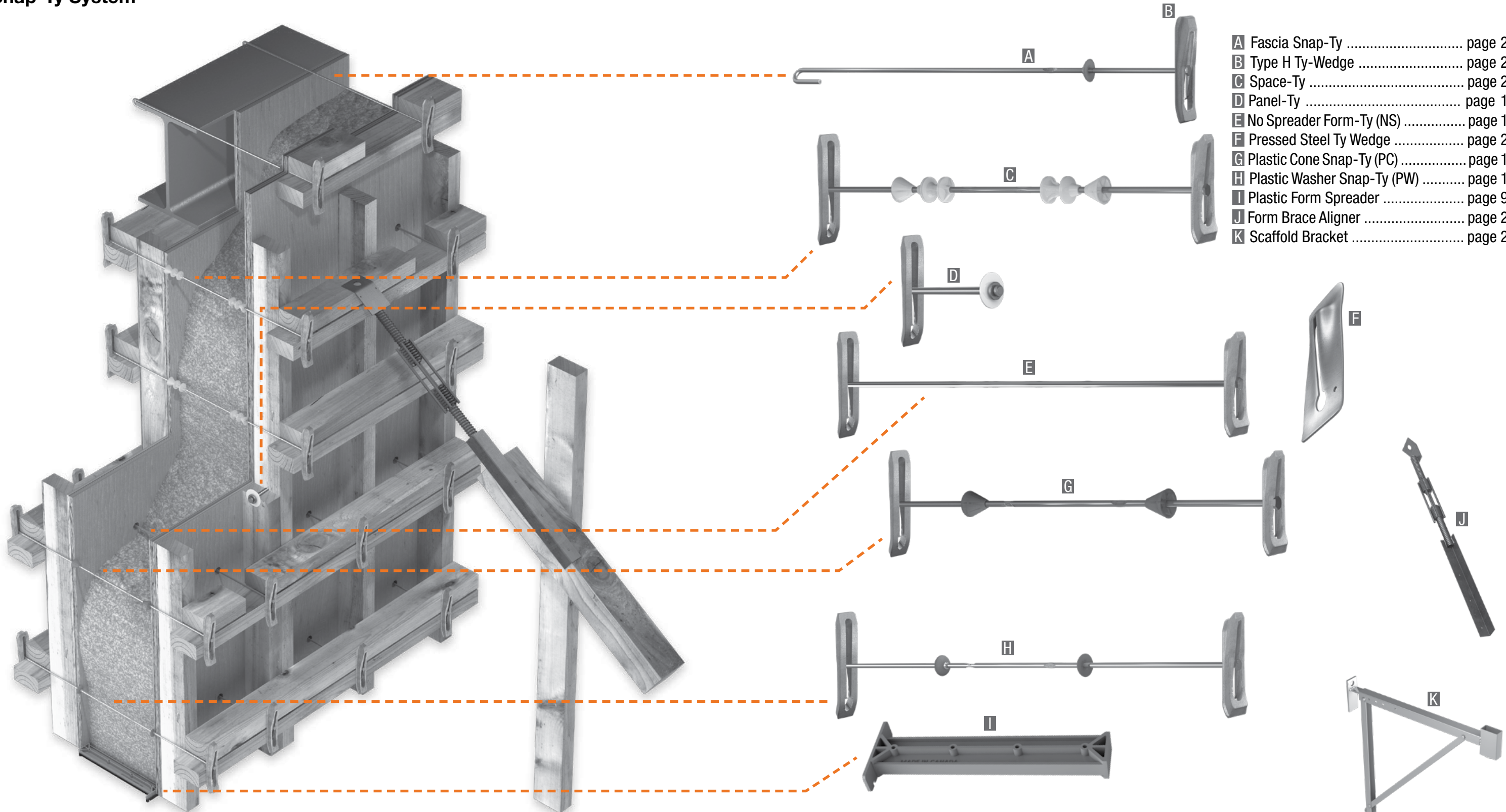
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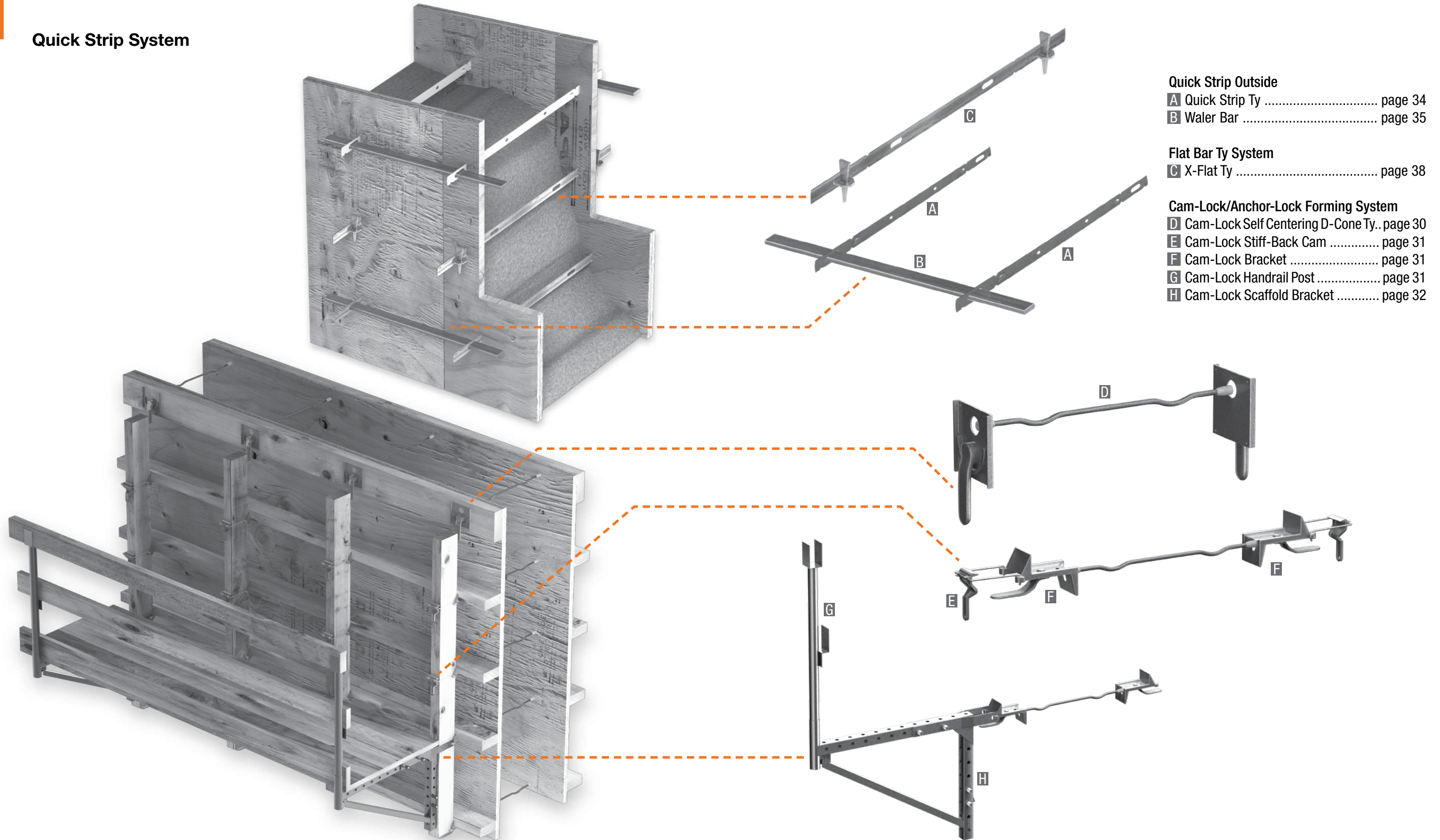
DIAGRAMS

Snap-Ty System

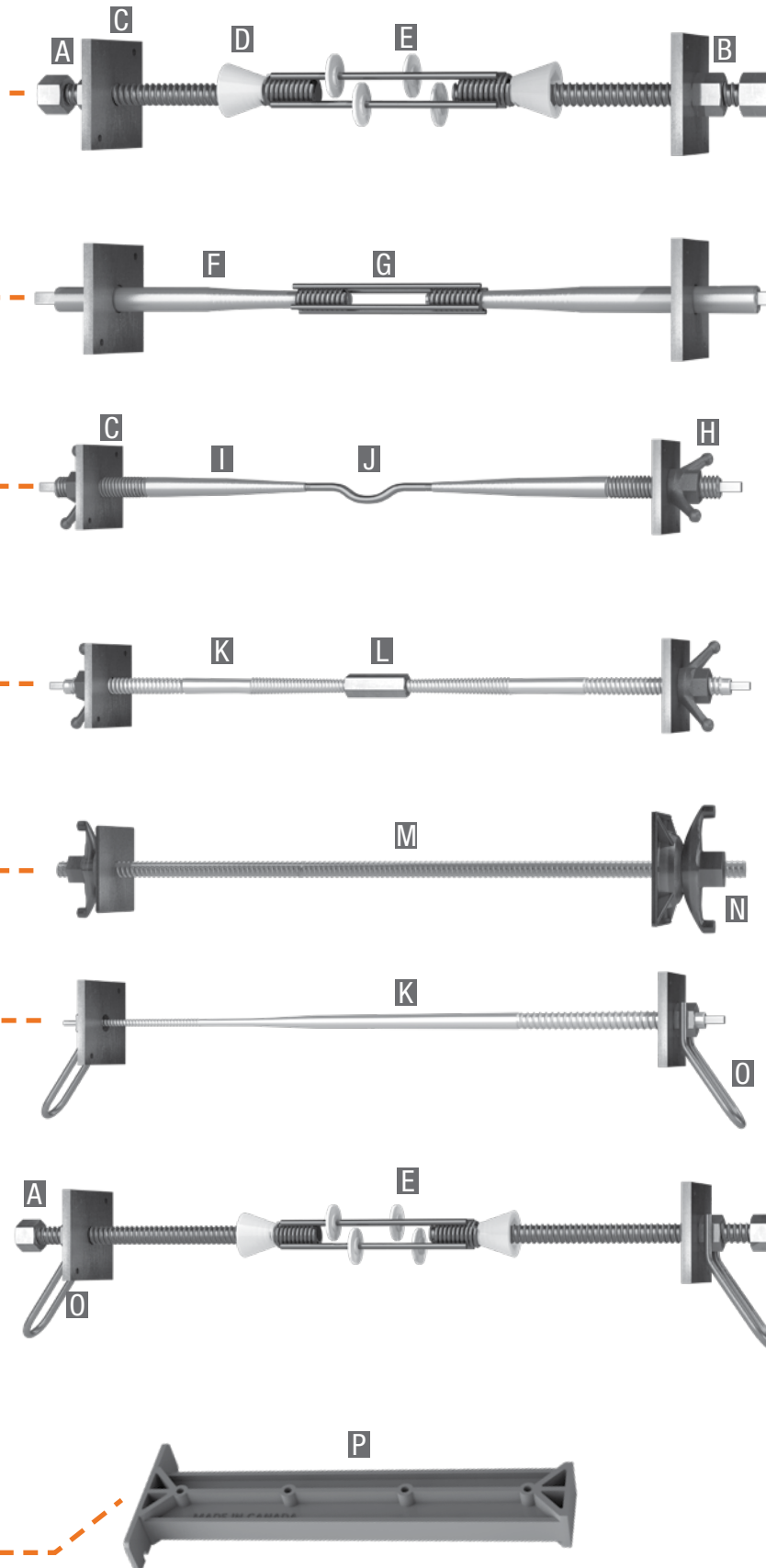
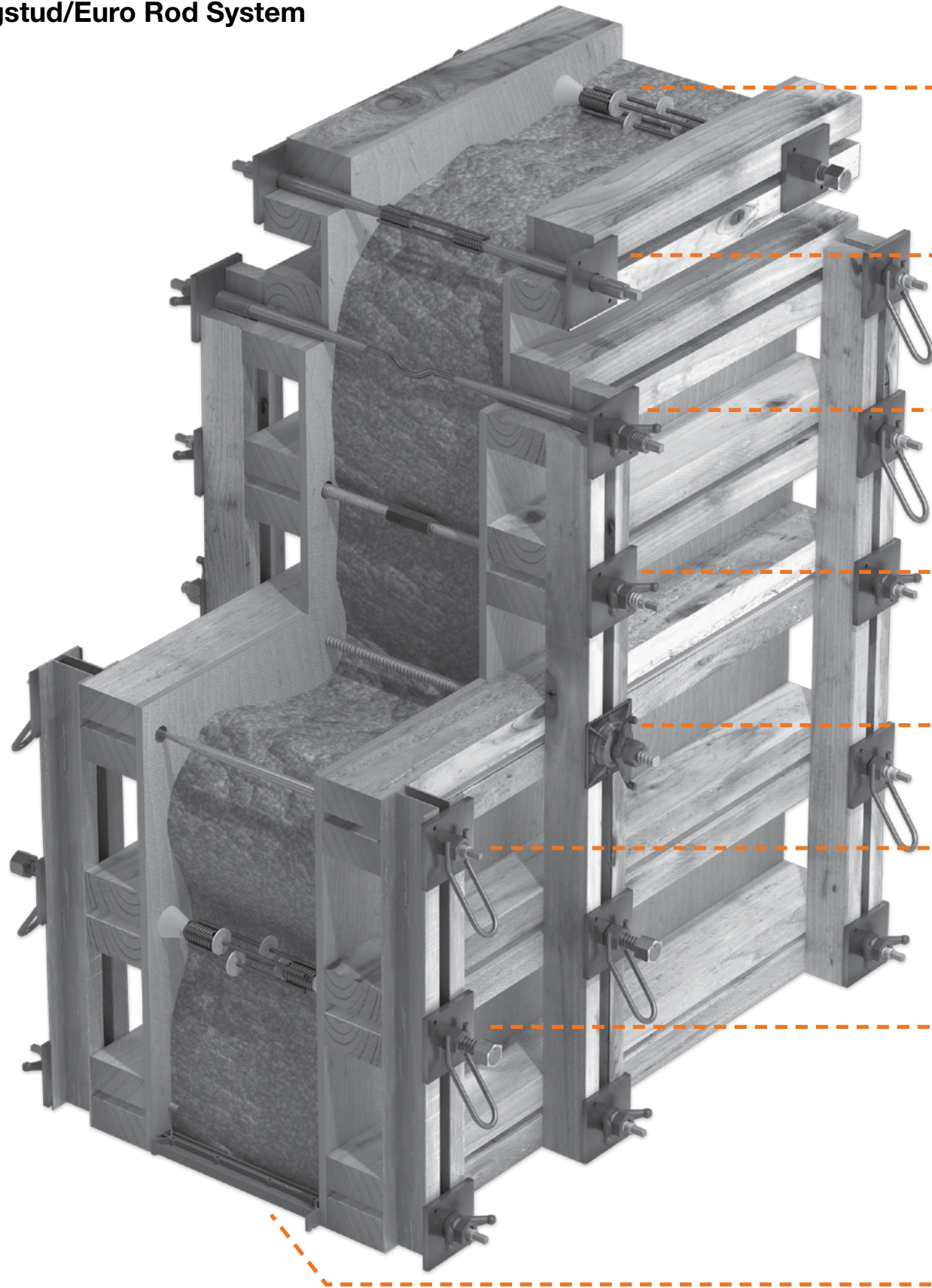


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Quick Strip System



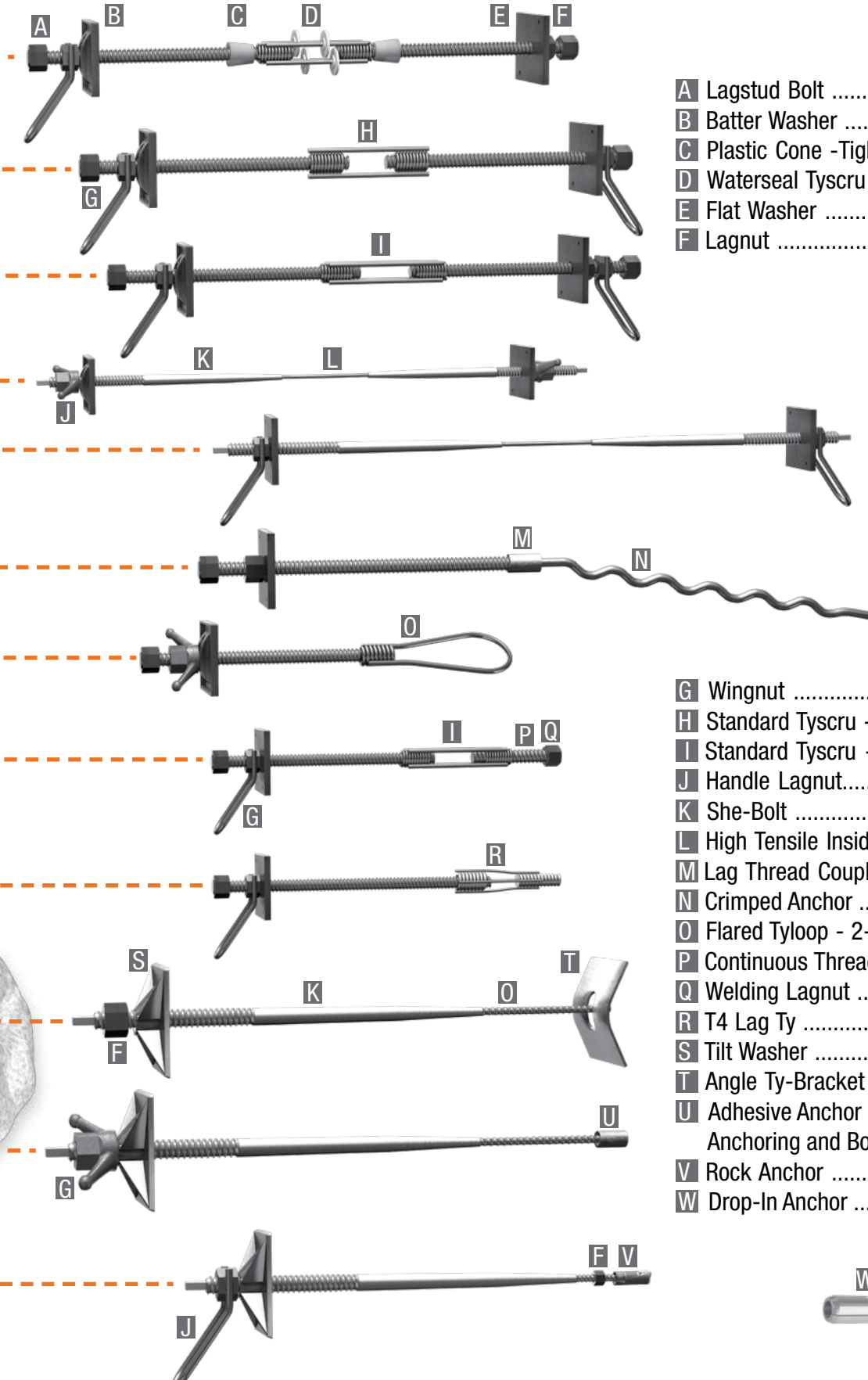
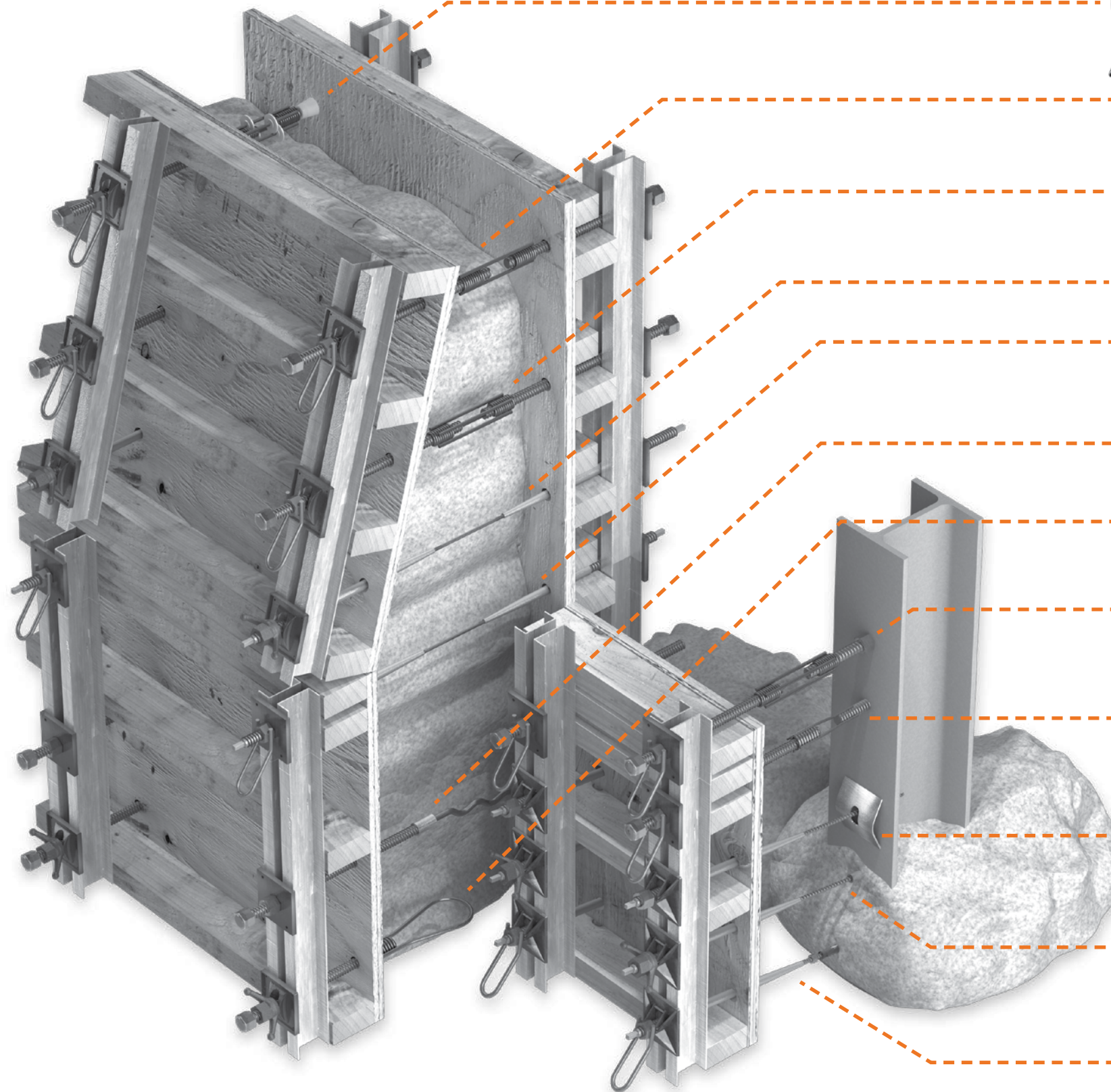
Lagstud/Euro Rod System



Cam-Lock/Anchor-Lock Forming System

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Lagstud System



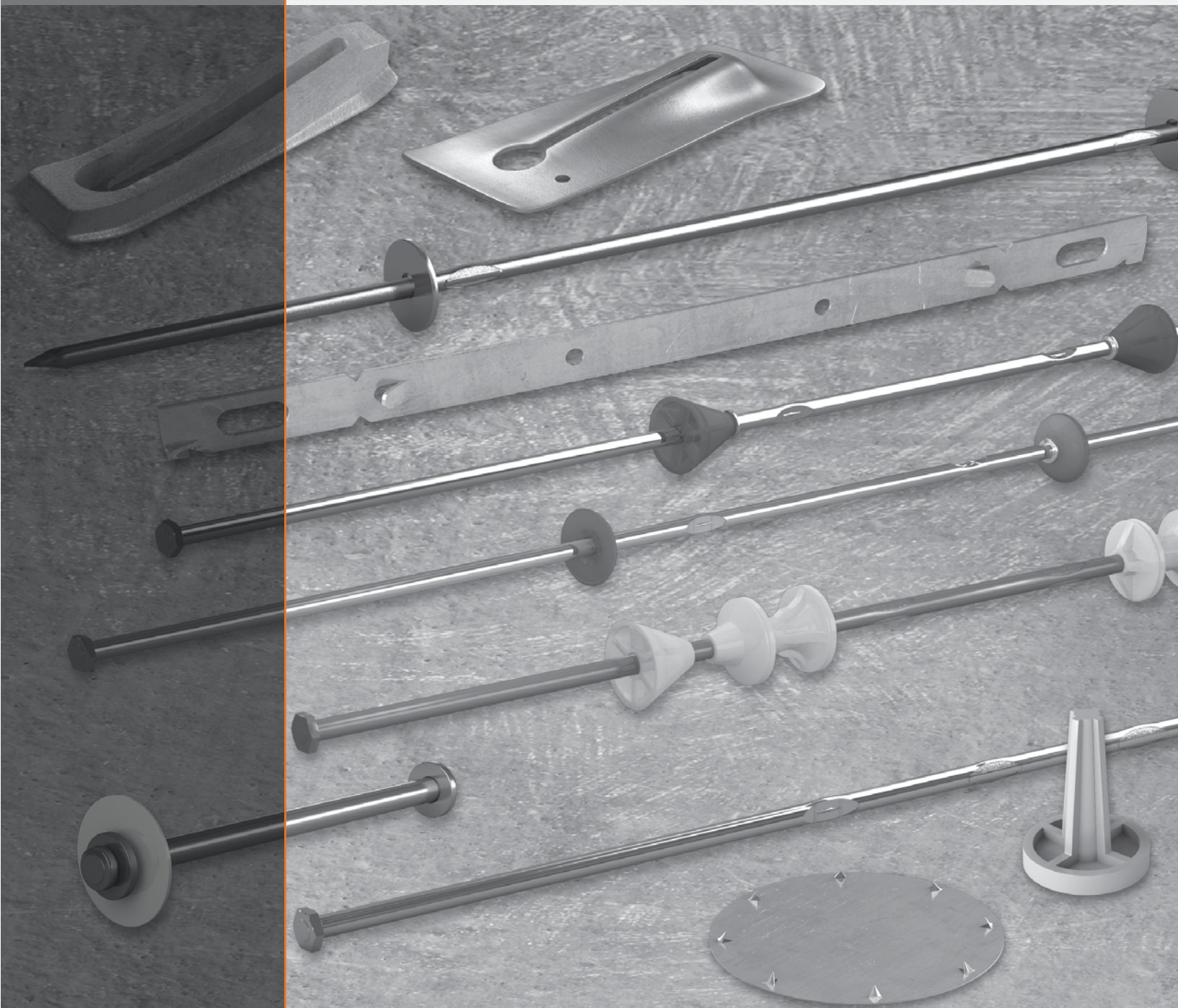
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NOTES



LIGHT DUTY

Snap-Ty

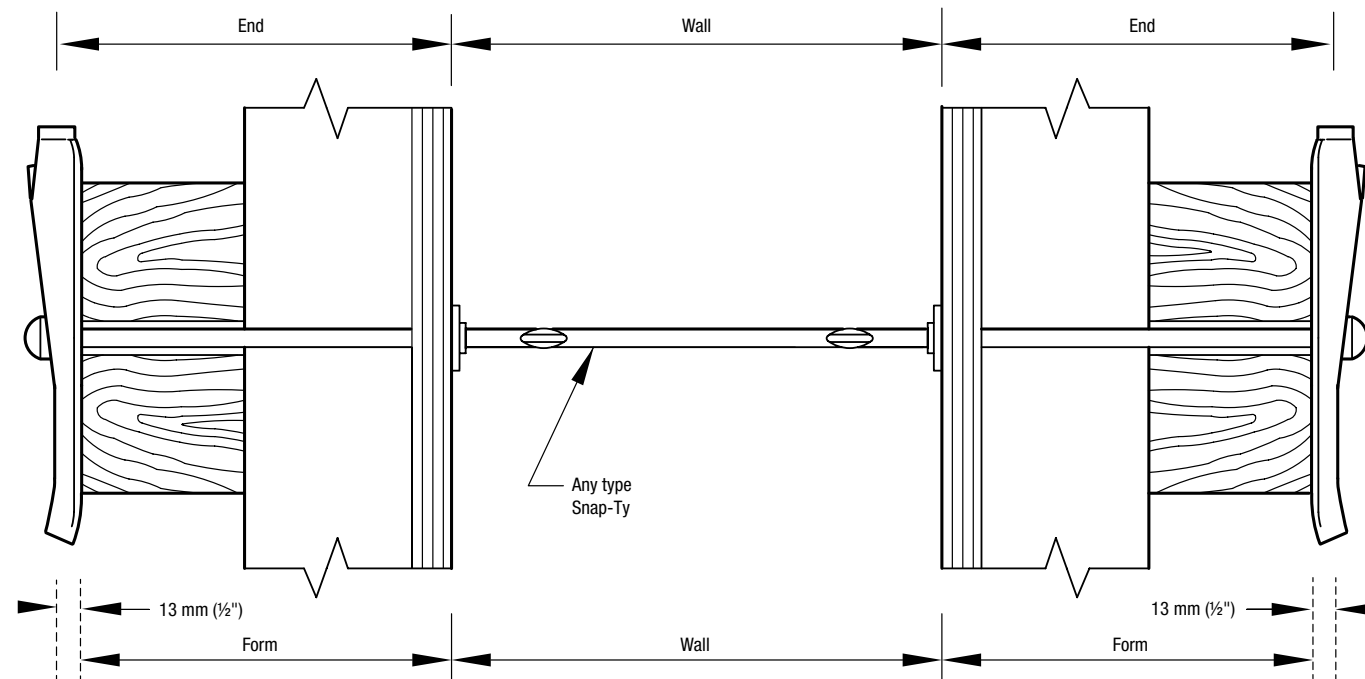
AR Snap-Tys are fabricated to fit either prefabricated panels or built-in-place forms. They are specifically designed for quick, easy and accurate erection of light formwork. End sizes can be as short as 32 mm (1¼") for Steel Washer Snap-Tys or as long as you need them to fit a special condition. Snap-Tys can be fabricated for any required wall thickness up to 6 m (19'-6") in length. Spreader washers are precisely located to give exact wall thicknesses. Break points are located at specified distances back from the wall face to permit clean stripping without spalling. All standard Tys are manufactured to provide set back from the wall face. The small Ty holes and washer indentations are easily pointed, grouted or plugged. Consult the Technical Department for minimum wall thicknesses. For exposed concrete or where a longer set back is required, the AR Space-Ty™ is suggested.

Snap-Tys are stocked in 120 mm or 211 mm (4¾" or 8½") ends for standard wall thicknesses.

10 kN (2,250 lbs) Snap-Tys are available in stainless steel upon request.

NOTE: For Ty removal and break back guidelines please see page 101 of the Appendix.

Refer to Lateral Pressure Design information on page 102 and typical Light Formwork on page 107 of the Appendix.



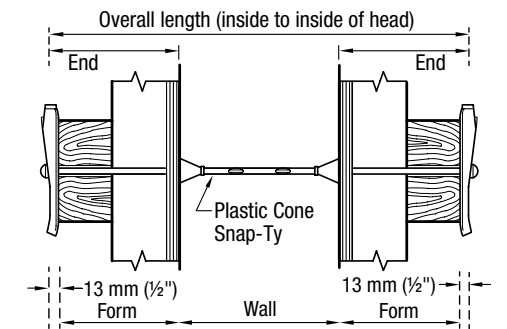
Plastic Cone Snap-Ty (PC)

The AR Plastic Cone Snap-Ty and the AR Heavy Duty Plastic Cone Snap-Ty are equipped with a Plastic Cone Spreader providing for a 25 mm (1") set back manufactured for specified wall thicknesses. The plastic cone reduces the likelihood of concrete paste seepage and protects the break back. The break back is approximately 3 mm (1/8") smaller than the cone length. The estimated break back is approximately 22 mm (7/8"). The table provides the length and taper of the cones. Special size cones are available as custom orders. Available in stainless steel. Also available in water seal.

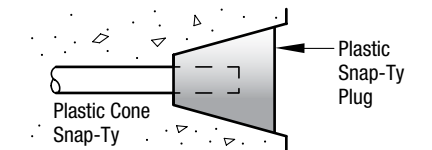
STANDARD 2.25M
APPROXIMATE SAFE
WORKING LOAD
 10kN (2,250 LBS)
 2:1 Safety Factor

HEAVY DUTY 3M
APPROXIMATE SAFE
WORKING LOAD
 13.5 kN (3,000 LBS)
 2:1 Safety Factor

Set back	Taper Inside to outside
25 mm (1")	10 mm to 25 mm (3/8" to 1")



For architectural design, insert the Plastic Snap-Ty Plug once form work has been removed.



To order, please specify the following information

EXAMPLE

Name Plastic Cone Snap-Ty (PC)
 Type Heavy Duty 3M
 End 120 mm (4¾")
 Wall 450 mm (18")
 End 120 mm (4¾")
 Break back (standard) 22 mm (7/8")
 Strength 13.5 kN (3,000 lbs)
 Quantity 300



Plastic Washer Snap-Ty (PW)

The AR Plastic Washer Snap-Ty and Heavy Duty Plastic Washer Snap-Ty are equipped with a plastic washer, provide for a 3 mm to 5 mm (1/8" to 3/16") break back less than the Plastic Washer Thickness and are manufactured for specified wall thicknesses. The Hex Head allows the Ty end to be broken back prior to removal of the forms, allowing for ease of stripping. Available in stainless steel. Also available in water seal.

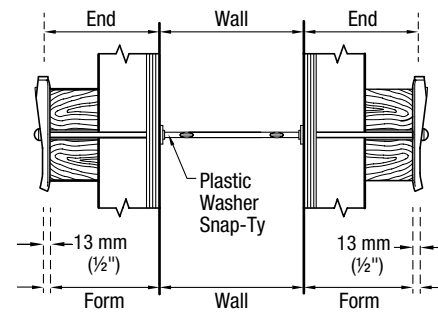
To order, please specify the following information

EXAMPLE

Name Plastic Washer Snap-Ty (PW)
 Type Standard 2.25M
 End 210 mm (8 1/4")
 Wall 250 mm (10")
 End 120 mm (8 1/4")
 Break back (standard) 3 mm (1/8")
 Strength 10 kN (2,250 lbs)
 Quantity (pkg of 100) 400

STANDARD 2.25M
APPROXIMATE SAFE
WORKING LOAD
10kN (2,250 LBS)
2:1 Safety Factor

HEAVY DUTY 3M
APPROXIMATE SAFE
WORKING LOAD
13.5 kN (3,000 LBS)
2:1 Safety Factor



Plastic Washer break back is 3 mm to 5 mm (1/8" to 3/16") less than the plastic washer thickness.

NOTE: For Ty removal and break back guidelines please see page 101 of the Appendix.



Panel-Ty

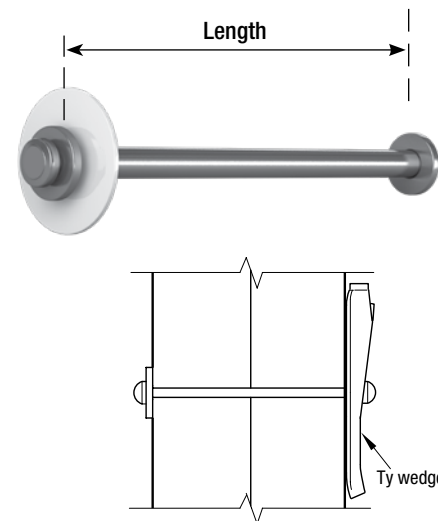
The AR Panel-Ty is equipped with a head washer at each end and with a large loose-fitting washer at one end. Its function is to tie together the end-studs of adjacent panel forms. Available in a range of sizes based on stud requirements. Also available in water seal.

To order, please specify the following information

EXAMPLE

Name Panel-Ty
 Length 100 mm (4")
 Quantity 200
 SWL is based on an approximate 2:1 Factor of Safety

STANDARD 2.25M
APPROXIMATE SAFE
WORKING LOAD
10kN (2,250 LBS)
2:1 Safety Factor



No Washer Snap-Ty (NW)

The AR No Washer Snap-Ty and Heavy Duty No Washer Snap-Ty have hex headed ends. These Snap-Tys are equipped with a 13 mm (1/2") break back and are manufactured for specified wall thicknesses. Available in stainless steel. Also available in water seal.

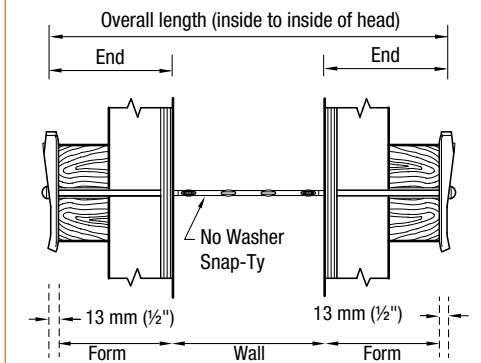
To order, please specify the following information

EXAMPLE

Name No Washer Snap-Ty (NW)
 Type Standard 2.25M
 End 210mm (8 1/4")
 Wall 200mm (8")
 End 210mm (8 1/4")
 Break back 13mm (1/2")
 Strength 10.0 kN (2,250 lbs)
 Quantity (lots of 100) 200

STANDARD 2.25M
APPROXIMATE SAFE
WORKING LOAD
10kN (2,250 LBS)
2:1 Safety Factor

HEAVY DUTY 3M
APPROXIMATE SAFE
WORKING LOAD
13.5 kN (3,000 LBS)
2:1 Safety Factor



NOTE: For Ty removal and break back guidelines please see page 101 of the Appendix.



No Spreader Form-Ty (NS)

The AR No Spreader Form-Ty and Heavy Duty No Spreader Form-Ty are plain rods with a hex headed end. These Snap-Tys are usually withdrawn from the wall or cut off after use. Can be equipped with a break back as a special order. Available in stainless steel.

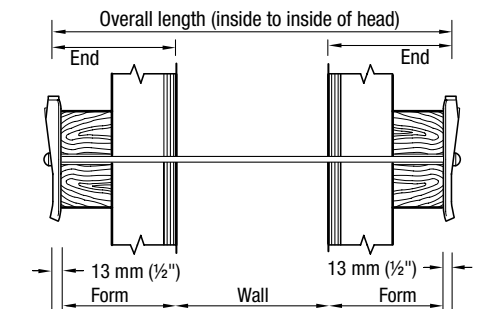
To order, please specify the following information

EXAMPLE

Name No Spreader Form-Ty (NS)
 Type Standard 2.25M
 Total Length ... End to End 400 mm (16")
 Break back N/A (N/A)
 Strength 10.0 kN (2,250 lbs)
 Quantity 200

STANDARD 2.25M
APPROXIMATE SAFE
WORKING LOAD
10kN (2,250 LBS)
2:1 Safety Factor

HEAVY DUTY 3M
APPROXIMATE SAFE
WORKING LOAD
13.5 kN (3,000 LBS)
2:1 Safety Factor



NOTE: When equipped with break back please see page 101 of the Appendix for Ty removal and break back guidelines.



Fascia Snap-Ty

The AR Fascia Snap-Ty is available for securing light outside spandrel beam forms to structural steel beams in the manner shown. Also available in water seal.

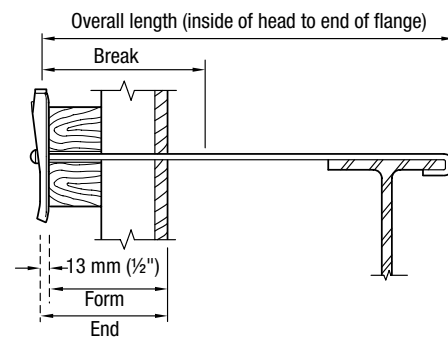
To order, please specify the following information

EXAMPLE

Name Fascia Snap-Ty
 End 200 mm (8")
 Overall Length 600 mm (24")
 Flange Depth 20 mm (3/4")
 Spreader Plastic Cone
 Break back 15 mm (1/2")
 Quantity 400

**APPROXIMATE SAFE
 WORKING LOAD
 3.6 kN (800 LBS)
 2:1 Safety Factor**

**ALSO AVAILABLE
 WITH ANY TYPE OF
 SPREADER WASHER
 AND PLASTIC CONE.**



Riser Support

The AR Riser Support provides a simple solution to support bulk heads for concrete stairs. It comes equipped with flat washers and a chisel point at both ends. Also available in water seal.

To order, please specify the following information

EXAMPLE

Name Riser Support
 Height of riser 150 mm (6")
 Quantity 200

Available up to 200 mm (8") in height. Refer to Lateral Design information on page 102 and typical Light Formwork on page 107 of the Appendix.



Snap-Ty I-Beam Ty (blind wall)

AR Snap-Ty I-Beam Tys are manufactured to fit around the I-Beam flange to support the formwork. A standard break back of 25 mm (1") is provided.

NOTE: Tolerance for wire bends will be calculated by AR. A 6 mm (1/4") tolerance may be added to the B & C dimension if desired for Ty placement.

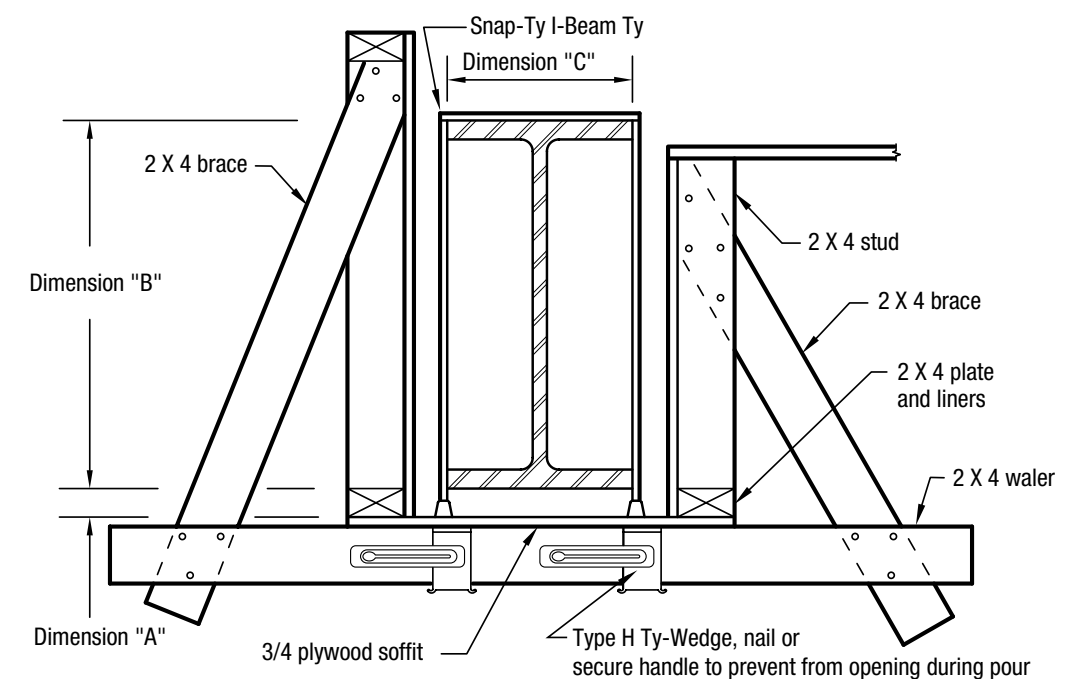
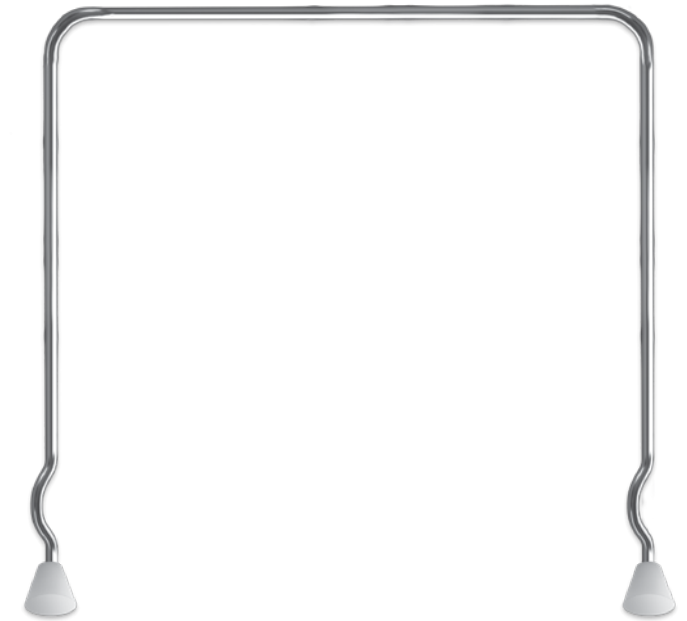
**APPROXIMATE SAFE
 WORKING LOAD
 10 kN (2,250 LBS)
 2:1 Safety Factor**

To order, please specify the following information

EXAMPLE

Name Snap-Ty I-Beam Ty (blind wall)
 Total Ty length:
 Sum of:
 Dimension "A" (as required)
 Dimension "B" (beam height)
 Dimension "C" (beam width)
 Dimension "B" (beam height)
 Dimension "A" (as required)
 Quantity 200

Refer to General Guidelines and Conditions on page 96 and Lateral Pressure Design Information beginning on page 102 of the Appendix.



Space-Ty™

BREAK BACK ASSURED

The Space-Ty™ re-bar locating device protects the break point during the concrete placement assuring a positive break and easy removal of the Ty end.

IMPROVED WATER SEAL

The plastic locating device is securely moulded to the Snap-Ty, effectively breaking the wire surface continuity, reducing the possibility of water seepage.

FIXED RE-BAR LOCATING DEVICE

Designed to accept and lock in place 10M, 15M, or 20M (#4, #5 or #6) re-bar into the correct position, preventing any movement during the concrete placement.

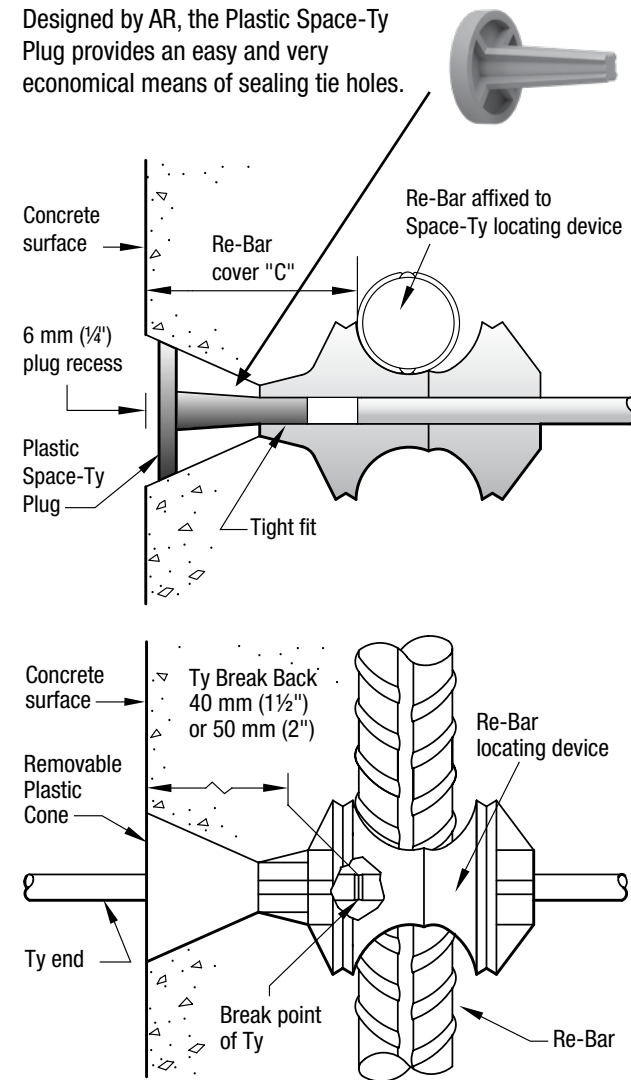
REMOVABLE PLASTIC CONE

The Removable Plastic Cone provides for an architectural recess in the concrete which can be sealed using the AR Plastic Set Back Tyscru Plug or by using standard grouting practices.

GUARANTEES CONCRETE COVER

The re-bar locating device guarantees the concrete cover as outlined in CSA -A23-3-M90. The Space-Ty™ rebar locating device complies with the Recommended Practice for Concrete Formwork as outlined in Architectural Concrete (ACI 347-95).

NOTE: Space-Tys™ have a guaranteed standard 40 mm (1½") set back. A 50 mm (2") set back is available on special order. Refer to Lateral Pressure Design information on page 102 and typical Light Formwork on page 107 of the Appendix.



Guaranteed concrete cover

For exposed conditions of 40 mm, 50 mm (1½", 2")



The Space-Ty™

SPACE-TY™ ASSEMBLY

The Space-Ty™ combines all essential features for light concrete forming. The Space-Ty™ re-bar locating device securely locks the re-bar at a correct distance from the face of the form and eliminates the need for spacers.

Minimum end length of 120 mm (4¾"). Standard sizes stocked in 120 mm (4¾") or 211 mm (8¼") ends.

FORM TY SPECIFICATIONS

Internal form ties shall be so arranged that when the forms are removed, no metal shall be within 40 mm or 50 mm (1½" or 2") of any exposed surface as outlined in CSA-A23-3-M90 or ACI 347-95. Use Space-Tys™ or approved equal and seal the tie holes with PVC plugs. The light grey plugs complement the adjacent concrete.

To order, please specify the following information

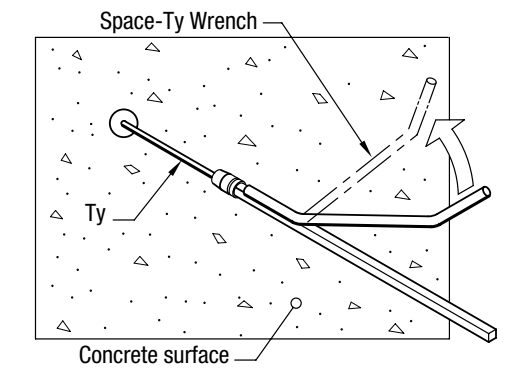
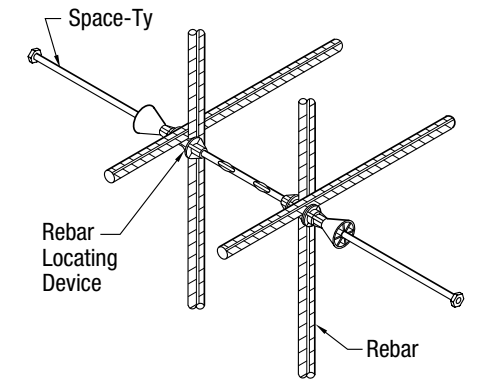
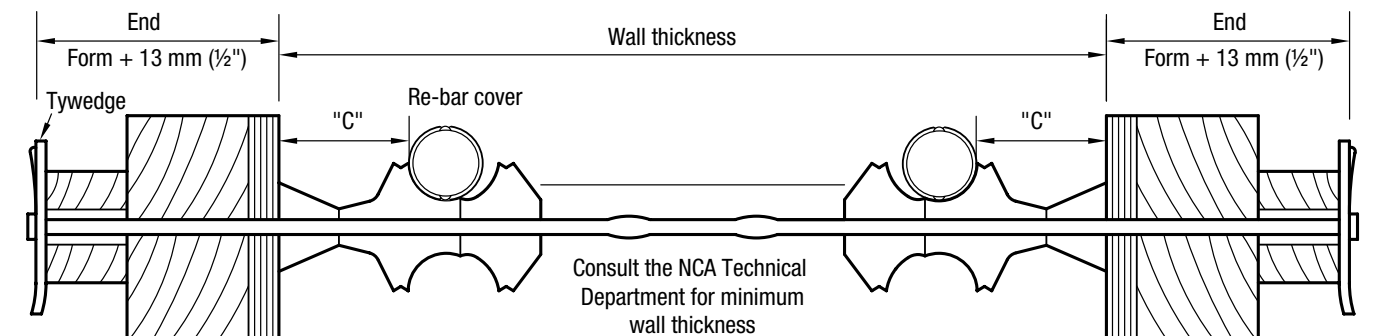
EXAMPLE

Name	Space-Ty
End	211 mm (8¼")
Wall	300 mm (8")
End	211 mm (8¼")
"C" dimensions	
40 mm or 50 mm (1½" or 2")	40 mm (1½")
Quantity (pkg of 50)	200

BREAK BACK TY

To facilitate the stripping of forms, the Space-Ty™ can be broken back prior to form removal. Using a Space-Ty™ wrench or standard 13 mm (½") socket wrench, twist and remove the Ty end.

NOTE: For Ty removal and break back guidelines please see page 101 of the Appendix. Refer to Lateral Pressure Design information on page 102 and typical Light Formwork on page 107 of the Appendix.



APPROXIMATE SAFE WORKING LOAD
13.5 kN (3,000 LBS)
2:1 Safety Factor

SNAP-TY ACCESSORIES

Pressed Steel Ty Wedge

The AR Pressed Steel Ty Wedge is designed to slip over the head of a standard or heavy duty Snap-Ty to safely secure the waler system in place. Caution should be used when used with hex head Space-Ty™ or Snap-Ty products.

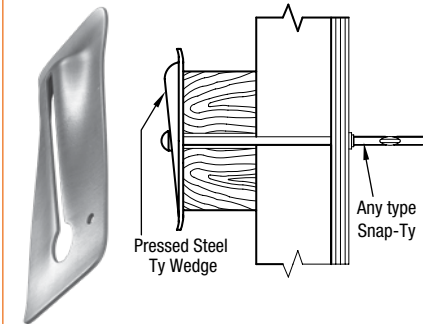
To order, please specify the following information

EXAMPLE

NamePressed Steel Ty-Wedge

Quantity 200

**APPROXIMATE SAFE
WORKING LOAD**
13.5 kN (3,000 LBS)
2:1 Safety Factor



Type H Ty-Wedge

AR Type H Ty Wedges are manufactured from a malleable cast iron material designed to slip over the head of a standard or heavy duty Snap-Ty. The Type H-Ty Wedge provides for long term durability, performance and bearing area to ensure proper load distribution on to the waler system.

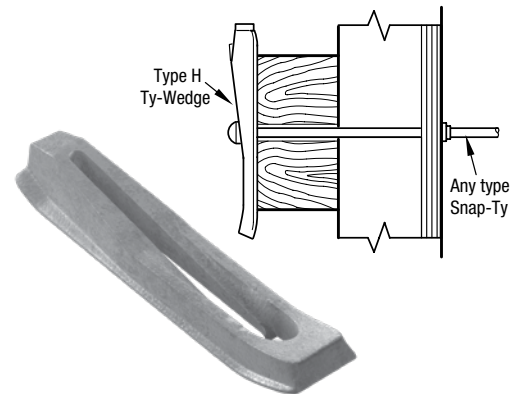
To order, please specify the following information

EXAMPLE

Name Type H Ty-Wedge

Quantity (lots of 50) 200

**APPROXIMATE SAFE
WORKING LOAD**
13.5 kN (3,000 LBS)
2:1 Safety Factor



A-Bracket

The AR A-Bracket is used to hold a horizontal waler bar, or a vertical stud with any type of wall form. The built-in slot allows the bracket to slip over 4-3/4" L&W snapties, and can be installed before or after waler bars have been positioned. The swivel bracket allows the snaptie end to lock-in and tightens on the 2 x 4 waler. The swivel bracket allows for 5/8" of adjustment to compensate for lumber variations.



Snap-Ty Wrench

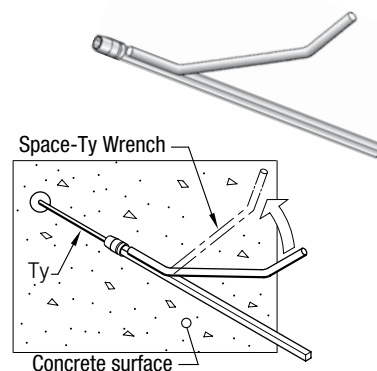
The AR Snap-Ty Wrench is designed to fit tight against the wall and facilitate the Snap-Ty break back once the concrete has cured. The angle of the Snap-Ty Wrench will prevent scraping of knuckles during the end removal. After the form has been removed, place the Snap-Ty Wrench on the Ty. Keep the Snap-Ty Wrench against the concrete, bend the Ty towards the concrete surface. Rotate the wrench using a cranking motion to break the Ty back within the concrete wall.

To order, please specify the following information

EXAMPLE

Name Snap-Ty Wrench

Quantity 2



Waler Bracket Forming System

The AR Waler Bracket is a proven method to form light weight walls and foundations. The basic unit of this system is the bracket with a moving wedge which provides the most effective type lock for the Snap-Ty. The basic components are the Waler Bracket and Snap-Tys, with plywood panels and loose 38 mm x 89 mm (standard 2x4 walers). No nailing is needed. Erection and stripping are made fast and simple and materials last longer. The Waler Bracket Forming System will save up to 50% of the forming cost.

Single Waler Bracket

The AR Waler Bracket is designed to be used with any AR Short-End Snap-Ty. The durable bracket can be used with both horizontal walers and vertical studs for any type of wall form; round, curved, battered, beam and/or columns. The Single Waler Bracket is fabricated from heavy gauge steel which is plated to resist corrosion for improved durability and reuse.

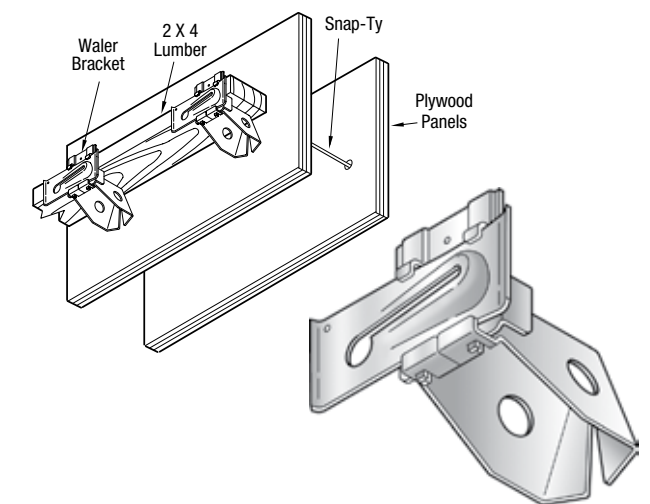
To order, please specify the following information

EXAMPLE

Name Single Waler Bracket

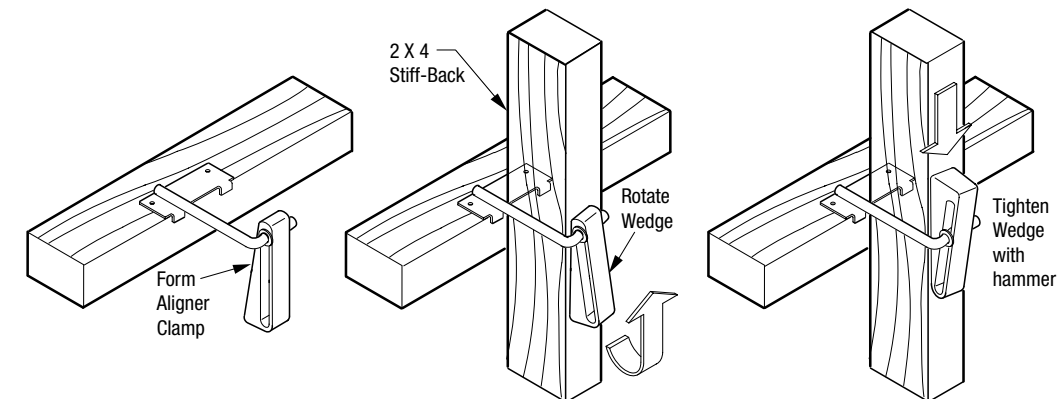
Quantity 200

APPROXIMATE SAFE WORKING LOAD
12 kN (2,700 LBS)
2:1 Safety Factor



Strong Back

The AR Form Aligner Clamp is designed for use with a single 38 mm x 89 mm (2" x 4") strong back for either vertical or horizontal form alignment. The Form Aligner Clamp can be installed after erection of the forms and is not limited by form-ty spacing. Sturdy, galvanized construction reduces maintenance and replacement and speedy installation reduces forming costs.

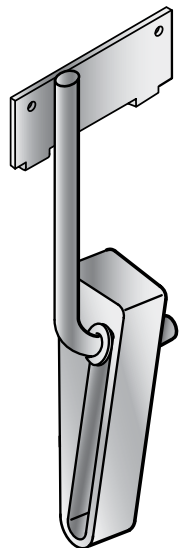


To order, please specify the following information

EXAMPLE

Name Strong Back

Quantity 200



Plastic Snap-Ty Plug

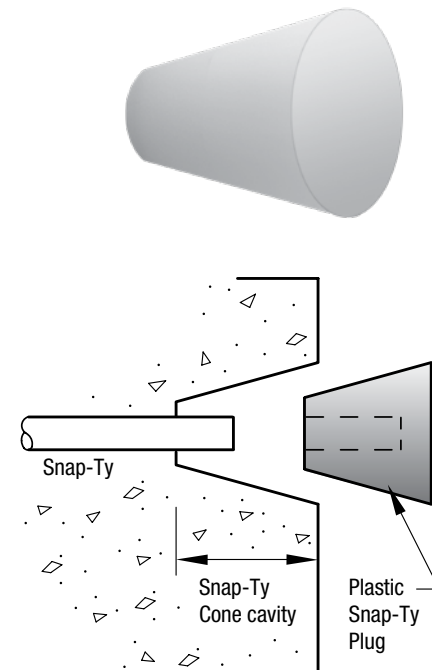
AR Plastic Snap-Ty Plugs are designed to provide an economical means of sealing Snap-Ty Cone holes, eliminating the need for grouting. The Plastic Snap-Ty Plug provides an architectural design in concrete walls and should be installed with a commercial grade adhesive material. Available in a standard grey colour. Other colours are available on special orders based on minimum quantities.

To order, please specify the following information

EXAMPLE

Name Plastic Snap-Ty Plug
Quantity 200

Plastic Snap-Ty Plug provides a recess of approximately 5mm (1/4").



Plastic Space-Ty™ Plug

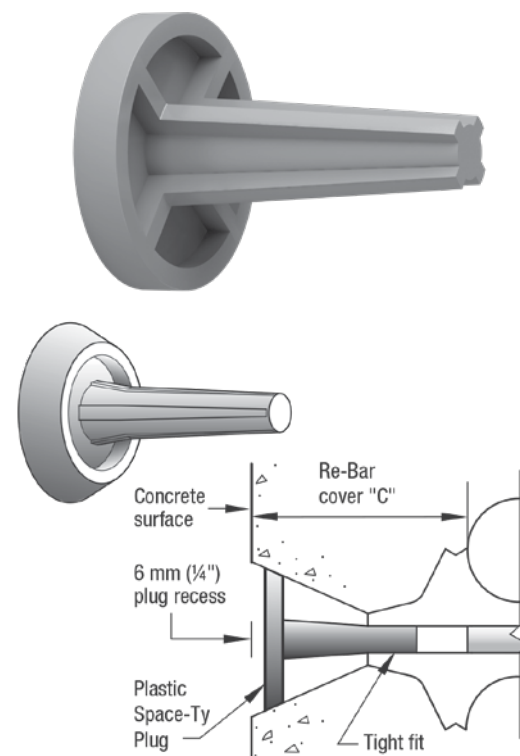
AR Plastic Space-Ty™ Plugs are designed to fit securely in the cone hole of a AR Space-Ty™ once the Ty break back is established in the concrete wall. The Space-Ty™ Plug is a simple and economical means of sealing Space-Ty™ holes providing an architectural design.

To order, please specify the following information

EXAMPLE

Name Plastic Space-Ty™ Plug
Colour light gray
Quantity 200

NOTE: Do not use Plastic Snap-Ty Plugs with AR Space-Tys™.



Form Brace Aligner

The AR Form Brace Aligner is designed to assist in accurately positioning and plumbing vertical forms. The heavy 25 mm (1") open style turnbuckle provides for fast, easy adjustments. The Form Brace Aligner is equipped with a bent nailing plate and holes. Manufactured from first quality materials for durability and repeat use. The Approximate Safe Working Loads of the aligner are limited by the field fastening and staking method. The Form Brace Aligner splicer unit provides for 90 mm (3 1/2") total adjustment. The overall maximum length is 1,040 mm (41") with a minimum length of 950 mm (37 1/2"). Also available in adjustable.

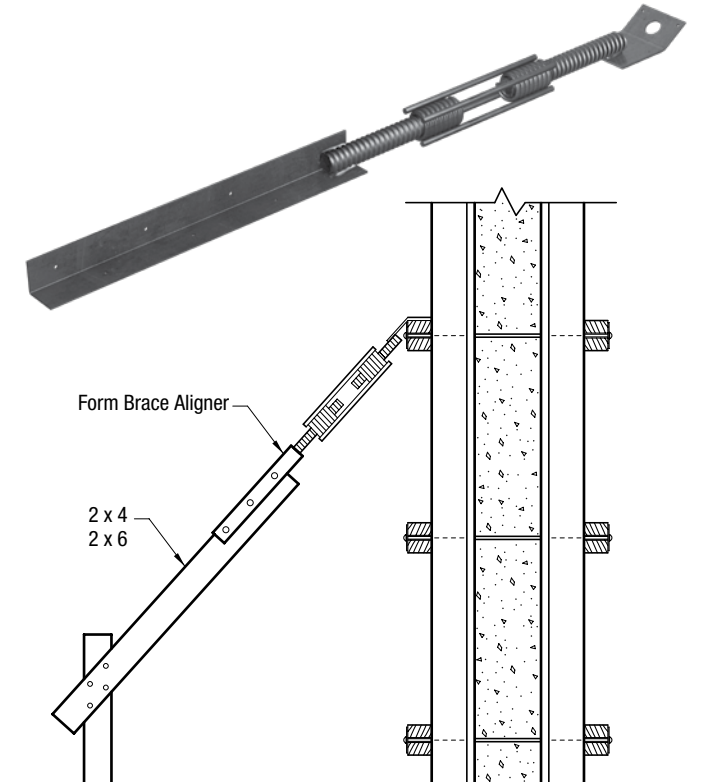
To order, please specify the following information

EXAMPLE

Name Form Brace Aligner
Quantity 2

NOTE: Not designed for wind loads.

Refer to General Guidelines and Conditions on page 96 and Lateral Pressure Design Information beginning on page 102 of the Appendix.



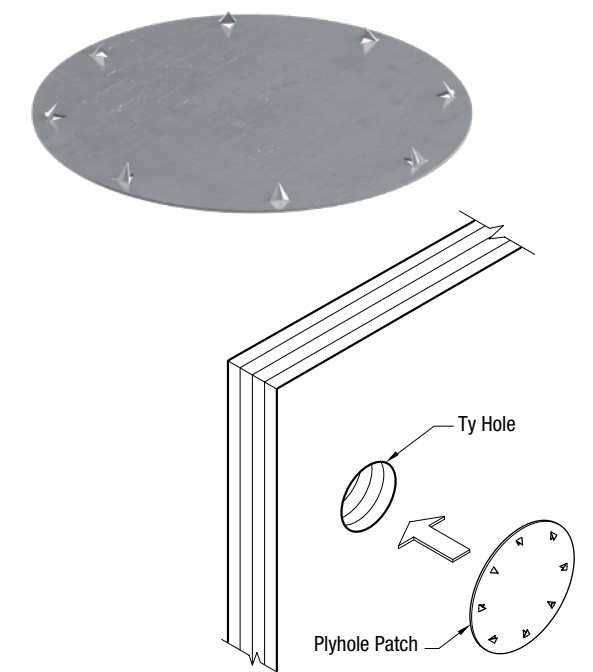
Plyhole Patch

The AR Plyhole Patch is designed to facilitate Ty hole repairs in wood formwork. Manufactured from 26 gauge galvanized steel, the 60 mm (2 1/4") diameter patch comes complete with its own fastening system. The self contained barbs eliminates the requirement for nails. Also available in plastic.

To order, please specify the following information

EXAMPLE

Name Plyhole Patch
Quantity (lots of 1,000) 1,000

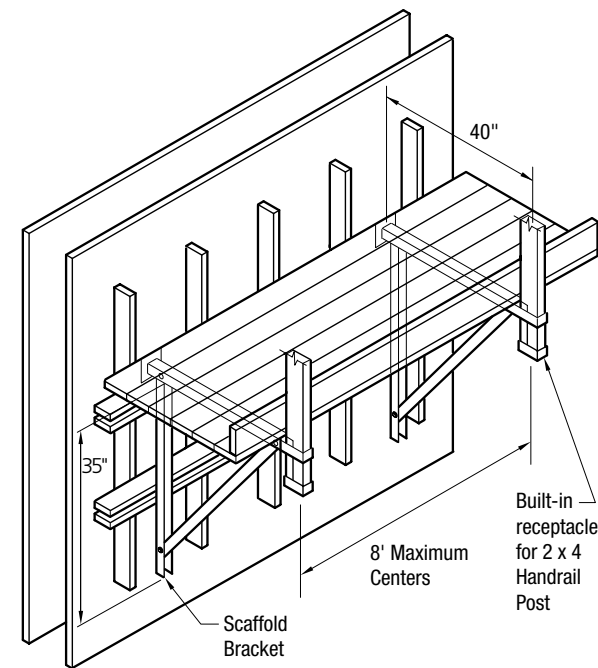
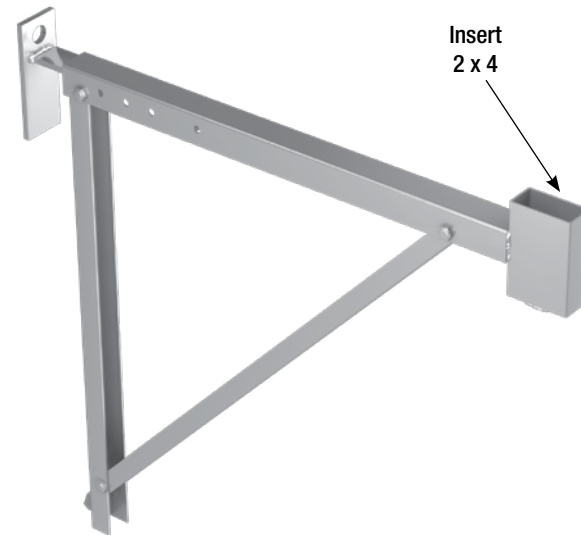


Scaffold Bracket

The AR Scaffold Bracket (TSB) meets most local code requirements and is suitable for most formwork systems. The Brackets are adjustable to fit vertical or horizontal wales and/or strongbacks by simply adjusting the pins position in the vertical or horizontal members. The AR Scaffold Bracket (TSB) can also be flush mounted to concrete surfaces and is also easily adapted to custom prefabricated forms.

Consult your AR Area Sales Representative or the AR Technical Department for additional information.

**APPROXIMATE SAFE
WORKING LOAD**
4.5 kN (1,000 LBS)
4:1 Safety Factor



Rod Clamp

AR Rod Clamps are malleable castings for plain or deformed re-bar ty systems. The Rod is clamped by a set screw and nut arrangement which tightens the grip as the load is applied. The clamp housing may be used indefinitely. The only wearing element is the relatively inexpensive nut and screw which can be replaced at will. The Rod Clamps are supplied with nail holes to simplify the attachment operation on the walers. Once the Ty rod is tightened and secured, bending the rod behind the clamp at 90° will provide an additional measure of safety.

To order, please specify the following information

EXAMPLE

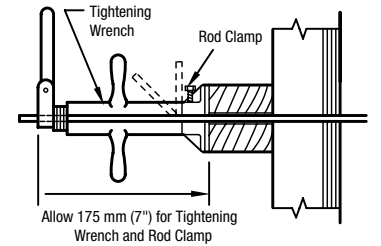
Name Rod Clamp
Rod Diameter 6 mm (1/4")
Quantity 200

Diameter

6 mm (1/4")

10 mm (3/8")

13 mm (1/2")



Refer to General Guidelines and Conditions on page 96 and Lateral Pressure Design Information beginning on page 102 of the Appendix.

Pencil Rod

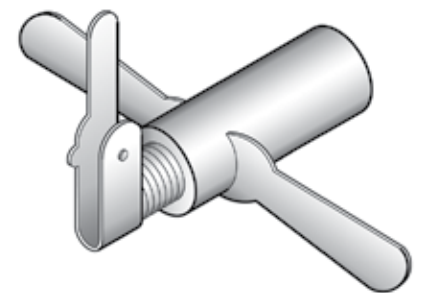
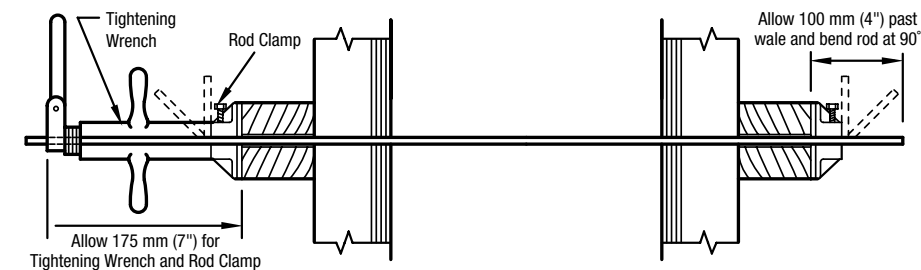
The AR Pencil Rod System is an economical forming system, used mainly for battered walls and foundations where the use of the AR Snap-ty is not feasible. Available in 1/4" diameter, cut to 10' or 20' lengths. Use where a clean breakback is not necessary. For use with the AR Rod Clamp and AR Tightening Wrench.



Diameter		kN	(lbs)
mm	(in)		
6	1/4"	10'	1,125
6	1/4"	20'	1,125

Pencil Rod Tightening Wrench

The AR Tightening Wrench is placed over a smooth or deformed rod behind a rod clamp and is used to draw the assembly tight, allowing the clamp to be properly tightened. The Tightening Wrench is available in 1/4", 3/8" and 1/2" sizes.



Caution: Do not use the Tightening Wrench for straightening forms or for pulling smooth rods from set concrete.

To order, please specify the following information

EXAMPLE

Name Tightening Wrench
Size 13 mm (1/2")
Quantity 200

APPROXIMATE SAFE WORKING LOADS 2:1 Safety Factor

Diameter		kN	(lbs)
mm	(in)		
6 mm	(1/4")	5 kN	(1,125 lbs)
10 mm	(3/8")	10 kN	(2,200 lbs)
13 mm	(1/2")	15 kN	(3,750 lbs)

Cam-Lock Forming System

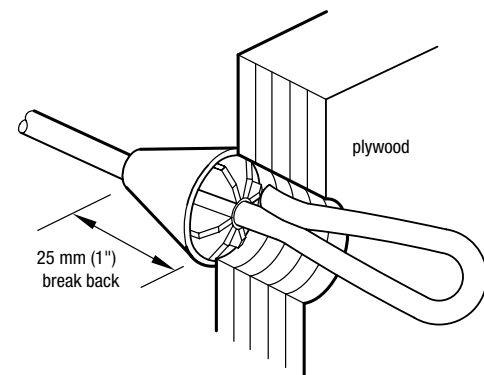
The AR Cam-Lock Forming System takes advantage of inexpensive forming materials, S4S 2x4s with 4'x8'x3/4" or 2'x8'x3/4" plywood sheets. When used for built-in-place forming, no ribbing or special hardware attached to the panels is necessary. The use of stiffbacks and walers is cut in half. Walers may be used either vertically or horizontally, but field tests have proved the latter method to be easier and faster.

The Cam-Lock Bracket holds the 2x4 waler in place by locking to the loop-end ty through caming pressure. Further rigidity of the form may be obtained through use of the Cam-Lock Stiff-Back Cam which connects to the ears on the back of the Cam-Lock Bracket, locking either a 2x4 or 2x6 in place with the same caming principle. This also assures perfect alignment of the form from top to bottom and enhances the system's adaptability to extremely high, close tolerance work.

The extreme rigidity of Cam-Lock Forming System makes it adaptable to all types of construction, and this same rigidity, coupled with the Cam-Lock Scaffold Bracket, makes it especially desirable for high wall forming. Economy of the system is realized in labour costs through the simplicity of the system as well as the increased man-hour production that result from easier handling of the light weight plywood sheets. Since only half as much dimension lumber is used, further savings are derived from lower material costs.

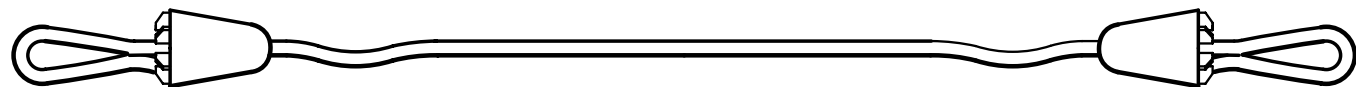
Cam-Lock Self Centering D-Cone Ty

The AR Cam-Lock Self Centering D-Cone Ty features a high density polyethylene Cone Washer. This Cone Washer will not absorb moisture or stick to the concrete, preventing break back problems. A smooth, uniform hole results after break back, allowing easier grouting and faster, better finishing. The standard 25 mm (1") D-Cone comes with a 25 mm (1") break back. Self-centering tapered cones require a drill hole size of 21 mm (13/16").



To order, please specify the following information
 EXAMPLE
 Name Cam-Lok Self Centering D-Cone Ty
 Quantity 200

APPROXIMATE SAFE WORKING LOAD
 10 kN (2,250 LBS)
 2:1 Safety Factor



Refer to General Guidelines and Conditions on page 96 and Lateral Pressure Design Information beginning on page 102 of the Appendix.

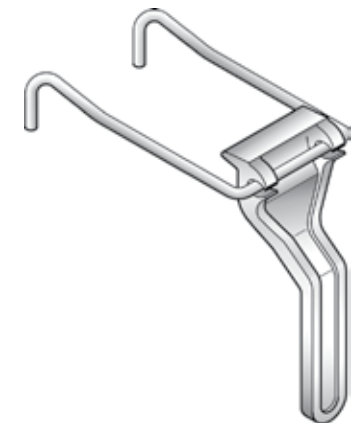
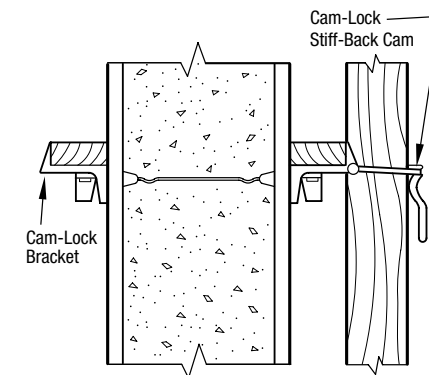
Cam-Lock Stiff-Back Cam

The AR Cam-Lock Stiff-Back Cam is used in combination with the Cam-Lock Bracket to support the 2x4 strong-backs to the form, providing additional strength and form alignment. Also available as a 2x6 stiff-back as a special order.

To order, please specify the following information
 EXAMPLE
 Name Cam-Lock Stiff-Back Cam
 Quantity 200

APPROXIMATE SAFE WORKING LOAD
 10 kN (2,250 LBS)
 2:1 Safety Factor

Refer to General Guidelines and Conditions on page 96 and Lateral Pressure Design Information beginning on page 102 of the Appendix.

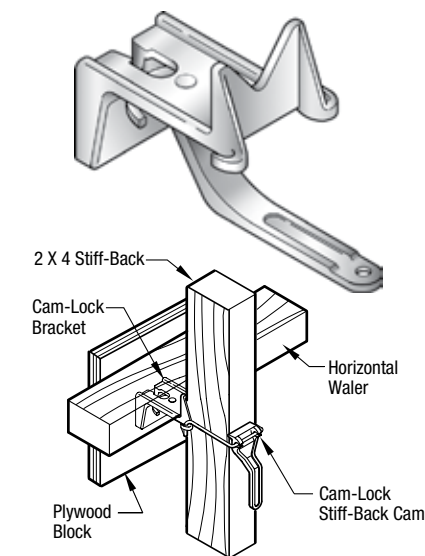


Cam-Lock Bracket

The AR Cam-Lock Bracket accomplishes many purposes in one accessory. It is a support for normal S4S, 2x4 walers. It has dual-ears for the support of the Cam-Lock Scaffold Bracket and the Cam-Lock Stiff-Back Cam. The forged cam finger grips the Ty loop securing it firmly to the form panel. The malleable cast bracket is designed with additional strength provided for at the points of strain. The Cam-Lock Bracket may be used with either horizontal or vertical walers. Cam-Lock Brackets may be used as a built-in-place forming system or attached to the plywood when used for gang forming.

To order, please specify the following information
 EXAMPLE
 Name Cam-Lock Bracket
 Quantity 200

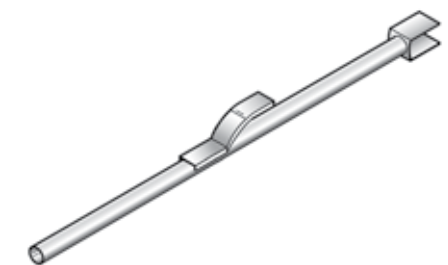
APPROXIMATE SAFE WORKING LOAD
 10 kN (2,250 LBS)
 2:1 Safety Factor



Cam-Lock Handrail Post

The AR Cam-Lock Handrail Posts are required with the use of all Cam-Lock Scaffold Brackets. A 1,065 mm (42") guard post with toeplate, mid-rail and top rail must be used. This requirement can easily and economically be met with the use of the Cam-Lock Handrail Post.

To order, please specify the following information
 EXAMPLE
 Name Cam-Lock Handrail Post
 Quantity 200



Cam-Lock Scaffold Bracket

The AR Cam-Lock Scaffold Bracket is constructed of sturdy, heavy gauge pressed steel. Extra rigidity is obtained by spot welded corner gusset plate and tubular riveted bracing. Hanger arms attach to the Cam-Lock Bracket ears in the same manner as the Cam-Lock Stiff Back Cam. Secure, firm attachment in seconds is accomplished without bolts, nuts or nails. It is quickly adaptable for use with 2x6 Stiff-Back by removal and repositioning of hanger arms. All new Scaffold Brackets are factory tested to 3,000 lbs.

To order, please specify the following information

EXAMPLE

Name Cam-Lok Scaffold Bracket

Quantity 200

APPROXIMATE SAFE WORKING LOAD
11 kN (2,500 LBS)
2:1 Safety Factor



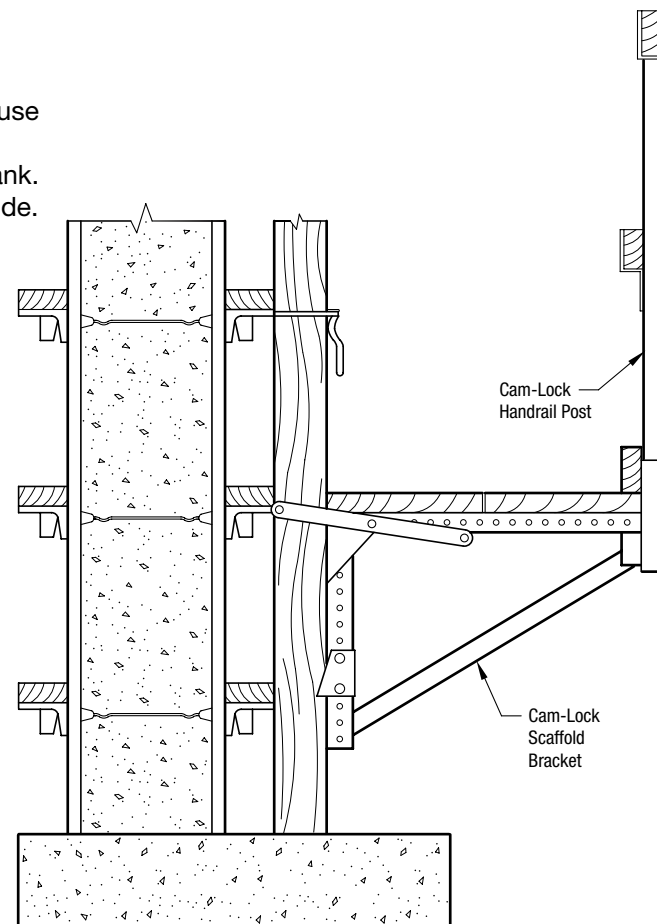
DON'Ts

- Never use the Scaffold Bracket with a short 2x4. Always use full length 2x4s that extend to a solid base.
- Never use the Scaffold Bracket with only one scaffold plank.
- Always use two approved 2x12 scaffold planks side by side.

DOs

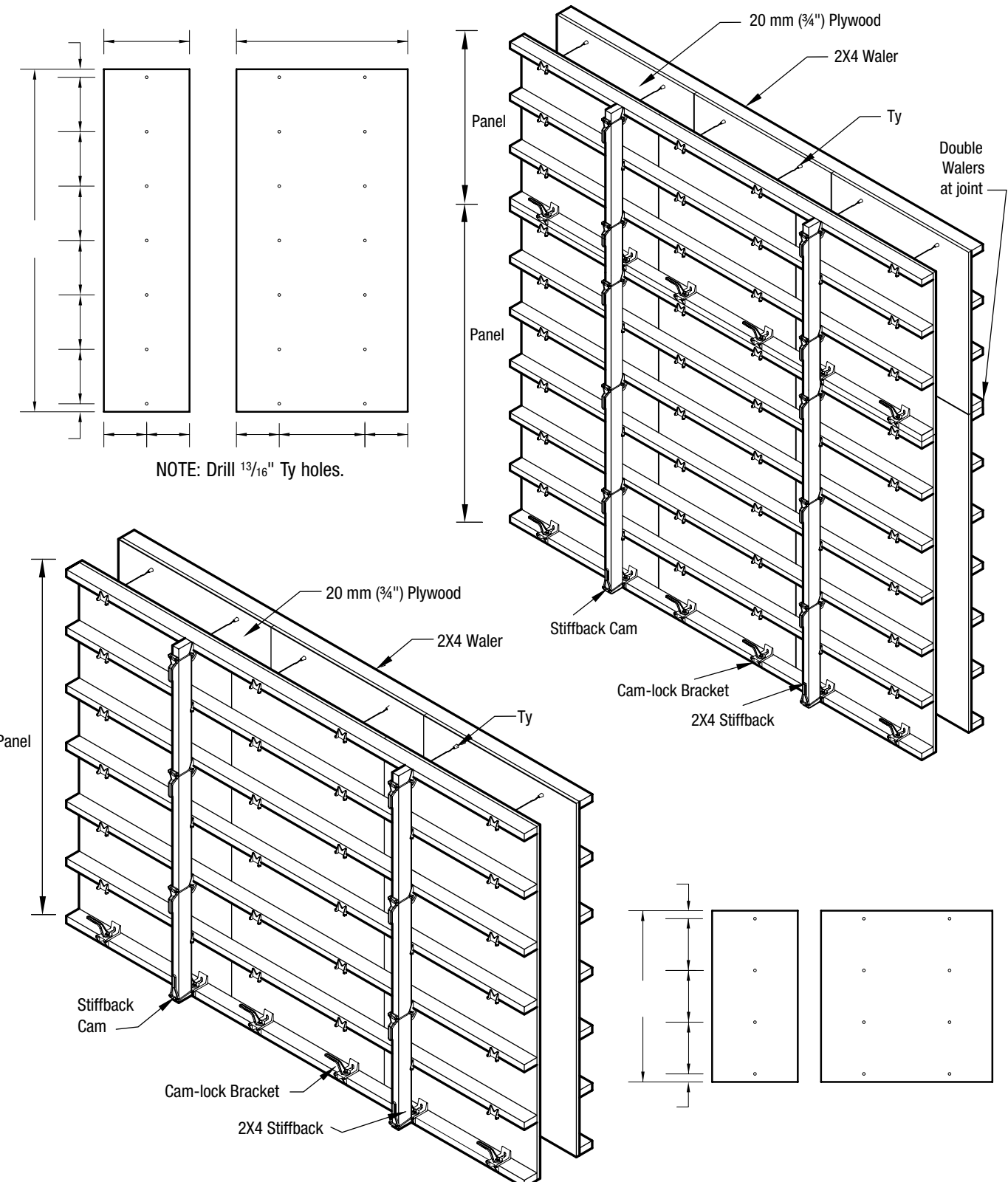
- The vertical 2x4 stiff-back must always extend to a solid base — the concrete footing, a floor slab or to compacted soil.
- The Scaffold Bracket must be attached to the second cam-lock form. Never attach the Scaffold Bracket to the top row of cam-lock brackets and form ties.
- A 2x4 stiff-back cam must always be attached directly below the Scaffold Brackets.
- A second 2x4 stiff-back cam must be attached directly below the Scaffold Bracket.
- Add an additional stiff-back cam at the bottom of the vertical 2x4 stiff-back to stabilize it.
- Scaffold Brackets are to be used on 6' centers along the form with two 2 x 12" scaffold planks.
- A 42" guardrail with a 2x4 toeplate, mid-rail and top rail must also be used.

Since we cannot anticipate every problem that may arise on the job in conjunction with the use of our product, we urge you to work safely and refer to your manuals for proper construction of concrete wall forming and scaffolding procedures



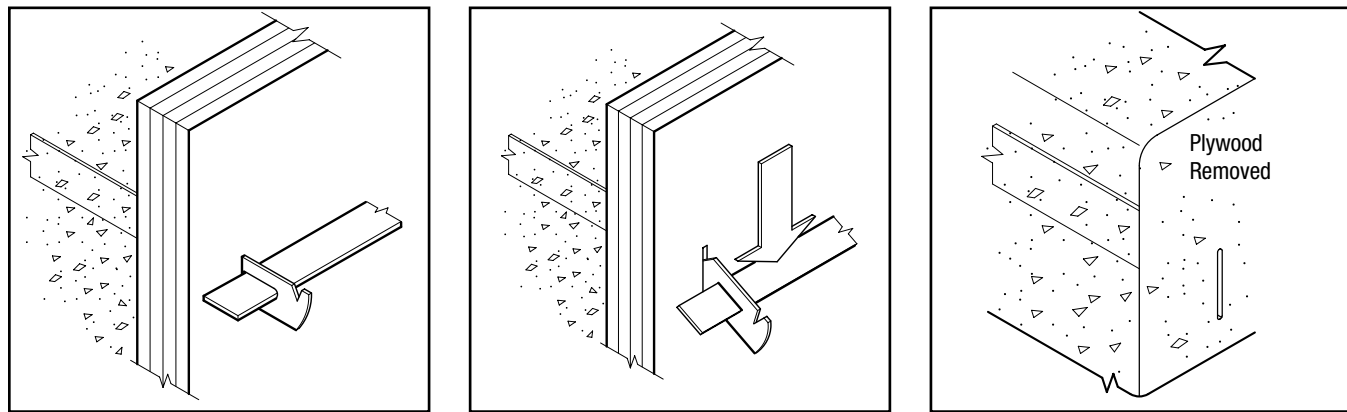
Not to be used above 6.0 m (20'-0"). Any scaffolding above six metres (twenty feet) should be checked with local, provincial code requirements.

Ty spacing for regular forming



Quick Strip Ty System

The AR Quick Strip Ty System is designed to provide a true, smooth wall for light forming applications. The AR Quick Strip Tys are designed to be simply inserted through pre-manufactured slots in 20 mm (¾") plywood form panels. They are secured in place by using a waler bar, which allows for quick form erection as well as efficient form stripping operations.

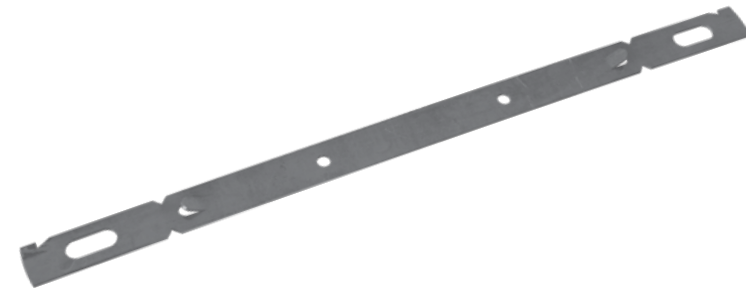


Quick Strip Ty

AR Quick Strip Tys are available for wall thicknesses ranging from 100 mm to 750 mm (4" to 30") and are designed to reduce waler and bracing requirements.

To order, please specify the following information
 EXAMPLE
 Name Quick Strip Ty
 Length wall thickness
 Quantity 250

APPROXIMATE SAFE WORKING LOAD
5 kN (1,150 LBS)
2:1 Safety Factor



Refer to General Guidelines and Conditions on page 96 and Lateral Pressure Design Information beginning on page 102 of the Appendix.

Quick Strip Corner Hinges

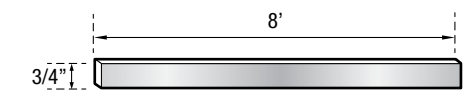
AR Quick Strip Corner Hinges provide an alternative method to achieving corner details. Hinges are secured to the Form Ply by using a simple carriage bolt. The hinges allow for a 15 mm (5/8") smooth rod or rebar to pass through, holding the forming securely in place. The corner hinges are designed to work for both inside and outside corners.



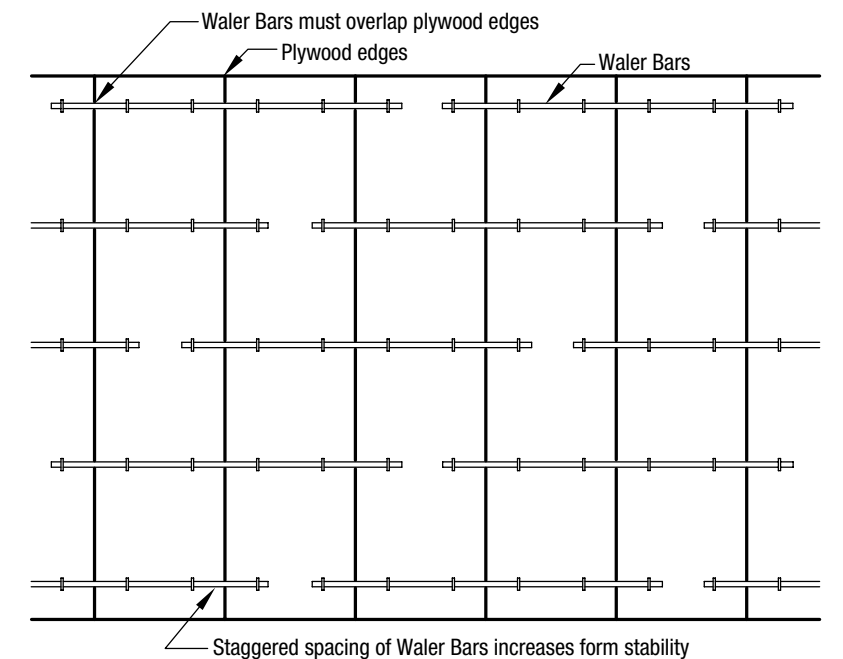
To order, please specify the following information
 EXAMPLE
 Name Corner Hinges
 Quantity 200

Waler Bar

The AR Quick Strip Ty Waler Bar is used to secure the Quick Strip Tys and form panels in place. The Waler Bar overlaps the adjacent edge of the form ply to increase the wall stability when pouring concrete. The Waler Bars are 6 mm x 20 mm x 2,400 mm (¼" x ¾" x 8') and are made from high quality carbon steel with milled edges for smooth installation.



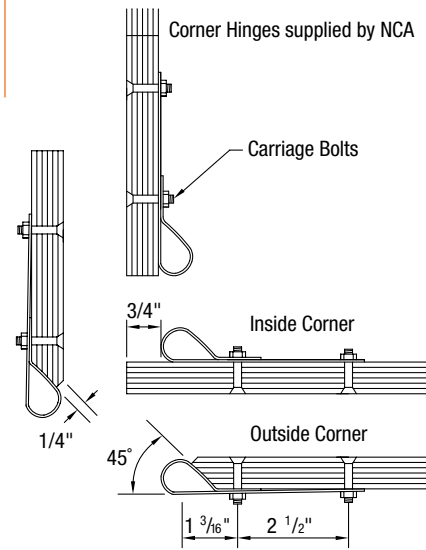
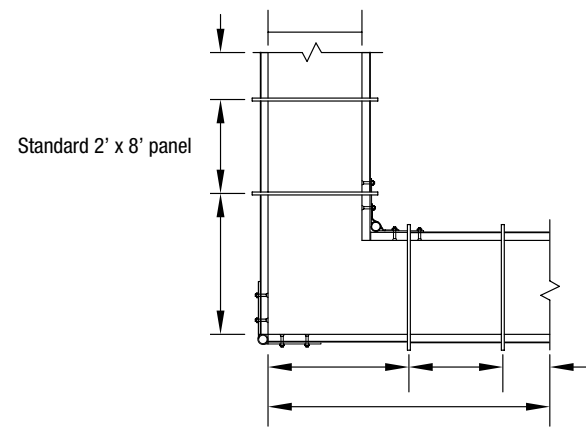
To order, please specify the following information
 EXAMPLE
 Name Waler Bar
 Quantity 200



Refer to General Guidelines and Conditions on page 102 and Lateral Pressure Design Information beginning on page 102 of the Appendix.

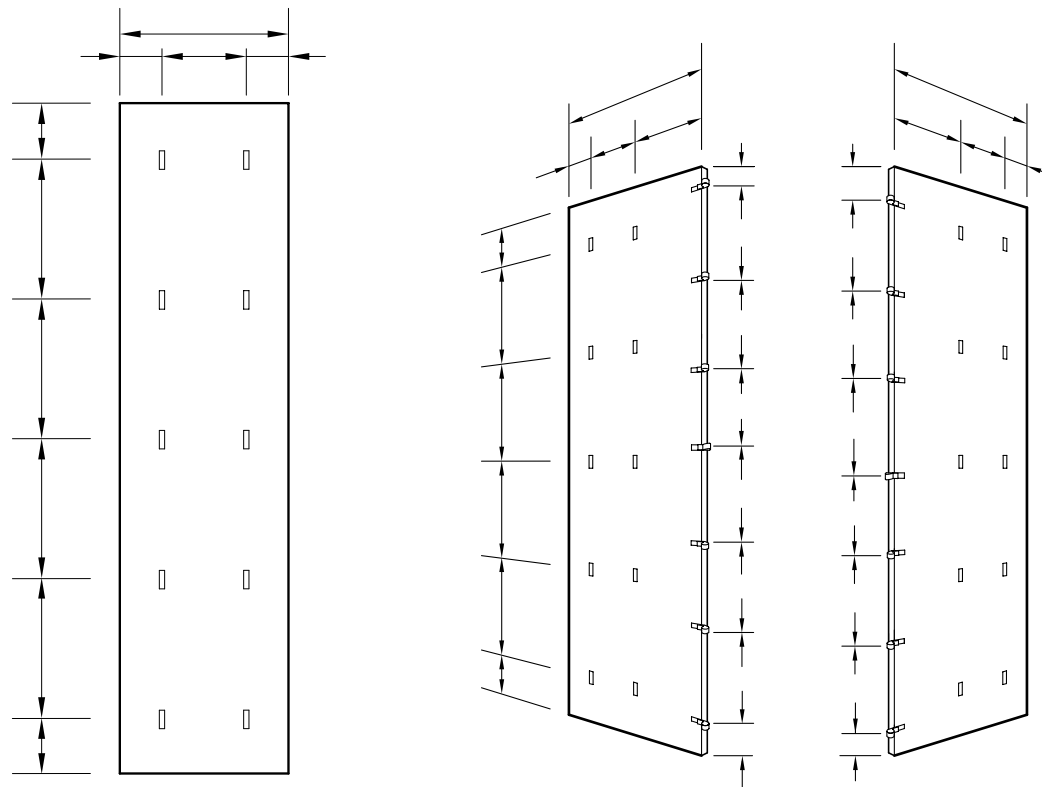
Quick Strip Form Panel Construction

Form panels are easily built. Rout $\frac{1}{4}$ " x 1" ty slots in $\frac{3}{4}$ " plywood. A template out of $\frac{1}{4}$ " plywood 6" x 7" cut-outs centered over the location where the ty slots are to be cut. A 6" x 6" x $\frac{1}{4}$ " block fastened to the face of an electric router using a $\frac{1}{4}$ " carbide bit will cut the ty slots the required size, $\frac{1}{4}$ " x 1". If desired, 4' x 8' outside panels may be used.



NOTE: AR Quick Strip Tys can be used without plywood panels, if desired. Tys can be slipped between common board and steel bars set vertically, eliminating most of the nailing and waling required.

Please consult your local AR Technical Representative or our Technical Department for Ty spacing.



Corners are made from $\frac{3}{4}$ " plywood, and hinges supplied by AR. Corner shown is the standard 2' and works best on most jobs. Corners are connected by inserting a $\frac{5}{8}$ " rod through the hinges.

Residential Ty

The AR Residential Ty is designed for modular forming systems utilizing 1-1/8" plywood. Crimped wires are designed to be secured in place by clips on the outside of the form and then are snapped off after the stripping of the forms using a break off tool. Available in standard sizes of 8"-10", 12"-14", 16", 18", 20", 22" and 24". Additional sizes available on request.



Wall Thickness	Box Qty
8"	250
9"	
10"	
12"	
13"	100
14"	
16"	
18"	
20"	100
22"	
24"	

Residential Ty Accessories

AR offers the supporting accessories used in 1-1/8" plywood modular forming. Standard 6" latch, top waler and tie breaker tool, along with other accessories are available.

Standard 6" Latch



Ty Breaker Tool



Top Waler



Additional Accessories

- Radius Wall Clip
- Stacking Clip
- Corner Latch
- Form Screws
- Shoulder Bolts
- E-Clip
- Half Clip
- Sleeve Nuts

Steel Ply Forming System

X-Flat Ty

The AR X-Flat Ty is designed to be used with modular form systems. Used in conjunction with a wedge bolt, it creates a secure form tie. The AR X-Flat Ty comes with a standard 1/4" set back. Available for 8", 10" and 12" wall sizes, additional wall sizes available on request.



Wall Size	SWL (lbs)
8"	3,000
10"	3,000
12"	3,000

APPROXIMATE SAFE WORKING LOAD
2:1 Safety Factor

Stacking Ty

The AR Stacking Ty, also referred to as "Snapie Ty", is used in light duty 1-1/8" plywood forming systems. Available in 5-5/8" to 12" sizes. Additional sizes available on request.

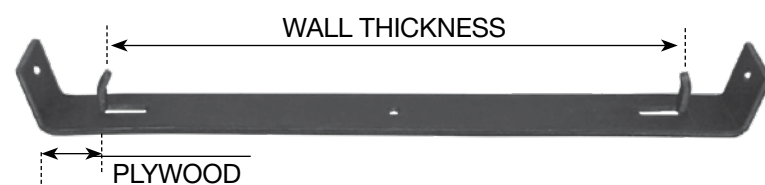


Plywood Size	Size	SWL (lbs)	Box Qty
1-1/8"	5-5/8"	1,500	100
	6"		
	7-5/8"		
	8"		
	9"		
	10"		
	11-5/8"		
12"			

APPROXIMATE SAFE WORKING LOAD
2:1 Safety Factor

Spreader Cleat

The AR Spreader Cleat is used to spread and hold the top and bottom of forms during concrete pour. The nail holes can be used to secure the cleats to the form. Available in 6"-12" standard sizes, for use with 3/4" and 1-1/8" plywood systems. Additional sizes available on request.



Plywood Size	Size	SWL (lbs)	Box Qty
1-1/8"	5-5/8"	1,500	100
	6"		
	7-5/8"		
	8"		
	9"		
	10"		
	11-5/8"		
12"			

APPROXIMATE SAFE WORKING LOAD
2:1 Safety Factor

Flatwork

K-Form PVC Form

K-FORM is a lightweight PVC cast in place formwork, replacing steel and wood forms where control joints are needed. The pre-drilled 1" holes on the vertical wall allow for locating dowel bars, and the holes on the horizontal surface are used for anchoring with mortar. This all-in-one screed rail system is easy to use and is designed to save time and labour on the job site. Once concrete is cured, they can be left in place, no need to remove and clean. K-Forms are available in 2", 4" and 6" heights and standard 8' length. Custom sizes and length can be requested.



Height	Length
2"	8'
4"	
6"	

Pin Pocket

The AR Pin Pocket, also referred to as "curb clamp", is a strong and durable clamp used for securing pins and forming stakes to the wood form. Coated with black paint for corrosion protection. Available 40 pieces per box.



Form Stake

AR Form Stakes are manufactured from high quality steel with a sharp point to minimize rock deflection. Form Stakes are available in 20 mm (3/4") and 22 mm (7/8") diameters and in standard lengths of 450 mm, 600 mm, 750 mm and 900 mm (18", 24", 30" and 36"). The Form Stake is equipped with spiral-patterned nail holes for use as form pins.

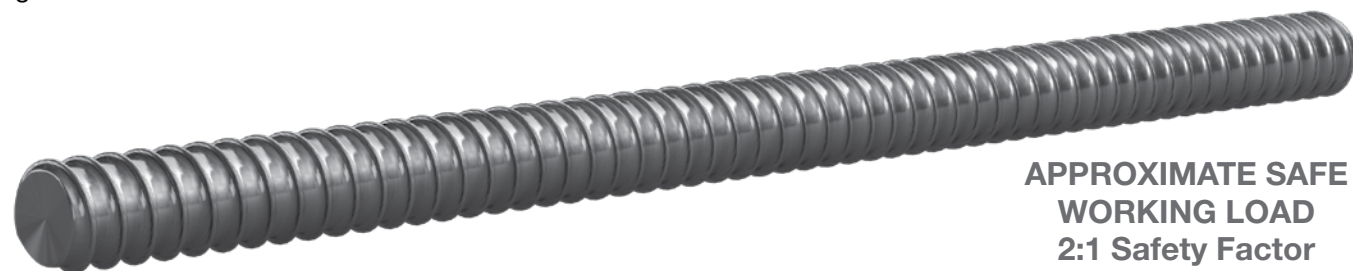
To order, please specify the following information

EXAMPLE
Name Form Stake
Diameter 3/4"
Length 24"
Quantity 10



Continuous Threaded Lagstud

The Acrow-Richmond Lagstud is perhaps the most versatile of all the members of the AR Tyscru family. This versatile product can be used in combination with the complete line of Tyscru products. Continuous Threaded Lagstud is available in both mild steel and high tensile in 3 m (10') and 3.6 m (12') lengths respectively. Field cutting may be accomplished with bolt cutters or carborundum blades. The Lagstud is particularly adaptable in combination with Tyscrus to make adjustable Tys, embedded in concrete or rock as an adjustable anchorage for the Tyscru, or in combination with Handle Lagnuts as an emergency lagstud bolt.



APPROXIMATE SAFE
WORKING LOAD
2:1 Safety Factor

LAGSTUD TENSILE PROPERTIES

Diameter in (mm)	Mild Steel		High Tensile Steel			
	Ultimate Loads lbs (kN)	Safe Working Loads lbs (kN)	Ultimate lbs	Loads (kN)	Safe Working lbs	Loads (kN)
½ (13)	15,000 (70)	7,000 (33)	18,000 (80)		9,000 (40)	
¾ (20)			36,000 (160)		18,000 (80)	
1 (25)	50,000 (220)	25,000 (110)	75,000 (335)		37,500 (165)	
1¼ (32)	74,000 (330)	37,000 (165)	120,000 (530)		49,000* (216)*	
1½ (38)	Contact the AR Technical Department for details.					

*When using 32 mm (1¼") High Tensile Lagstud, use double nuts to obtain full capacity of Rod, 265 kN (60,000 lbs).

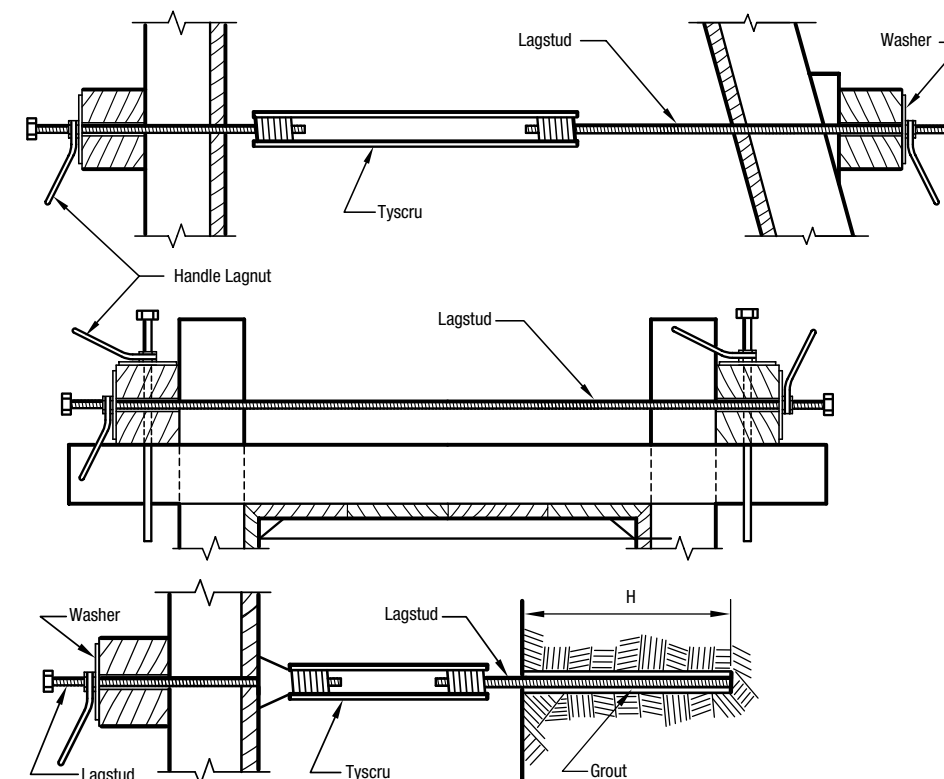
LAGSTUD FOR EMBEDDED ANCHORS

Diameter in (mm)	Approx. Safe Working Loads @ 2:1		Embedment "H"	
	lbs	(kN)	1,000 psi (6.9 MPa) in (mm)	2,000 psi (13.8 MPa) in (mm)
½ (13)	4,500	(20)	16 (408)	12 (304)
½ (13)	6,750	(30)	20 (508)	15 (378)
¾ (20)	9,000	(40)	24 (609)	18 (458)
1 (25)	13,500	(60)	32 (816)	24 (609)
1 (25)	18,000	(80)	40 (1,020)	30 (760)
1¼ (32)	27,000	(120)	40 (1,020)	30 (760)

To order, please specify
the following information

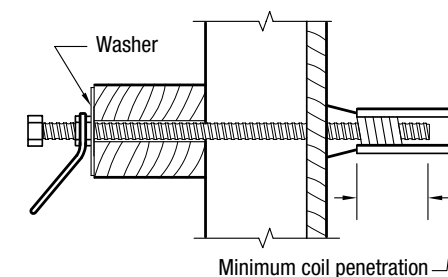
EXAMPLE
Name Continuous Threaded Lagstud
Type 9M
Diameter 13 mm (½")
Length 3.6 m (12')
Grade of Steel High Tensile
Quantity 50

Continuous Threaded Lagstud



Lagstud Bolt

AR Lagstud Bolts are threaded for the coil of an AR Tyscru or insert. Available in ½", ¾", 1" and 1¼" (13 mm, 20 mm, 25 mm and 32 mm) diameters and lengths as required in 2" (50 mm) increments. All Lagstud Bolts have a hexagon nut welded to it as an integral head, and should be used with a running nut, handle lagnut or wingnut as shown.



To order, please specify
the following information

EXAMPLE
Name Lagstud Bolt
Diameter 13 mm (½")
Length 400 mm (16")
Type 33 kN (7,500 lbs)
Quantity 200

APPROXIMATE SAFE WORKING LOAD 2:1 Safety Factor

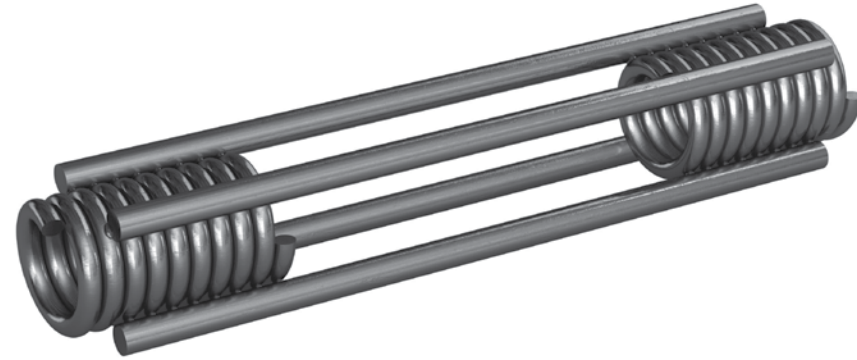
Diameter in (mm)	Mild Steel lbs (kN)	High Tensile lbs (kN)
½ (13)	7,000 (33)	9,000 (40)
¾ (20)	N/A N/A	18,000 (80)
1 (25)	25,000 (110)	37,500 (165)
1¼ (32)	37,500 (165)	49,000* (216)
1½ (38)	Contact the NCA Technical Department for details.	

*When using 1¼" (32 mm) High Tensile Lagstud, use double nuts to obtain full capacity of Rod, 60,000 lbs (265 kN). All lagstud bolts to be used with running nut, handle lagnut or wing nut.



Tyscru

The AR Tyscru is an extra strong, resistance welded Ty designed to take the abuse encountered in medium and heavy concrete construction. An extremely simple Ty, capable of many combinations and uses in the field, it may be used with or without Tycones or combined with Continuous Threaded Lagstud to form an Adjustable Tyscru



Determining your Tyscru Requirement

Tyscru: The Tyscru length is determined by subtracting each set back requirement from the wall thickness at the tie location. Lagstud or lagstud bolt length is determined by adding the form thickness to the set back on one side plus the Tyscru coil length plus 13 mm (1/2"). Lagstud or Lagstud Bolt are furnished standard in even 50 mm (2") lengths. Select the next higher full unit over actual length determined. For extreme adjustment requirements, 25 mm to 50 mm (1" to 2") may be added.

Wall Thickness: Distance between the form facings at the Tyscru location.

Set Back: Required distance of Ty metal from the finished concrete face with or without the use of Tycones. Set back may be required at one or both faces, usually both. Total set back is the sum of set backs from both wall faces. When Tycones are used, their length is equal to the required set back.

Form Thickness: Distance measured between the finished concrete surface to the outside face of the flat washer — includes plywood sheeting material, studs, wales and washer.

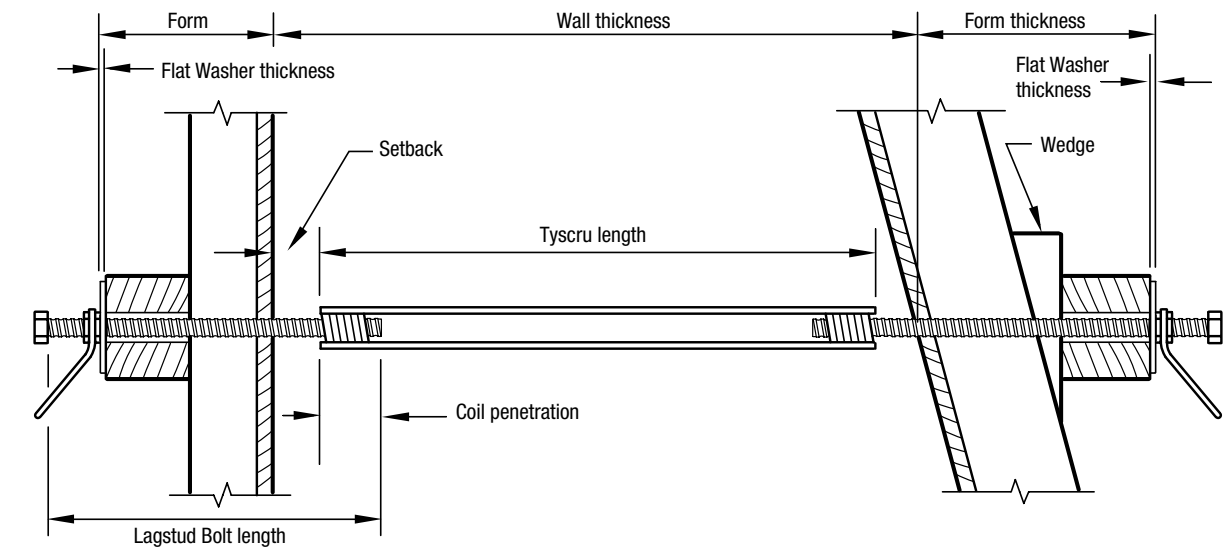
Coil Penetration: Distance the Lagstud should penetrate the Tyscru coil length plus 13 mm (1/2").

General instructions: For extreme penetration or extended concrete curing requirements, the Lagstud or Lagstud Bolt is normally greased to facilitate removal. To break the bond and permit easy removal, it is a good practice to turn the lagstud or lagstud bolt a quarter to one-half turn, in and out, eight to twelve hours after the concrete has been poured.

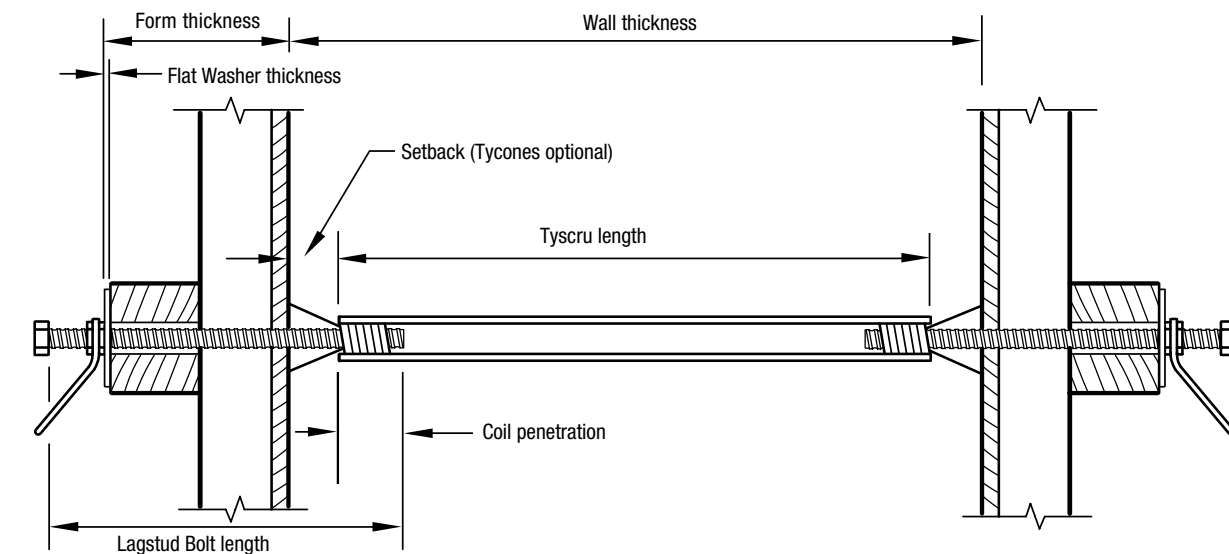
The minimum Lagstud Bolt length required is equal to the sum of the flat washer, waler studs, form ply, set back and the coil length plus 13 mm (1/2").

Tyscru

Battered Wall Form



Plumb Wall Form



Refer to the Appendix for General Guidelines on page 96, Lateral Pressure information on page 102 and typical Medium and Heavy Formwork beginning on page 108. See page 51 for approximate safe working load System Chart.

Tyscru

2-Strut Nominal Diameter			Safe Load		PLASTIC TYCONE SET BACK	
mm	(in)	Tyscru Type	kN	(lbs)		
13 mm	(½")	4.5M	20 kN	(4,500 lbs)	25 mm or 38 mm or 50 mm	(1" or 1½" or 2")
13 mm	(½")	6.75M	30 kN	(6,750 lbs)	25 mm or 38 mm or 50 mm	(1" or 1½" or 2")
13 mm	(½")	9.0M	40 kN	(9,000 lbs)	25 mm or 38 mm or 50 mm	(1" or 1½" or 2")
20 mm	(¾")	9M	40 kN	(9,000 lbs)	25 mm or 50 mm	(1" or 2")
25 mm	(1")	13.5M	60 kN	(13,500 lbs)	25 mm or 50 mm	(1" or 2")

SWL is based on an approximate 2:1 Factor of Safety

4-Strut Nominal Diameter			Safe Load		PLASTIC TYCONE SET BACK	
mm	(in)	Tyscru Type	kN	(lbs)		
*13 mm	(½")	9M	40 kN	(9,000 lbs)	25 mm or 38 mm or 50 mm	(1" or 1½" or 2")
20 mm	(¾")	18M	80 kN	(18,000 lbs)	25 mm or 50 mm	(1" or 2")
25 mm	(1")	18M	80 kN	(18,000 lbs)	25 mm or 50 mm	(1" or 2")
25 mm	(1")	27M	120 kN	(27,000 lbs)	25 mm or 50 mm	(1" or 2")
25 mm	(1")	37M	165 kN	(37,000 lbs)	25 mm or 50 mm	(1" or 2")
32 mm	(1 1/4")	27M	120 kN	(27,000 lbs)	25 mm or 50 mm	(1" or 2")
32 mm	(1 1/4")	37M	165 kN	(37,000 lbs)	25 mm or 50 mm	(1" or 2")

4-Strut - Refer to page XX for details about the 6-Strut Tyscru

*Available as a special order.

SWL is based on an approximate 2:1 Factor of Safety

Minimum Sizes of Tyscru

Description Tyscru Diameter	Standard	Cone-Tight	Standard Waterseal	Cone-Tight Waterseal
13 mm (½") T2-4.5M	100 mm (4")	100 mm (4")	150 mm (6")	150 mm (6")
13 mm (½") T2-6.7M	100 mm (4")	100 mm (4")	150 mm (6")	150 mm (6")
20 mm (¾") T2-7.6M	100 mm (4")	150 mm (6")	150 mm (6")	200 mm (8")
20 mm (¾") T2-9M	100 mm (4")	150 mm (6")	150 mm (6")	200 mm (8")
25 mm (1") T2-13.5M	150 mm (6")	150 mm (6")	200 mm (8")	200 mm (8")
25 mm (1") T4-18M	150 mm (6")	150 mm (6")	200 mm (8")	200 mm (8")
20 mm (¾") T4-18M	150 mm (6")	150 mm (6")	200 mm (8")	200 mm (8")
25 mm (1") T4-27M	150 mm (6")	150 mm (6")	250 mm (10")	300 mm (12")
25 mm (1") T4-37M	200 mm (8")	150 mm (6")	250 mm (10")	300 mm (12")
32 mm (1¼") T4-27M	150 mm (6")	150 mm (6")	250 mm (10")	300 mm (12")
32 mm (1¼") T4-37M	200 mm (8")	200 mm (8")	250 mm (10")	300 mm (12")

The minimum Lagstud Bolt length required is equal to the sum of the flat washer, waler studs, form ply, set back and the coil length plus 13 mm (½").

Standard Tyscru

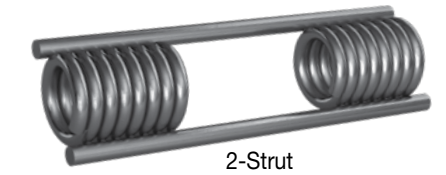
The AR Standard 2-Strut Tyscru is available in 13 mm, 20 mm and 25 mm (½", ¾" and 1") nominal diameters and may be fabricated to required length to the nearest 3 mm (1/8"). The AR Standard 4-Strut Tyscru is available in 20 mm, 25 mm and 32 mm (¾", 1" and 1¼") nominal diameters and may be fabricated to required length to the nearest 3 mm (1/8").

To order, please specify the following information

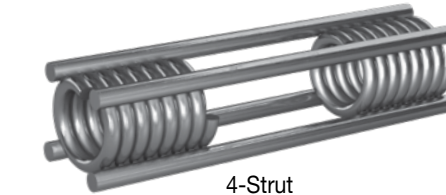
EXAMPLE

Name Standard Tyscru
 Type 2-strut 4.5M
 Nominal Diameter 13 mm (½")
 Tyscru length 560 mm (22")
 Strength 20 kN (4,500 lbs.)
 Quantity 100

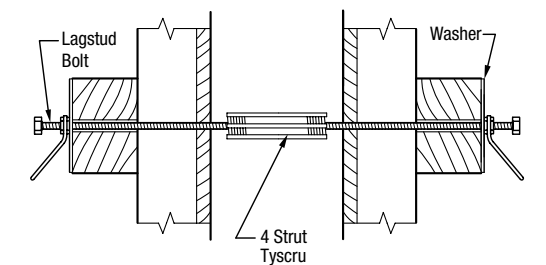
APPROXIMATE SAFE WORKING LOAD
 see table on page 51
2:1 Safety Factor



2-Strut



4-Strut



Cone-Tight Tyscru

The AR Cone-Tight Tyscru has the same capacities as the Standard 2-Strut and 4-Strut Tyscru and is available in 13 mm, 20 mm, 25 mm and 32 mm (½", ¾", 1" and 1¼") nominal diameters in a minimum length of 100 mm (4"). Cone-Tight Tycones are readily attached to the protruding coils. For coil protrusion lengths see table below.

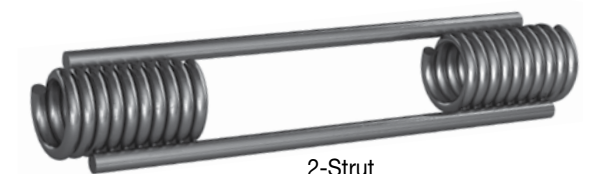
To order, please specify the following information

EXAMPLE

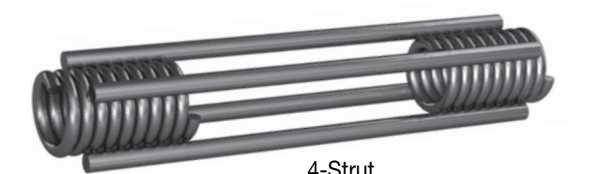
Name Cone-Tight Tyscru
 Type 4-strut 18M
 Nominal Diameter 20 mm (¾")
 Tyscru length 300 mm (12")
 Strength 40 kN (9,000 lbs.)
 Quantity 100

APPROXIMATE SAFE WORKING LOAD
 see table on page 51
2:1 Safety Factor

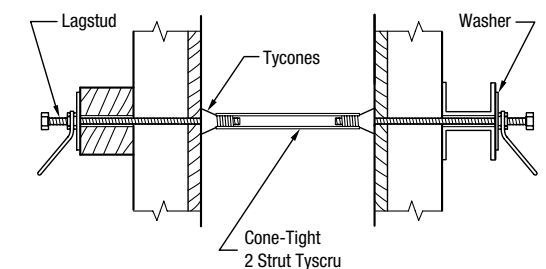
Diameter	Coil Protrusion
13 mm (½")	10 mm (3/8")
20 mm (¾")	13 mm (½")
25 mm (1")	13 mm (½")
32 mm (1¼")	13 mm (½")



2-Strut



4-Strut



Refer to the Appendix for General Guidelines on page 96, Lateral Pressure information on page 102 and typical Medium and Heavy Formwork beginning on page 108. See page 51 for approximate safe working load System Chart.

Waterseal Tyscru

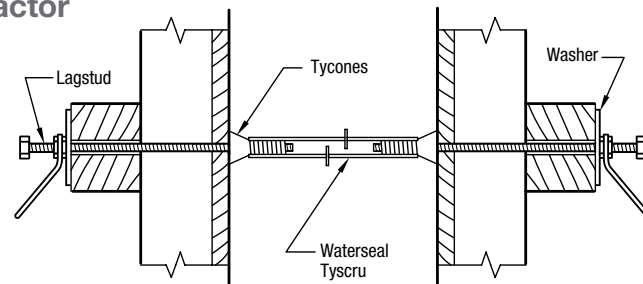
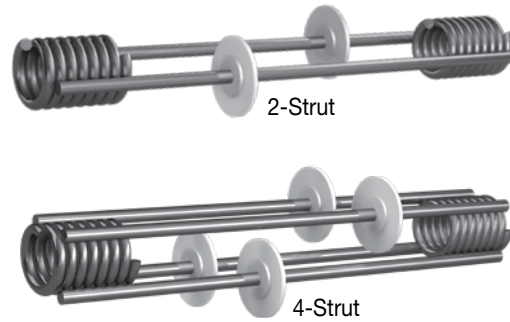
The AR Waterseal Tyscru has the same capacity as the standard 2-Strut and 4-Strut Tyscru. The Waterseal Tyscru is available as standard or cone tight in 13 mm, 20 mm, 25 mm and 32 mm (½", ¾", 1" and 1¼") nominal diameters in a minimum length of 100 mm (4") for a Cone-Tight Tyscru and 150 mm (6") for a Waterseal Tyscru. AR uses a unique manufacturing process to fuse a water stop plastic washer to each wire strut. The plastic washer will break the surface continuity and prevent seepage of water along the struts.

To order, please specify the following information

EXAMPLE

Name Waterseal Tyscru
 Type 2-strut 6.75M
 Nominal Diameter 13 mm (½")
 Tyscru length 250 mm (22")
 Strength 20 kN (4,500 lbs.)
 Quantity 200

APPROXIMATE SAFE WORKING LOAD
 see table on page 42
2:1 Safety Factor



Adjustable Tyscru

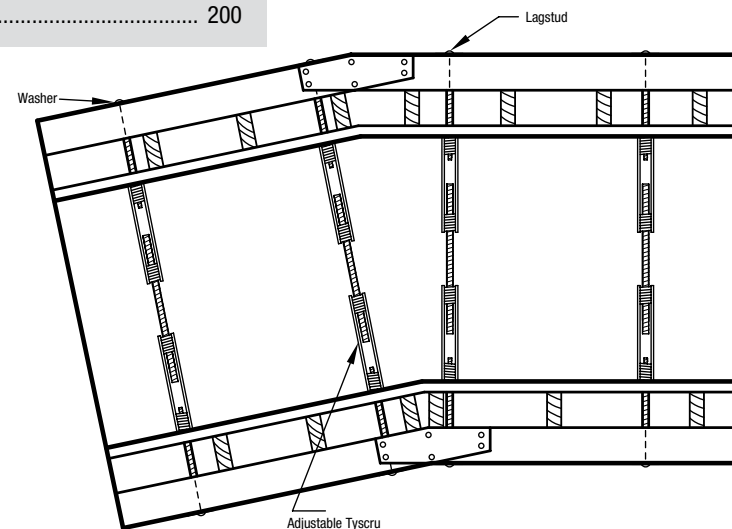
The AR Adjustable Tyscru, consisting of two Tyscrus (cone tight one end) and one Continuous Threaded Lagstud, is available in 13 mm, 20 mm, 25 mm and 32 mm diameters (½", ¾", 1" and 1¼") diameters.

To order, please specify the following information

EXAMPLE

Name Adjustable Tyscru
 Type 2-strut 4.5M
 Nominal Diameter 13 mm (½")
 Length 225 mm (9")
 Strength 30 kN (6,750 lbs.)
 Quantity 200

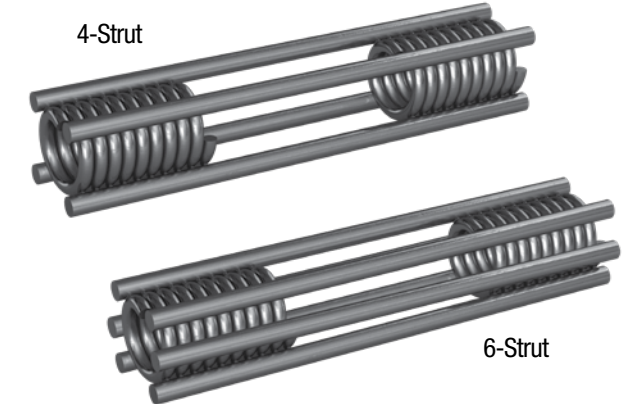
APPROXIMATE SAFE WORKING LOAD
 see table on page 51
2:1 Safety Factor



Heavy Tyscru (4-Strut and 6-Strut)

The AR 6-Strut Heavy Tyscru is available in 32 mm and 38 mm (1¼" and 1½") nominal diameter and may be fabricated to required lengths to the nearest 3 mm (1/8"). The AR 6-Strut Heavy Tyscru is available as a standard or water seal Tyscru for both diameters. A 32mm (1¼") Cone Tight 6-strut Heavy Tyscru is also available.

APPROXIMATE SAFE WORKING LOAD
 see table on page 51
2:1 Safety Factor



To order, please specify the following information

EXAMPLE

Name 4-Strut Heavy Tyscru
 Diameter 20 mm (¾")
 Length 300 mm (12")
 Strength 40 kN (9,000 lbs.)
 Quantity 100

Name 6-Strut Heavy Tyscru
 Diameter 32 mm (1")
 Length 300 mm (12")
 Strength 165 kN (37,000 lbs.)
 Quantity 200

4-STRUT

Diameter mm (in)	Type	Safe Load	
		kN	(lbs)
*13 mm (½")	9 M	40 kN	(9,000 lbs)
20 mm (¾")	18 M	80 kN	(18,000 lbs)
25 mm (1")	18 M	80 kN	(18,000 lbs)
25 mm (1")	27 M	120 kN	(27,000 lbs)
25 mm (1")	37 M	165 kN	(37,000 lbs)
32 mm (1¼")	27 M	120 kN	(27,000 lbs)
32 mm (1¼")	37 M	165 kN	(37,000 lbs)

6-STRUT

Diameter mm (in)	Safe Load	
	kN	(lbs)
32 mm (1¼")	200 kN	(45,000 lbs)
38 mm (1½")	245 kN	(55,000 lbs)

Ty-Anchor (2-Strut and 4-Strut)

The AR Ty-Anchor is probably the most common re-anchorage device used. It has been the workhorse of the industry and well proven through the years. It is well suited to use even in the very low strength concretes. See the appendix for estimated working and ultimate load ratings in various concrete strengths.

APPROXIMATE SAFE WORKING LOAD
see table on page 51
2:1 Safety Factor

To order, please specify the following information

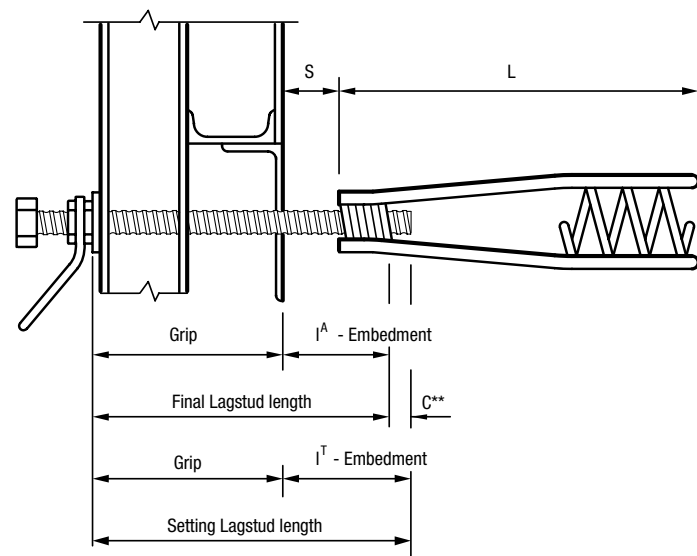
EXAMPLE

Name Ty-Anchor
Type 2-Strut
Diameter 25 mm (1")
Length 300 mm (12")
Quantity 200

Diameter	Strut	Length "L"	Set back "S"	I ^T	I ^A	C*
25 mm (1")	2	300 mm (12")	100 mm (4")	185 mm (7 1/4")	165 mm (6 1/2")	20 mm (3/4")
32 mm (1 1/4")	2 or 4	380 mm (15")		195 mm (7 3/4")	175 mm (7")	20 mm (3/4")
32 mm (1 1/4")	2 or 4	450 mm (17 1/2")		195 mm (7 3/4")	175 mm (7")	20 mm (3/4")
32 mm (1 1/4")	2 or 4	500 mm (20")		195 mm (7 3/4")	175 mm (7")	20 mm (3/4")
38 mm (1 1/2")	2 or 6	600 mm (24")		215 mm (8 1/2")	190 mm (7 1/2")	25 mm (1")

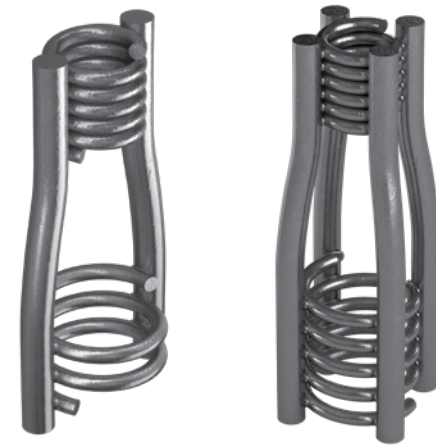
*Set back can be increased for greater strength.

**Clearance between setting bolt and final bolt.



APPROXIMATE ULTIMATE CAPACITIES

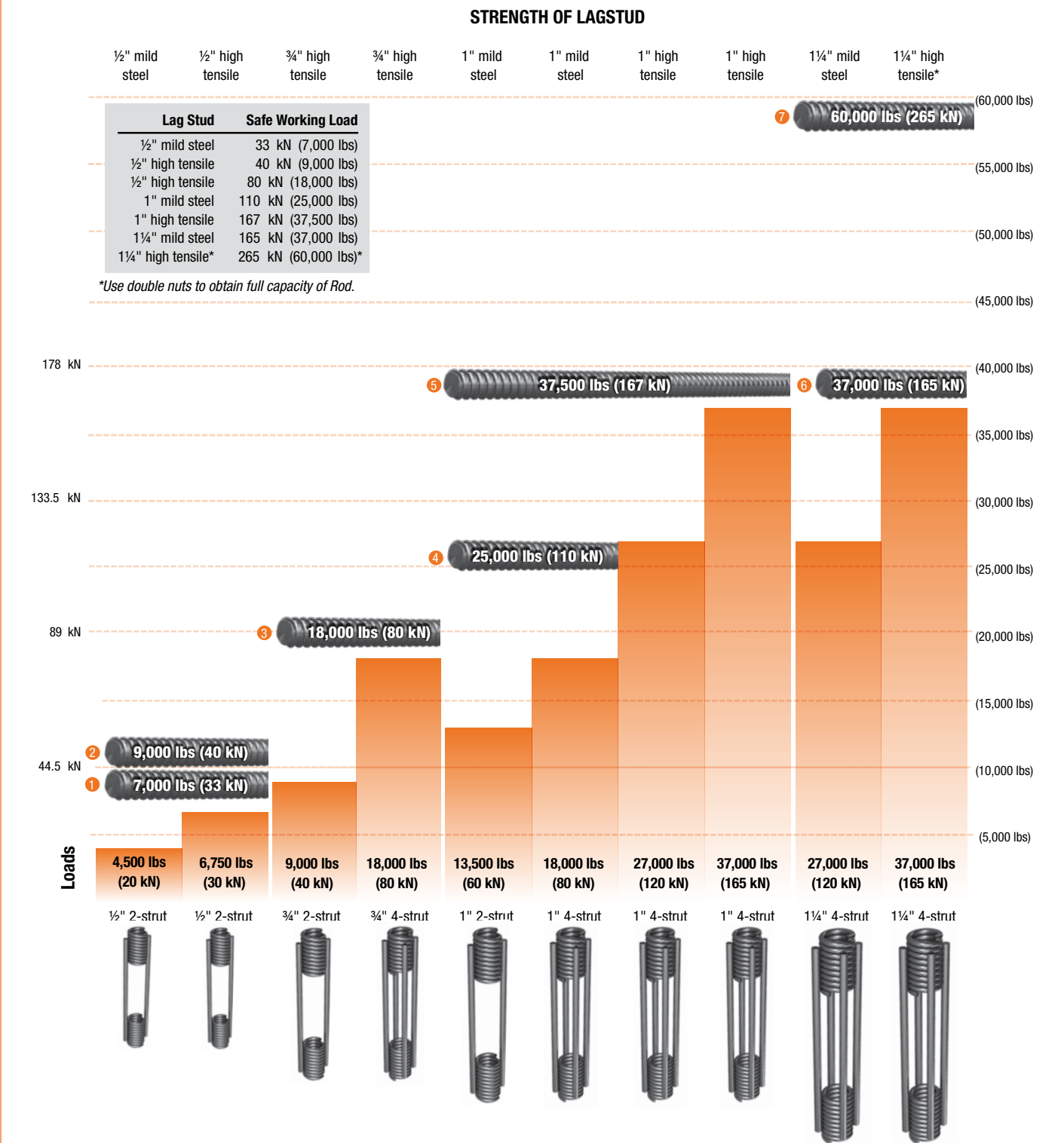
Diameter mm (in)	Strut	Type	kN	(lbs)
25 mm (1")	2- Strut	15 M	67 kN	(15,000 lds)
32 mm (1 1/4")	2- Strut	15 M	67 kN	(15,000 lds)
32 mm (1 1/4")	2- Strut	40 M	178 kN	(40,000 lds)
32 mm (1 1/4")	4- Strut	60 M	265 kN	(60,000 lds)
38 mm (1 1/2")	4- Strut	60 M	265 kN	(60,000 lds)
38 mm (1 1/2")	6- Strut	90 M	400 kN	(90,000 lds)



2-Strut

4-Strut

Safe Working Load



Refer to the Approximate Safe Working Loads and Ultimate Capacities calculated for various concrete strengths table on pages 51 and 112 of the Appendix.

Refer to the Appendix for General Guidelines on page 96, Lateral Pressure information on page 102 and typical Medium and Heavy Formwork beginning on page 108.

Ty-Frame

The AR Standard Ty-frame consists of four coils welded to a truss-like arrangement of wire struts with a leg at the front face extending down to the soffit, for support of the riser form. Ty-frames are designed for the individual riser and seat bracket condition.

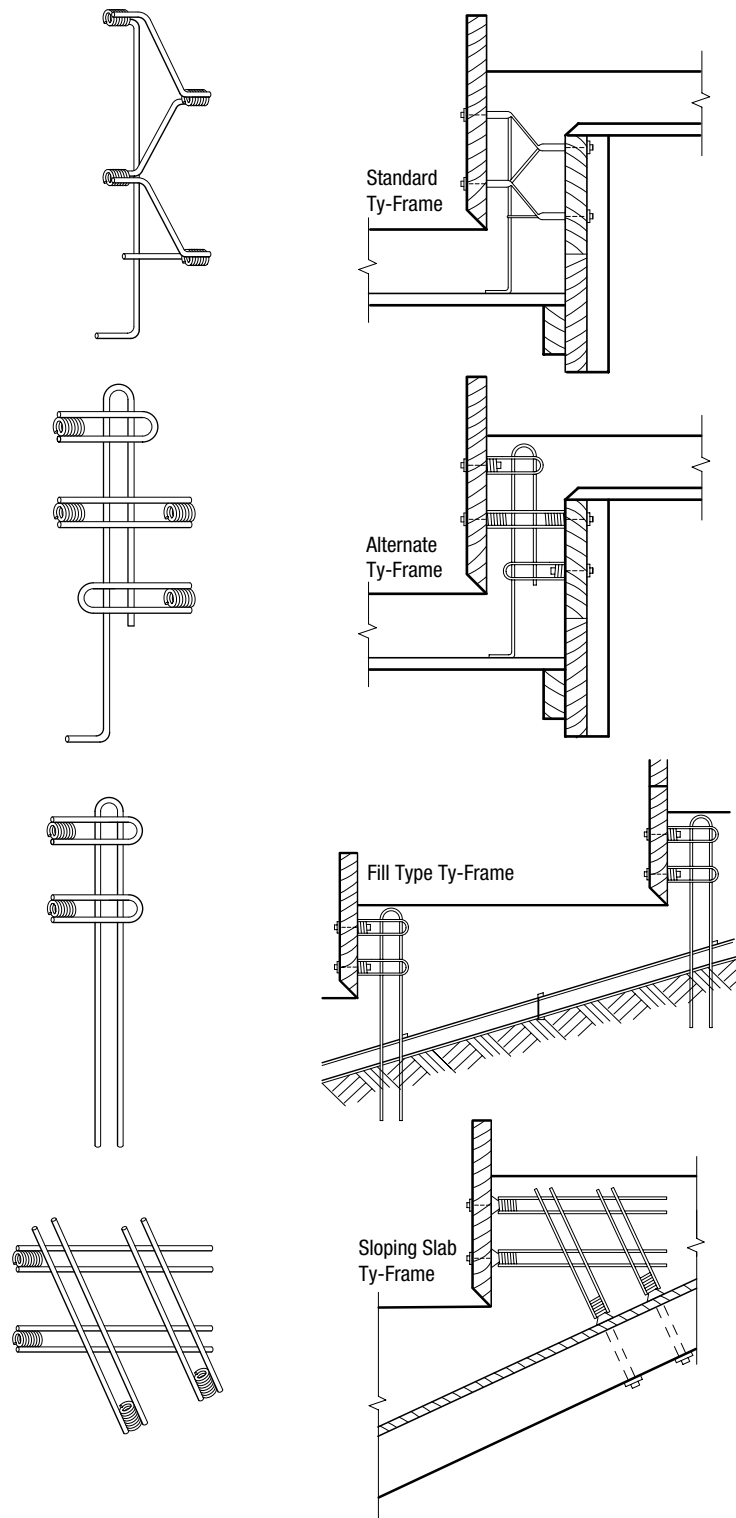
The AR Alternate Ty-frame may be supplied in its alternate form, at our discretion, if job conditions warrant. This alternate form consists of a series of Tyloops, or Tyloops and Tyscru, welded to a strong vertical support member.

The AR Fill Type Ty-frame is made to fit the job condition where the riser is poured on fill. Usually manufactured in multiple units to support 2, 3, or 4 seat brackets with one unit.

The AR Sloping Slab Ty-frame consists of Tyscrus welded together in exact positions to support the riser form.

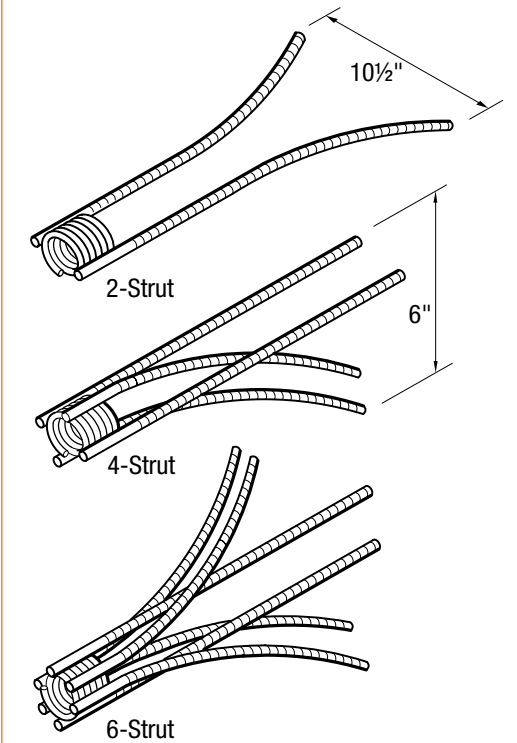
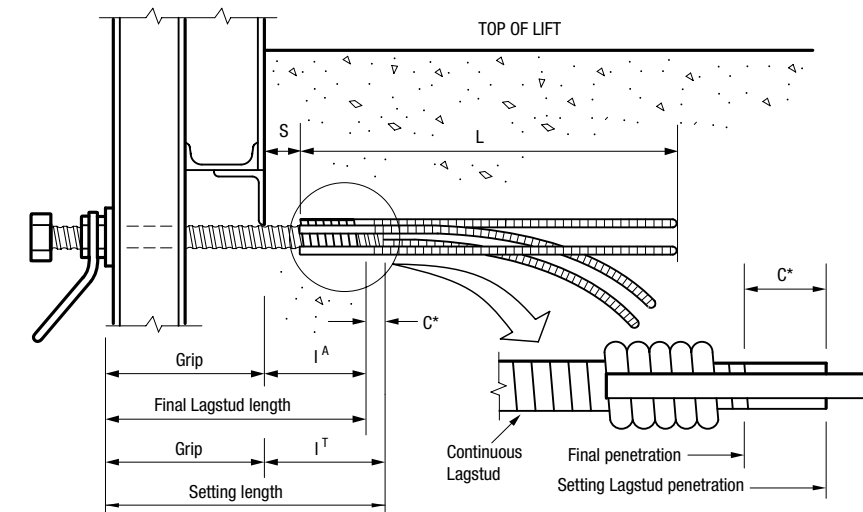
To order, please specify the following information

EXAMPLE
Name Alternate Ty-Frame
Supply a sketch or complete details of risers and seat bracket
Quantity 200



Tybow Anchor (2-strut, 4-strut and 6-strut)

The AR Tybow Anchor combines the advantages of the Tyscru coil with the efficiency of the bow shaped continuous threaded struts to make a highly effective anchorage device. Used with lagstud bolts or He-Bolts, the Ty-Bow is applicable even in the lowest concrete strengths. See the appendix for estimated working and ultimate load ratings in various concrete strengths.



APPROXIMATE SAFE WORKING LOADS 2:1 Safety Factor

Anchor Type	Diameter	Length "L"	Set back "S"	I ^T	I ^A	C*	Safe Working Load kN (lbs)
2-Strut	20 mm, 25 mm, 32 mm (3/4", 1", 1 1/4")	450 mm (18")		195 mm (7 3/4")	175 mm (7")	20 mm (3/4")	67 kN (15,000 lbs)
4-Strut	25 mm, 32 mm (1", 1 1/4")	450 mm (18") 610 mm (24 3/8")	100 mm (4")	222 mm (8 3/8")	190 mm (7 1/2")	32 mm (1 1/4")	134 kN (30,000 lbs)
6-Strut	38 mm (1 1/2")	600 mm (24")		230 mm (9")	190 mm (7 1/2")	38 mm (1 1/2")	200 kN (45,000 lbs)

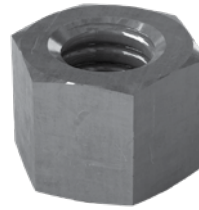
*Clearance between setting bolt and final bolt. Other sizes available upon request.

To order, please specify the following information

EXAMPLE
Name Tybow Anchor
Type 2-Strut
Diameter 32 mm (1 1/4")
Length 450 mm (18")
Quantity 200

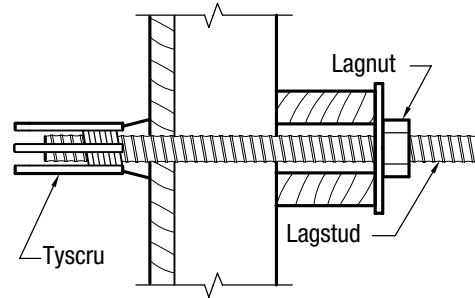
Lagnut

AR Lagnuts are manufactured with Lag thread and are available in 1/2" through 1 1/2" (13 mm through 38 mm) diameters. Warning: when utilizing Lagnuts on through-Ty applications, such as Continuous Threaded Lagstud, double nuts are required to develop ultimate loads for 1 1/4" (32 mm) applications. For all other applications, AR Lagnuts are designed to develop the full published ultimate load of AR Lagstud.



APPROXIMATE SAFE WORKING LOADS 2:1 Safety Factor

Diameter in (mm)	SAFE WORKING LOADS	
	lbs	(kN)
1/2 (13)	9,000	(40)
3/4 (20)	18,000	(80)
1 (25)	37,500	(167)
1 1/4 (32)	49,000*	(216)*
1 1/2 (38)	NCA Technical Department for details.	



To order, please specify the following information

EXAMPLE

Name Lagnut
Diameter 25 mm (1")
Quantity 200

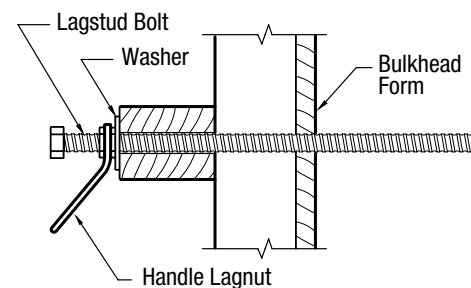
*When using 1 1/4" (32 mm) High Tensile Lagstud, use double nuts to obtain full capacity of Rod, 60,000 lbs (265 kN).

Handle Lagnut

AR Handle Lagnuts are made of hex nuts welded to substantial wire loops. Available in 1/2", 3/4", 1" and 1 1/4" (13 mm, 20 mm, 25 mm and 32 mm) diameters with lag thread. The handle eliminates the need for using a wrench and makes installation and/or stripping fast and simple.

APPROXIMATE SAFE WORKING LOADS 2:1 Safety Factor

Bolt Diameter in (mm)	Threads per inch (TPI)	Handle length from nut centre in (mm)	Safe Working Load	
			lbs	(kN)
1/2 (13)	6	5 (125)	9,000	(40)
3/4 (20)	4 1/2	4 7/8 (120)	18,000	(80)
1 (25)	3 1/2	5 1/2 (140)	37,500	(167)
1 1/4 (32)	3 1/2	8 3/8 (210)	57,500	(256)
1 1/2 (38)	Contact the AR Technical Department for details.			



To order, please specify the following information

EXAMPLE

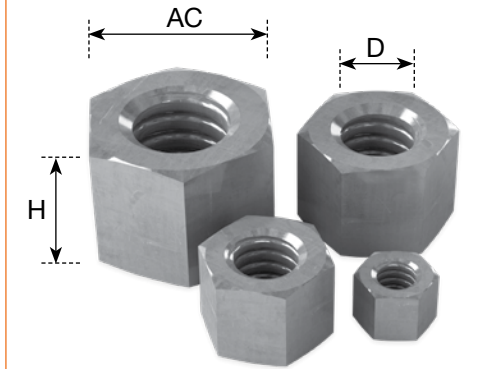
Name Handle Lagnut
Diameter 13 mm (1/2")
Quantity 200

Coil Nuts

AR Coil Nuts Two standard coil nuts of each size equal the strength of one heavy duty tall coil nut of the same size.

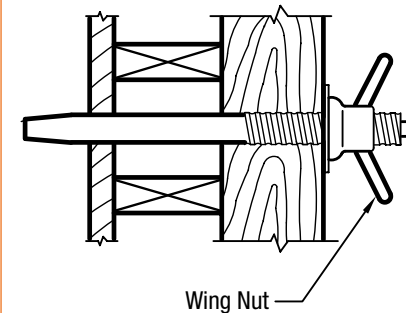
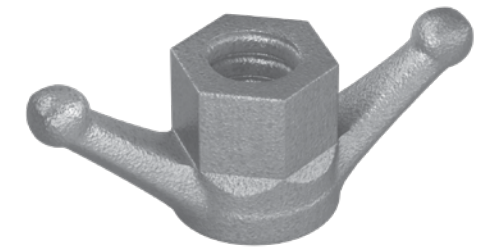
APPROXIMATE SAFE WORKING LOADS 2:1 Safety Factor

D Size	H Size	AC Across Flats	Box Qty	Weight per 100pcs lbs	APPROXIMATE SAFE WORKING LOAD lbs
1/2"	0.484	0.863	500	6.2	6,000
5/8" Finished	0.547	0.930	500	11.4	8,000
3/4" Finished	0.641	1.107	500	11.4	9,000
3/4" Heavy	0.734	1.231	250	17.8	9,000
7/8"	0.859	1.416	250	27.6	16,000
1"	0.984	1.600	150	15.0	18,000
1-1/4"	1.219	2.123	70	75.2	27,000
1-1/2"	1.469	2.682	40	122.6	40,000



Wing Nut

AR Wing Nuts are manufactured with a lag thread and are used with AR She-Bolts or Taper-Tys. Fabricated in 20 mm, 25 mm and 32 mm (3/4", 1" and 1 1/4") diameters.



Size in (mm)	Ultimate Tensile Load	
	lbs	(kN)
3/4 (20)	40,000	(178)
1 (25)	82,000	(365)
1 1/4 (32)	115,000	(512)

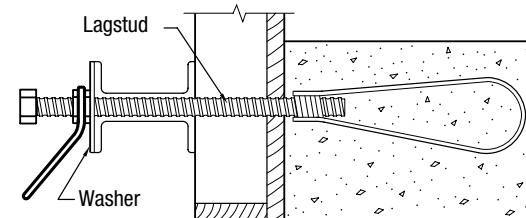
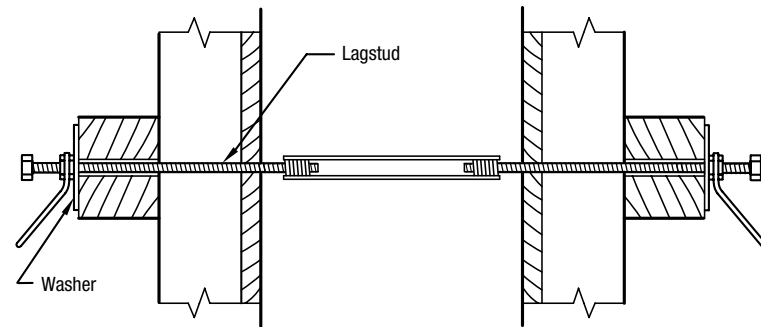
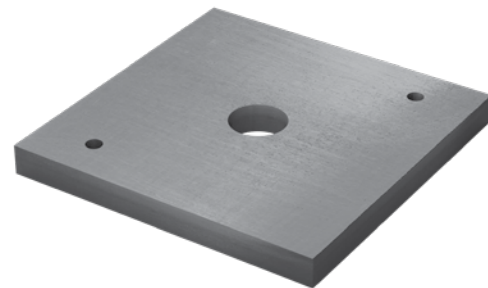
To order, please specify
the following information

EXAMPLE

Name Wing Nut
Quantity 25 mm (1")

Flat Washer

AR Flat Washers are made from flat steel plate. For optimization, AR Washers are square. For best results the washer should be placed so that its length runs parallel to the walers and the gap or space spanned by the washer should not exceed the physical bolt diameter plus 1/4" (6 mm).



Bolt Diameter in (mm)	Plate Size in (mm)	Hole Size in (mm)
1/2 (13)	3 3/4 x 3 3/4 x 1/4 (95 x 95 x 6)	9/16" (14 mm)
3/4 (20)	5 x 5 x 3/8 (125 x 125 x 10)	13/16" (21 mm)
3/4 (20)	6 x 6 x 1/2 (150 x 150 x 13)	13/16" (21 mm)
1 (25)	5 x 5 x 3/8 (150 x 150 x 10)	1 1/16" (27 mm)
1 (25)	6 x 6 x 1/2 (150 x 150 x 13)	1 1/16" (27 mm)
1 1/4 (32)	6 x 6 x 1/2 (150 x 150 x 13)	1 3/8" (35 mm)
1 1/4 (32)	8 x 8 x 3/4 (200 x 200 x 19)	1 3/8" (35 mm)

Contact AR Technical Department for details.

Bolt Dia.	Plate Size	DISTANCE BETWEEN WALER										
		1"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"	2 3/4"	3"	3 1/4"	
1/2"	3 3/4" x 3 3/4" x 1/4"	6,750 lbs	3,750 lbs	2,500 lbs	1,900 lbs	1,600 lbs		1,100 lbs				
3/4"	5" x 5" x 3/8"		25,000 lbs	14,000 lbs	9,000 lbs	7,000 lbs	5,600 lbs		4,000 lbs			
3/4"	6" x 6" x 1/2"		60,000 lbs	33,000 lbs	22,000 lbs	16,000 lbs	13,500 lbs		9,600 lbs			
1"	5" x 5" x 3/8"			38,000 lbs	38,000 lbs	24,000 lbs	18,000 lbs	14,000 lbs		10,000 lbs		
1"	6" x 6" x 1/2"			38,000 lbs	38,000 lbs	24,000 lbs	18,000 lbs	14,000 lbs		10,000 lbs		
1 1/4"	6" x 6" x 1/2"			37,000 lbs	37,000 lbs	27,000 lbs	19,000 lbs	15,000 lbs			10,000 lbs	
1 1/4"	8" x 8" x 3/4"			125,000 lbs	125,000 lbs	91,000 lbs	65,000 lbs	50,000 lbs				35,000 lbs

(1 1/2") Contact AR Technical Department for details.

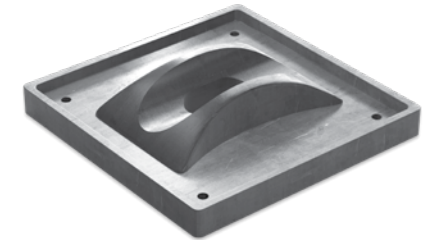
Bolt Size	Plate Diameter (mm)	DISTANCE BETWEEN WALER										
		25 mm	32 mm	35 mm	45 mm	50 mm	57 mm	63 mm	70 mm	75 mm	82 mm	
13	95 x 95 x 6	30 kN	16 kN	11 kN	8.5 kN	7.1 kN		4.9 kN				
20	125 x 125 x 10		111 kN	62 kN	40 kN	31 kN	25 kN		18 kN			
20	150 x 150 x 13		266 kN	146 kN	98 kN	71 kN	60 kN		43 kN			
25	125 x 125 x 10			169 kN	169 kN	106 kN	80 kN	62 kN		45 kN		
25	150 x 150 x 13			169 kN	169 kN	106 kN	80 kN	62 kN		45 kN		
32	150 x 150 x 13			165 kN	165 kN	120 kN	85 kN	66 kN			45 kN	
32	200 x 200 x 19			555 kN	555 kN	405 kN	290 kN	220 kN				155 kN

Contact AR Technical Department for details.

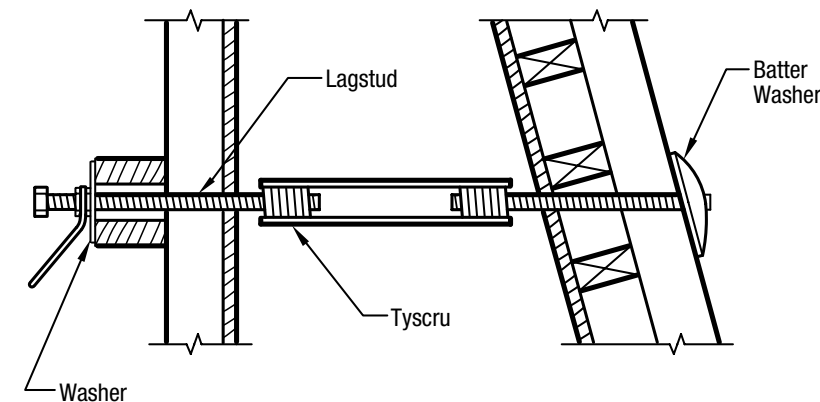
System load reduction from increased waler spacing.

Batter Washer

AR Batter Washers are designed to hold a lagstud at any angle up to 45° without need for wedging. Nail holes are provided for attaching the washers to the walers or strongbacks. Multiple lumber grips on the underside prevent slippage when the washers are not nailed. Available for all lagstud sizes.



Bolt Diameter mm (in)	Washer Dimensions		Washer Height	
	mm	(in)	mm	(in)
13 mm (1/2")	89 mm	89 mm (3 1/2" x 3 1/2")	25 mm	(1")
22 mm (7/8")	125 mm	140 mm (5" x 5 1/2")	36 mm	(1 1/16")
25 mm (1")	165 mm	165 mm (6 1/2" x 6 1/2")	41 mm	(1 5/8")
29 mm (1 1/8")	165 mm	165 mm (6 1/2" x 6 1/2")	39 mm	(1 9/16")
35 mm (1 3/8")	170 mm	170 mm (6 3/4" x 6 3/4")	45 mm	(1 3/4")
38 mm (1 1/2")	175 mm	175 mm (7" x 7")	45 mm	(1 3/4")
41 mm (1 5/8")	175 mm	175 mm (7" x 7")	45 mm	(1 3/4")



To order, please specify the following information

EXAMPLE

Name Batter Washer
 Diameter 20 mm (3/4")
 Quantity 200

Lag Thread Coupler

AR Lag Thread Couplers are used to couple two Lag Rods of the same diameter. The Lag Thread Coupler is used with lag thread systems and is manufactured with a positive stop.

APPROXIMATE SAFE WORKING LOADS 2:1

Rod Diameter	Outside Diameter	Overall Length	Type	kN	(lbs)
13 mm (1/2")	20 mm (3/4")	50 mm (2")	9M	40 kN	9,000 lbs
20 mm (3/4")	30 mm (1 1/8")	75 mm (3")	18M	80 kN	18,000 lbs
25 mm (1")	38 mm (1 1/2")	100 mm (4")	37.5M	167 kN	37,500 lbs

To order, please specify the following information

EXAMPLE

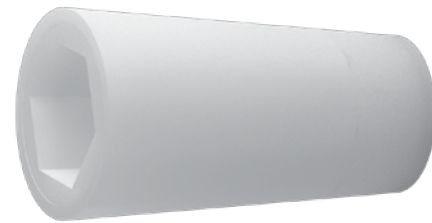
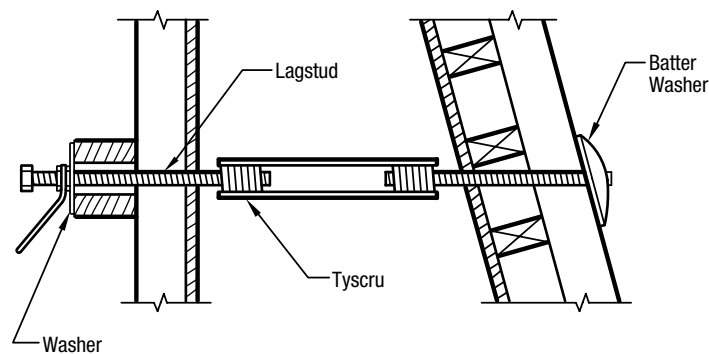
Name Lag Thread Coupler
 Rod diameter 20 mm (3/4")
 Quantity 200



Consult your AR Area Sales Representative or the AR Technical Department for additional information.

Plastic Cone-Tight Tycone

AR Plastic Cone-Tight Tycones are designed to engage the protruding coil of a Cone-Tight Tyscrus. Actual lengths are greater than the set back requirement. See accompanying chart for dimensions.



To order, please specify the following information

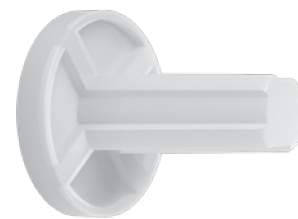
EXAMPLE

Name Plastic Cone-Tight Tycone
Nominal Diameter 20 mm (3/4")
Set back 25 mm (1")
Quantity 200

Tyscrus Diameter		Set back		Nominal Diameter and Depth		Taper	
mm	(in)	mm	(in)	mm	(in)	mm	(in)
13 mm	(1/2")	25 mm	(1")	13 mm x 35 mm	(1/2" x 1 3/8")		
13 mm	(1/2")	38 mm	(1 1/2")	13 mm x 48 mm	(1/2" x 1 7/8")	25 mm to 32 mm	(1" to 1 1/4")
13 mm	(1/2")	50 mm	(2")	13 mm x 60 mm	(1/2" x 2 3/8")		
20 mm	(3/4")	25 mm	(1")	20 mm x 38 mm	(3/4" x 1 1/2")		
20 mm	(3/4")	50 mm	(2")	20 mm x 61 mm	(3/4" x 2 3/8")	38 mm to 45 mm	(1 7/16" to 1 11/16")
20 mm	(3/4")	75 mm	(3")	20 mm x 89 mm	(3/4" x 3 1/2")		
25 mm	(1")	25 mm	(1")	25 mm x 38 mm	(1" x 1 1/2")		
25 mm	(1")	50 mm	(2")	25 mm x 61 mm	(1" x 2 3/8")	48 mm to 54 mm	(1 7/8" to 2 1/8")
32 mm	(1 1/4")	25 mm	(1")	32 mm x 38 mm	(1 1/4" x 1 1/2")		
32 mm	(1 1/4")	50 mm	(2")	32 mm x 61 mm	(1" x 2 3/8")	57 mm to 61 mm	(2 1/4" to 2 3/8")

Plastic Set Back Tyscrus Plug

AR Plastic Set Back Tyscrus Plugs are designed to provide an easy and economical means of sealing 13 mm, 20 mm and 25 mm (1/2", 3/4" and 1") diameter Tycone holes at a required set back. While providing an interesting architectural effect. The Plastic Set Back Tyscrus Plugs are available in light gray. Other colours are available on special order. The plugs may be used in exterior and/or interior applications. Additional sealing or caulking is optional.

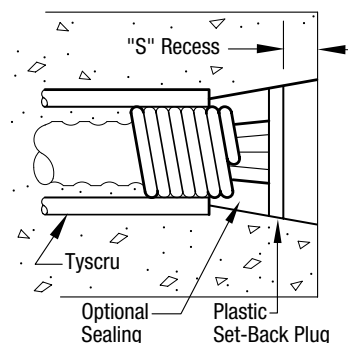


Tyscrus Plug Diameter		Tycone Set Back		Approximate Recess	
mm	(in)	mm	(in)	mm	(in)
13 mm	(1/2")	25 mm	(1")	13 mm	(1/2")
		38 mm	(1 1/2")	16 mm	(5/8")
		50 mm	(2")	20 mm	(3/4")
20 mm	(3/4")	25 mm	(1")	16 mm	(5/8")
		50 mm	(2")	32 mm	(1 1/4")
25 mm	(1")	25 mm	(1")	6 mm	(1/4")
		50 mm	(2")	10 mm	(3/8")

To order, please specify the following information

EXAMPLE

Name Plastic Set Back Tyscrus Plug
Nominal diameter 13 mm (1/2")
Colour light gray
Quantity 200



Consult your AR Area Sales Representative or the AR Technical Department for additional information.

Cone Removal Wrench (T-Shape and L-Shape)

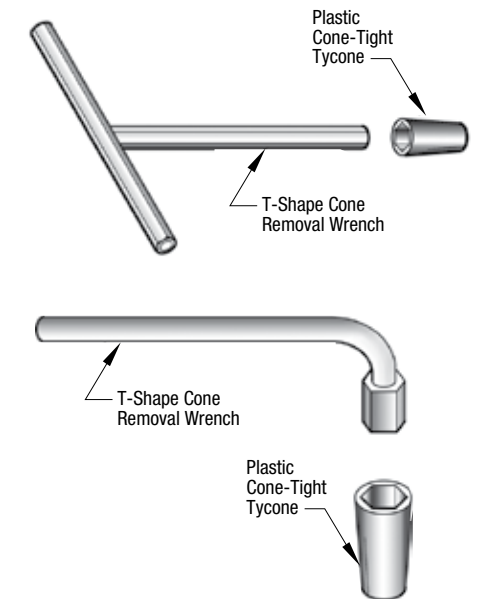
The AR Cone Removal Wrenches are designed to remove the plastic cones from Cone Tight Tyscrus. Available for 13 mm, 20 mm, 25 mm and 32 mm (1/2", 3/4", 1" and 1 1/4") diameter cones.

Wrench Type	Washer Dimensions	
	mm	(in)
T-Shape	13 mm, 20 mm	(1/2" x 3/4")
L-Shape	25 mm, 32 mm	(1" x 1 1/4")

To order, please specify the following information

EXAMPLE

Name Cone Removal Wrench
Type T-Shape
Diameter 20 mm (3/4")
Quantity 2



Lag Wrench

The AR Lag Wrench is designed for tightening and removing of AR lag bolts when constructing the formwork assembly. The Lag Wrench solid 25 mm (1") diameter L-shape steel construction is equipped with a 300 mm (12") round handle and a 140 mm (5 1/2") 90° radius. The Lag Wrench is supplied as a complete unit: handle and socket. Available for 13 mm, 20 mm, 25 mm and 32 mm (1/2", 3/4", 1" and 1 1/4") bolt size.



To order, please specify the following information

EXAMPLE

Name Lag Wrench
Rod diameter 25 mm (1")
Quantity 1

Plastic Coil Setting Plug

The AR Lag Wrench is designed for tightening and removing of AR lag bolts when constructing the formwork assembly. The Lag Wrench solid 25 mm (1") diameter L-shape steel construction is equipped with a 300 mm (12") round handle and a 140 mm (5 1/2") 90° radius. The Lag Wrench is supplied as a complete unit: handle and socket. Available for 13 mm, 20 mm, 25 mm and 32 mm (1/2", 3/4", 1" and 1 1/4") bolt size.

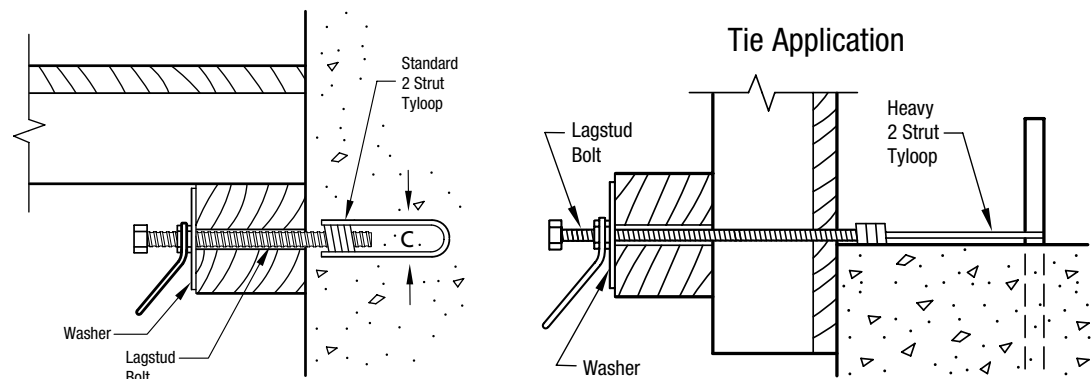


Consult your AR Area Sales Representative or the AR Technical Department for additional information.

Tyloop (2-Strut)

The AR Standard 2-Strut Tyloop (TL-2) is made of a single looped wire welded to a helix coil in 13 mm and 20 mm (1/2" and 3/4") nominal diameters. Suitable for light anchorage requirements or as emergency tie, tie down, corner tie, etc. Standard length is 100 mm (4") for 13 mm (1/2") diameter and 150 mm (6") for 20 mm (3/4") diameters. This unit may be fabricated in lengths to suit the job site requirements.

The AR Heavy 2-Strut Tyloop (TL-2-H) is made with heavier wire and are principally used as anchors for medium heavy construction. The standard length is 150 mm (6") for both 13mm (1/2") and 20 mm (3/4") diameter. The Tyloop can also be fabricated in longer lengths.



To order, please specify the following information

EXAMPLE

Name Tyloop (2-Strut) (TL-2-H)
 Type Heavy 9M
 Nominal Diameter 20 mm (3/4")
 Length 150 mm (6")
 Coil type Cone Tight
 Quantity 200

APPROXIMATE SAFE WORKING LOADS 2:1

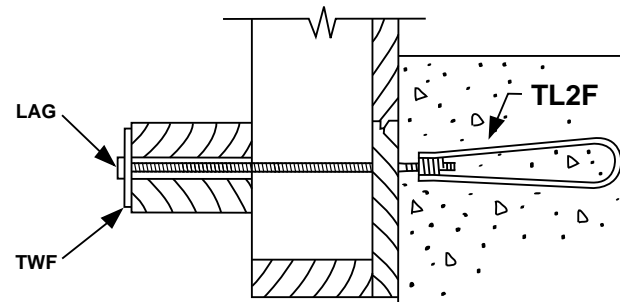
Also available as a Cone-Tight and Ferrule Tyloop

Type	Size	Inside radius "C"	Safe Working Load kN (lbs)
4.5M 1/2" Tyloop	13 mm x 102 mm (1/2" x 4")	20 mm (3/4")	22.3 kN (4,500 lbs)
9M 1/2" Heavy Tyloop	13 mm x 152 mm (1/2" x 6")	20 mm (3/4")	40 kN (9,000 lbs)
9M 3/4" Tyloop	20 mm x 152 mm (3/4" x 6")	29 mm (1 1/8")	40 kN (9,000 lbs)
12M 3/4" Heavy Tyloop	20 mm x 152 mm (3/4" x 6")	29 mm (1 1/8")	53.4 kN (12,000 lbs)

Flared 2-Strut Tyloop (TL2F)

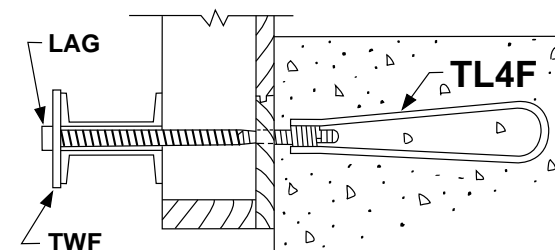
AR 2 Strut Flared Tyloops are made with the loop end flared for greater anchorage in the concrete. Standard lengths are 9" (230 mm) for 1/2" (13 mm) diameter and 12" (305 mm) for 3/4" (20 mm) diameter. Can be supplied in special lengths and flares to order.

TO ORDER, give nominal diameter, by length, symbol and name. Example: - 1/2" x 9" (13 mm x 230 mm) TL2F 2 Strut Flared Tyloop.

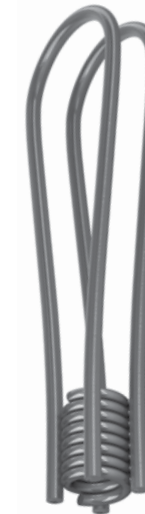


Flared 4-Strut Tyloop (TL4)

The AR Flared 4-Strut Tyloop is made with two looped wires welded to a helix coil. Suitable for heavy form anchorage in mass concrete construction. The standard length is 380 mm (15") for 25 mm (1") and 32 mm (1 1/4") diameters with struts flaring to 75 mm (3") diameters. The standard flare unit is supplied unless special size or shaped flares are requested.

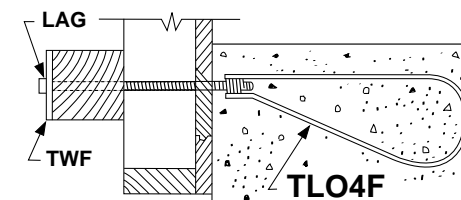


Sizes	
inch	(mm)
1/2" - 6"	(13 - 150)
3/4" - 9"	(20 - 225)
1" - 12"	(25 - 300)
1 1/4" - 15"	(32 - 380)



Heavy 4-Strut Offset Flared Tyloop (TL4-H)

The AR Offset Flared 4-Strut Tyloop is made of two looped wires welded to a helix coil. The loops are flared and offset so that the center of anchorage is below the center line of the coil to distribute the load well into the concrete and still keep the coil at or near the top of the pour or other boundary restrictions.



Sizes	
inch	(mm)
1 x 15	(25 x 380)
1 1/4 x 18	(32 x 460)

Other sizes available



APPROXIMATE SAFE WORKING LOADS 4:1

APPROXIMATE WORKING LOADS FOR TYLOOPS

Size and Type	* As Tie lbs (kN)	As an Anchor**	
		Tension lbs (kN)	Shear*** lbs (kN)
TL2 1/2" x 4" Standard Tyloop (13 x 100)	1,900 (8.5)	1,125 (5.0)	750 (3.5)
TL2 3/4" x 6" Standard Tyloop (20 x 150)	3,900 (17.5)	2,250 (10.0)	1,500 (7.0)
TL2-H 3/4" x 6" Heavy Tyloop (20 x 150)	5,200 (23.0)	2,625 (12.5)	1,875 (8.3)
TL2F 1/2" x 9" Flared Tyloop (13 x 230)	—	2,250 (10.0)	750 (3.5)
TL2F 3/4" x 12" Flared Tyloop (20 x 305)	—	3,375 (15.0)	1,875 (8.3)
TL4F 1" x 15" Flared 4-Strut (25 x 380)	—	6,000 (26.5)	3,375 (15.0)
TL4F 1 1/4" x 15" Flared 4-Strut (32 x 380)	—	6,750 (30.0)	4,500 (20.0)

Refer to the Approximate Safe Working Loads and Ultimate Capacities calculated for various concrete strengths table on pages 51 and 112 of the Appendix.

Flared 6-Strut Tyloop

The AR Flared 6-Strut Tyloop is made with three wires welded to a helix coil. The three loops are flared to provide greater anchorage in concrete.

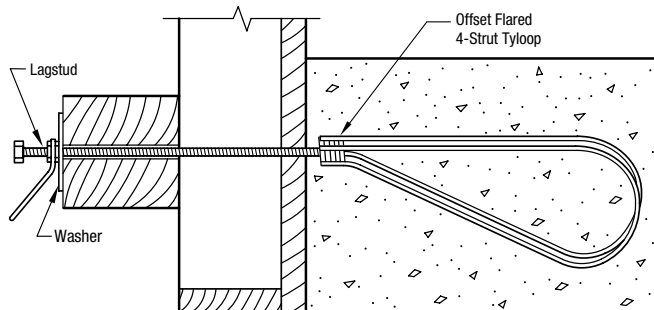
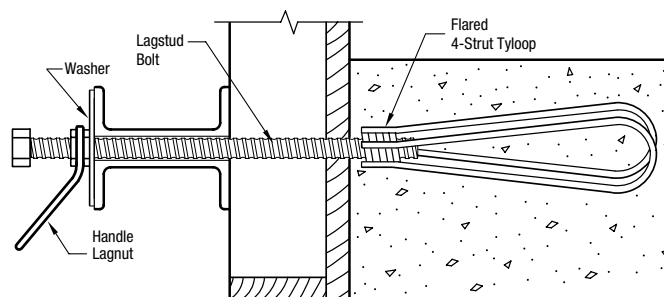
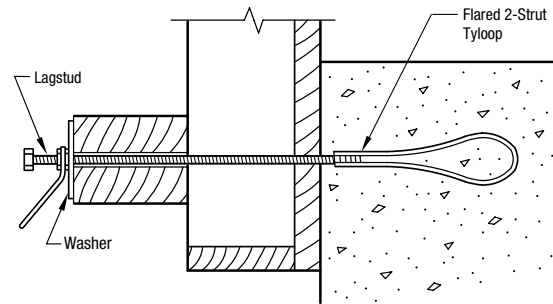
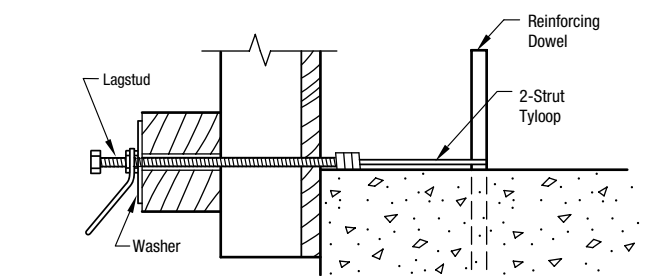
STANDARD
APPROXIMATE SAFE
WORKING LOAD
 207 kN (46,500 lbs)
 2:1 Safety Factor

HEAVY
APPROXIMATE SAFE
WORKING LOAD
 275 kN (61,800 lbs)
 2:1 Safety Factor



Flared 6-Strut Tyloop					
Diameter		Length		Flare	
32 mm	(1¼")	380 mm	(15")	170 mm	(6¾")
38 mm	(1½")				

Edge condition limitations will govern.
 Contact the AR Technical Department for further details.
 Other configurations and designs are available.



Refer to the Approximate Safe Working Loads and Ultimate Capacities calculated for various concrete strengths table on pages 51 and 112 of the Appendix.

Tyback Tyloop

The AR Tyback Tyloop is fabricated with two looped wires welded to a helix coil. The Tyback Tyloop is specially designed to tie into existing reinforcing bars to form bulkheads and for dam construction. Available as a 20 mm x 215 mm (¾" x 8½") standard size, the AR Tyback Tyloop can be custom fabricated to meet job site conditions.

To order, please specify the following information

EXAMPLE
 Name Tyback Tyloop
 Diameter 20 mm (¾")
 Quantity 200

APPROXIMATE SAFE
WORKING LOAD
 80 kN (18,000 lbs)
 2:1 Safety Factor



Coil Length

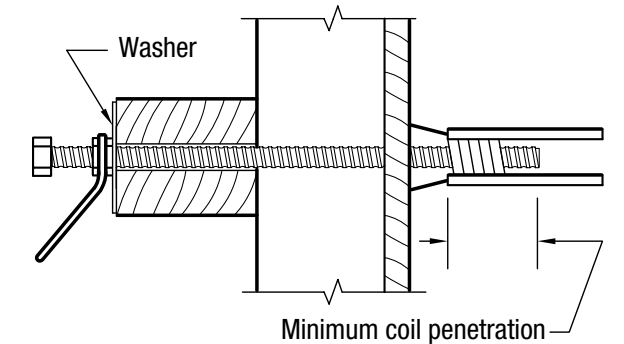
Standard Tyloop			
Diameter		Ultimate Strength	Coil Length Including Penetration
13 mm	(½")	44.5 kN (10,000 lbs)	40 mm (1½")
13 mm	(½")	80.0 kN (18,000 lbs)	50 mm (2")
20 mm	(¾")	80.0 kN (18,000 lbs)	50 mm (2")
20 mm	(¾")	106.0 kN (24,000 lbs)	60 mm (2⅜")

Flared Single and Double Flared Tyloop			
Diameter		Ultimate Strength	Coil Length Including Penetration
13 mm	(½")	80 kN (18,000 lbs)	55 mm (2⅛")
20 mm	(¾")	106 kN (24,000 lbs)	50 mm (2")
25 mm	(1")	133 kN (30,000 lbs)	60 mm (2⅜")
25 mm	(1")	213 kN (48,000 lbs)	75 mm (3")
32 mm	(1¼")	267 kN (60,000 lbs)	75 mm (3")

Double Looped Flared Tyloop			
Diameter		Ultimate Strength	Coil Length Including Penetration
25 mm	(1")	267 kN (60,000 lbs)	75 mm (3")
32 mm	(1¼")	267 kN (60,000 lbs)	75 mm (3")

Tybow Anchor			
Diameter		Ultimate Strength	Coil Length Including Penetration
32 mm	(1¼")	80 kN (18,000 lbs)	75 mm (3")
38 mm	(1½")	160 kN (36,000 lbs)	75 mm (3")

Refer to the Approximate Safe Working Loads and Ultimate Capacities calculated for various concrete strengths table on pages 51 and 112 of the Appendix.

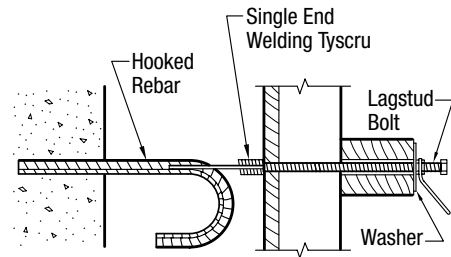


Single End Welding Tyscru

The AR Single End Welding Tyscru is made with 2 struts welded to a coil at one end only, leaving the open end available for field welding, particularly suitable for heavy and special applications. Available in 13 mm, 20 mm and 25 mm (½", ¾" and 1") diameters.

To order, please specify the following information

EXAMPLE
 Name Single End Welding Tyscru
 Nominal Diameter 20 mm (½")
 Overall length 100 mm (4")
 Quantity 200



APPROXIMATE SAFE WORKING LOAD
 2:1 Safety Factor



APPROXIMATE SAFE WORKING LOADS

Diameter	Length	Safe Working Load	Weld Length
13 mm (½")	100 mm (4")	16.5 kN (3,750 lbs)	32 mm (1¼")
20 mm (¾")	150 mm (6")	30.0 kN (6,750 lbs)	38 mm (1½")
25 mm (1")	250 mm (10")	60.0 kN (13,500 lbs)	50 mm (2")

NOTE: Diameter of rebar will influence Single End Welding Tyscru strength.

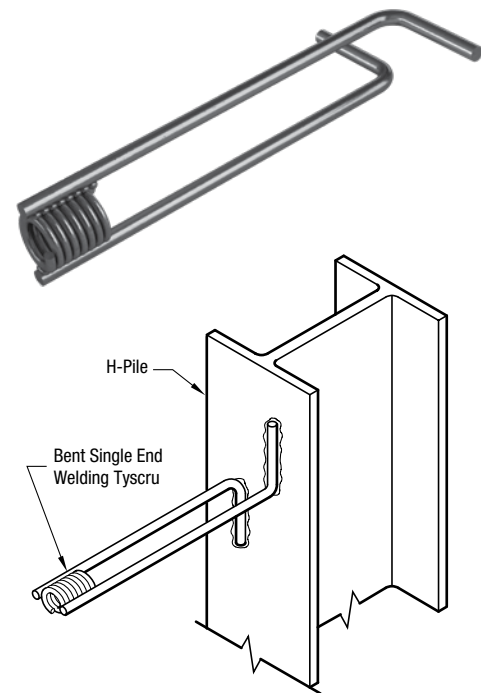
Bent Single End Welding Tyscru

The AR Bent Single End Welding Tyscru is made with 2 struts welded to a coil at one end. The other end of the 2 struts is bent at 90° in opposite directions away from the coil. This allows for field welding onto sheet piling and H-Pile construction. Available in 13 mm, 20 mm and 25 mm (½", ¾" and 1") diameters and may be fabricated to the required lengths.

To order, please specify the following information

EXAMPLE
 Name Bent Single End Welding Tyscru
 Nominal Diameter 13 mm (½")
 Length (L) 100 mm (4")
 Leg depth 25 mm (1")
 Quantity 200
 SWL is based on an approximate 2:1 Factor of Safety

APPROXIMATE SAFE WORKING LOAD
 2:1 Safety Factor



APPROXIMATE SAFE WORKING LOADS

Diameter mm (in)	L mm (in)	B mm (in)	Shear Safe Working Load
13 mm (½")	100 mm (4")	25 mm (1")	22 kN (5,000 lbs)
20 mm (¾")	150 mm (6")	38 mm (1½")	22 kN (5,000 lbs)
25 mm (1")	250 mm (8")	50 mm (2")	44 kN (10,000 lbs)

NOTE: Weld both sides of both struts. Field test should be conducted to establish actual approximate safe working load. Failure will occur in shear.

Refer to the Appendix for General Guidelines on page 96, Lateral Pressure information on page 102 and typical Medium and Heavy Formwork beginning on page 108. See page 51 for approximate safe working load System Chart.

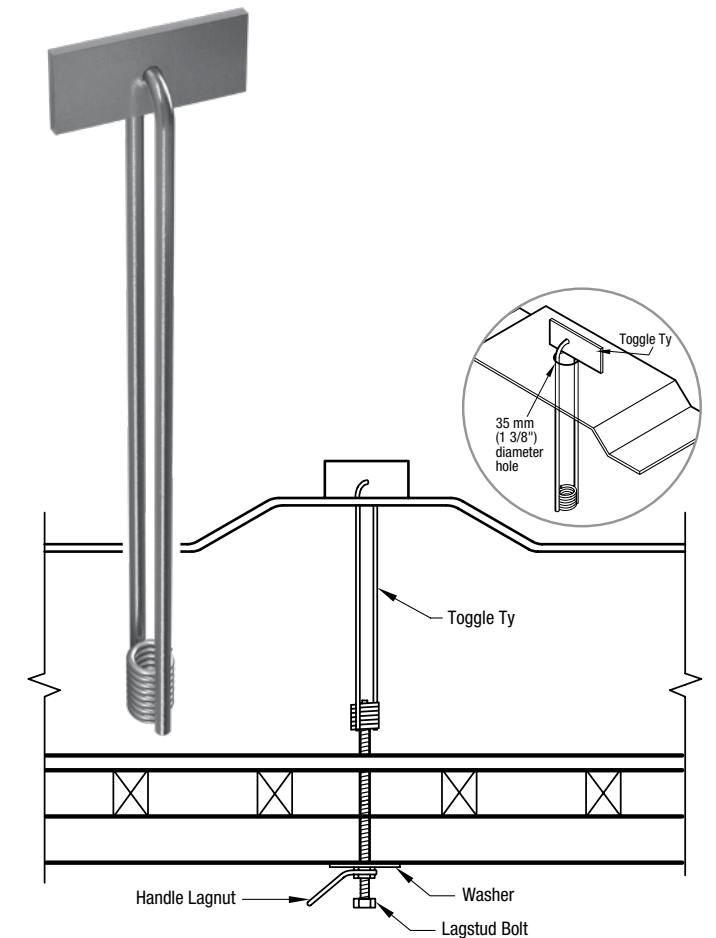
Toggle Ty

AR Toggle Tys are used to anchor a facing formwork, back to steel or wood sheet piling and require a 35 mm (1 3/8") diameter hole through the sheathing to permit entry of the toggle. Toggle plate sizes are shown below.

APPROXIMATE SAFE WORKING LOADS 2:1

To order, please specify the following information

EXAMPLE
 Name Toggle Ty
 Type standard 2.25M
 Diameter 13 mm (½")
 Length 380 mm (15")
 Plate size 5 mm x 32 mm x 75 mm (3/16" x 1¼" x 3")
 Quantity 200

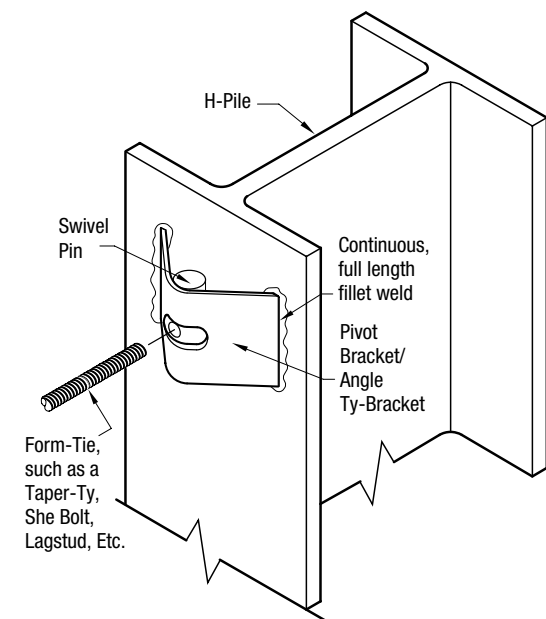
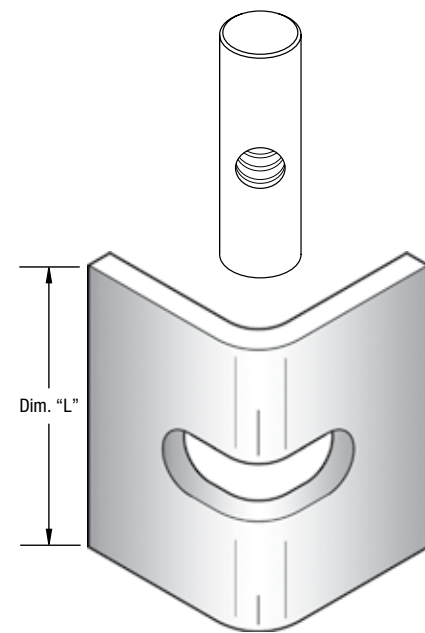
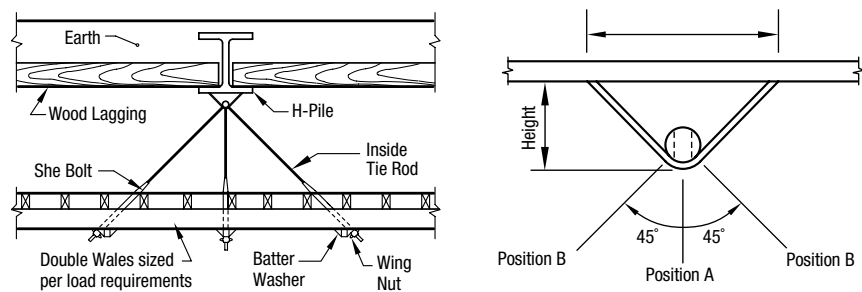


Type	Safe Load	TOGGLE SIZE	
		Steel Sheathing	Wood Sheathing
13 mm (½") Standard 2.25M	10 kN (2,250 lbs)	5 mm x 32 mm x 75 mm (3/16" x 1¼" x 3")	10 mm x 25 mm x 115 mm (3/8" x 1" x 4½")
13 mm (½") Heavy 3.75M	17 kN (3,750 lbs)	6 mm x 32 mm x 75 mm (¼" x 1¼" x 3")	10 mm x 25 mm x 115 mm (3/8" x 1" x 4½")

Refer to the Appendix for General Guidelines on page 96, Lateral Pressure information on page 102 and typical Medium and Heavy Formwork beginning on page 108. See page 51 for approximate safe working load System Chart.

Angle Ty-Bracket

The AR Angle Ty-Bracket is designed to tie single-sided forming to steel piles, metal beams, etc. Brackets are available from 13 mm to 25 mm (1/2" to 1") diameters as identified in the table below, with lag thread or can be special ordered with NC thread. The AR Angle Ty-Bracket allows a full 90° of pivot of the form-tie and will exceed the tensile capacity of the form-tie when correctly installed by a certified licensed welder.



APPROXIMATE SAFE WORKING LOAD
2:1 Safety Factor

To order, please specify the following information
EXAMPLE
 Name Single End Welding Tyscru
 Form-Ty Diameter 25 mm (1")
 Quantity 100

Note: Performance could vary based on the quality of weld.

Warning: To ensure proper engagement (final installation) the Form-tie must extend beyond the swivel pin a minimum of 13 mm (1/2"). An easy way to accomplish this is to line up the swivel pin and the Formtie in position A and thread the Form-tie through the swivel pin until it contacts the metal piling.

APPROXIMATE SAFE WORKING LOADS

Form Tie Diameter mm (in)	Dim. "L"	Bracket SWL kN (lbs.)	
		Position A	Position B
13 mm (1/2")	115 mm (4 1/2")	40 kN (9,000 lbs)	28 kN (6,300 lbs)
20 mm (3/4")	115 mm (4 1/2")	80 kN (18,000 lbs)	56 kN (12,500 lbs)
25 mm (1")	152 mm (6")	140 kN (31,500 lbs)	98 kN (22,000 lbs)

Contact AR for non-standard sizes or thread configurations.

Refer to the Appendix for General Guidelines on page 96, Lateral Pressure information on page 102 and typical Medium and Heavy Formwork beginning on page 108. See page 51 for approximate safe working load System Chart.

T4 Lag Ty

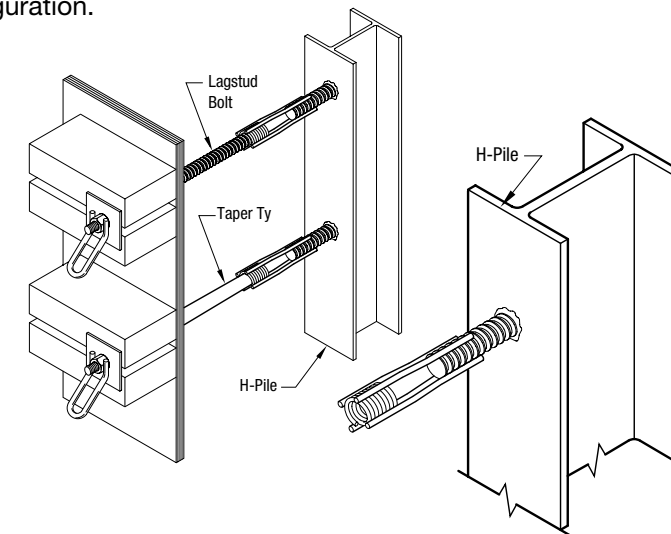
The AR T4 Lag Ty is designed to be welded on structural members for single sided forming. The AR Lag Ty consists of a 20 mm (3/4") diameter coil with a 75 mm (3") mild steel lag stud fabricated together with a typical 4-strut configuration.

APPROXIMATE SAFE WORKING LOAD
80 kN (18,000 lbs)
2:1 Safety Factor

To order, please specify the following information

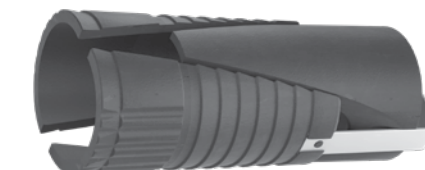
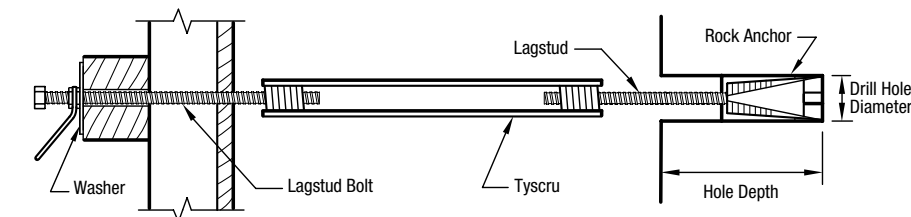
EXAMPLE
 Name T4 Lag Ty
 Quantity 200

NOTE: Field welding to structural members should be performed by a certified licensed welder.



Rock Anchor

AR Rock Anchors are used for anchoring with AR Lagstud or NC Rod in form tying and anchoring of concrete facings to rock excavation. Available in 13 mm, 20 mm and 25 mm (1/2", 3/4" and 1") diameters.



APPROXIMATE SAFE WORKING LOADS 2:1

Diameter mm (in)	Drill Hole Diameter mm (in)	Hole Depth (minimum) mm (in)	Safe Working Load* kN (lbs)
13 mm (1/2")	35 mm (1 3/8")	150 mm (6")	20 kN (4,500 lbs)
20 mm (3/4")	45 mm (1 3/4")	200 mm (8")	40 kN (9,000 lbs)
25 mm (1")	45 mm (1 3/4")	250 mm (10")	80 kN (18,000 lbs)

*AR recommends that all Rock Anchors be tested under job-site conditions to determine if ambient stratum conditions will limit approximate safe working load.

Consult the AR Technical Department for other thread patterns, other drill hole diameters and higher Approximate Safe Working Load requirements.

NOTE: Remove temporary plastic band before installation. The lagstud end must be against back-strap then forced to bottom of bore hole before tightening. Do not overtighten. Overtightening destroys the bond.

AR Rock Anchor Assembly

Transition couplers give the AR mechanical cone shell anchors the ability to be used with lagstud or National Course thread, for single sided forming applications.

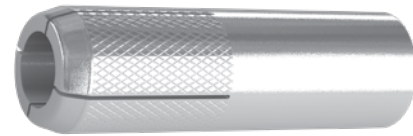
Refer to AR's Rock Anchoring and Bolt System catalogue for technical information or consult the AR Technical Department.

Refer to the Appendix for General Guidelines on page 96, Lateral Pressure information on page 102 and typical Medium and Heavy Formwork beginning on page 108. See page 51 for approximate safe working load System Chart.



Drop-In Anchor

The lag thread AR Drop-in Anchor features an internally threaded all-steel shell, with an preassembled expansion cone insert. The Drop-In Anchors are designed to work as part of the forming system, matched to the thread of AR Lagstuds or Lagbolts. The Drop-In Anchors are made from carbon steel and electroplated galvanized for corrosion protection. The Drop-in Anchor is used for any application requiring anchorage in solid concrete or homogeneous igneous rock. Ideal for lagging, AR Drop-In Anchors are also effective for hanging bolting or anchoring application with AR Tylags, Lagstud Bolts or Lagstud. Not recommended for uncured concrete (less than 7 days old), lightweight concrete or masonry block or brick.



Anchor	Drill Bit	Thread	Thread Length	Anchor Length (Minimum Depth of Embedment)
NCA 1/2LT	5/8"	1/2" - 6 lagthread	20 mm (3/4")	50 mm (2")
NCA 3/4LT	1"	3/4" - 4 1/2 lagthread	35 mm (1 3/8")	80 mm (3 1/16")

Ultimate Shear and Tension Values (kN/lbs) in Concrete

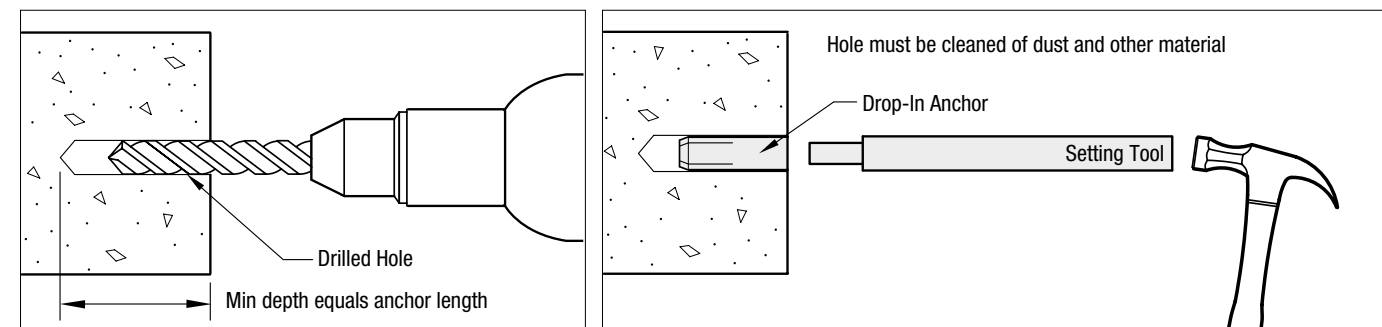
Anchor	Tension		Shear
	f _c = 15MPa (2,200 psi)	f _c = 30MPa (4,400 psi)	f _c = 15MPa (2,200 psi)
NCA 1/2LT	15 (3,300)	27 (6,075)	20 (4,500)
NCA 3/4LT	36 (8,100)	49 (11,000)	42 (9,450)

AR suggests a minimum safety factor of 2:1. On site conditions such as, poor concrete, placing technique, concentrated loads on the formwork, improper use of cranes or concrete pumping could increase the risk. If such site conditions exist, the user must increase the safety factor to compensate.

For anchoring situations not associated with forming, industry practice is to apply a safety factor of 4:1 minimum. For applications of greater risk a larger safety factor may be selected. For edge distance and load reductions contact AR technical representative. Specifications subject to change without notice.

To order, please specify the following information

EXAMPLE
 Name Drop-In Anchor
 Quantity 200



1. Drill hole for expansion anchor

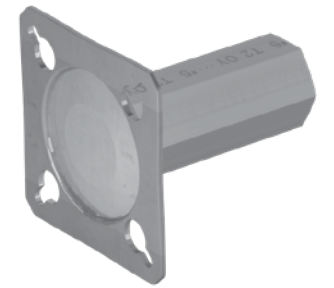
2. Insert expansion anchor into hole and tap flush

3. Using an NCA setting tool, set anchor by driving until shoulder of the setting tool is seated against the anchor

Refer to the Appendix for General Guidelines on page 96, Lateral Pressure information on page 102 and typical Medium and Heavy Formwork beginning on page 108. See page 51 for approximate safe working load System Chart.

Formsavers™

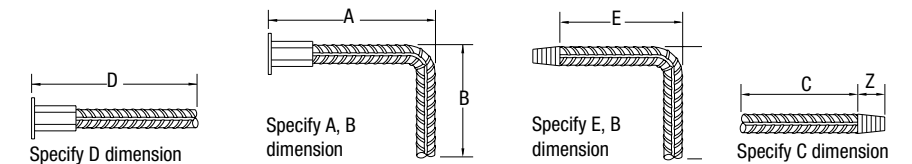
AR Formsaver™ dowel bar assemblies provide continuity and structural integrity to reinforced concrete construction in segmental pour applications. The AR Formsaver™ is designed with our unique tapered thread system, factory installed thread protectors, and durable mounting plates for easy attachment to forms. The taper threaded design, like the complete family of couplers, provides load path continuity in tension, compression and stress reversal applications. AR Formsaver™ mechanical splices provide superior performance well beyond the yield strength of the reinforcing bar.



REBAR DESIGNATION				Taper Threaded Rebar (Male) ¹		Coupler/Rebar Assembly (Female) ²	
ASTM in-lbs	mm	Type	Soft Metric	Part Number	Length "C" (in)	Part Number	Length "D" (in)
4	12 m	10 M	13 mm	FS4M24	610 mm (24")	FS4F20	508 mm (20")
				FS4M36	914 mm (36")	FS4F24	610 mm (24")
5	16 mm	15 M	16 mm	FS5M24	610 mm (24")	FS5F24	610 mm (24")
				FS5M30	762 mm (30")	FS5F30	762 mm (30")
				FS5M36	914 mm (36")	FS5F36	914 mm (36")
6	20 mm	20 M	19 mm	FS6M36	914 mm (36")	FS6F24	610 mm (24")
						FS6F36	914 mm (36")
7	22 mm	—	22 mm	FS7M36	914 mm (36")	FS7F36	914 mm (36")
				FS7M48	1219 mm (48")		
8	25 mm	25 M	25 mm	FS8M48	1219 mm (48")	FS8F52	1321 mm (52")
9	28 mm	30 M	29 mm	FS9M48	1219 mm (48")	FS9F52	1321 mm (52")
10	32 m	-	32 mm	FS10M60	1524 mm (60")	FS10F64	1626 mm (64")
11	36 mm	35 M	36 mm	FS11M60	1524 mm (60")	FS11F64	1626 mm (64")

¹ Includes Rebar Thread Protector

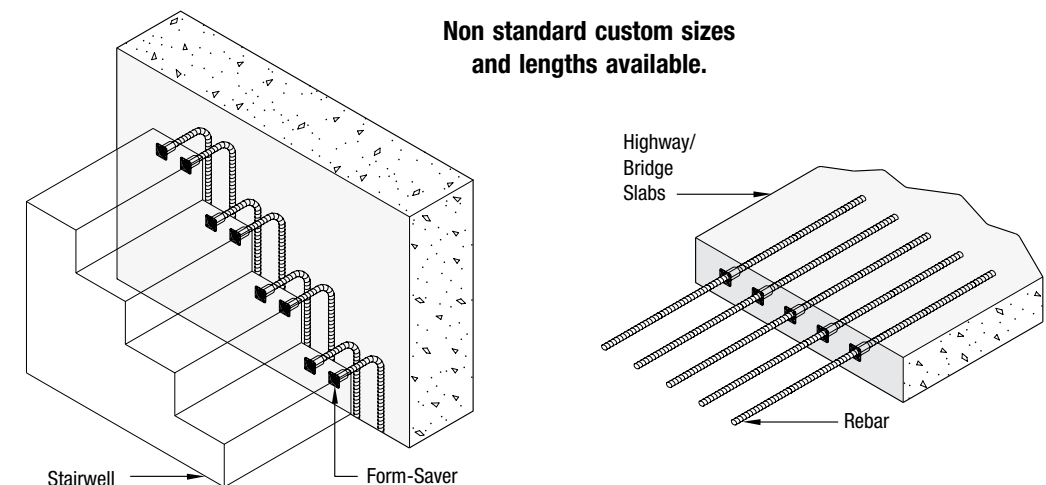
² Includes Coupler Thread Protector



How to Order by Part Number

FS	SIZE	STYLE	LENGTH	X	LENGTH	E
Attached nailer plate form saver	Rebar size	F indicates coupler/rebar, M indicates threaded rebar (other styles on request)	In mm (inches) of "A", "C" or "D"	Indicates bent rebar (optional)	In mm (inches) of "B" (optional)	Epoxy (optional)

Non standard custom sizes and lengths available.






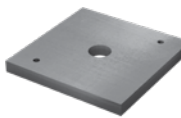
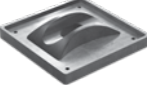


Welding Lagnut

AR Welding Lagnuts are designed to be used in single sided (blind side) forming applications or when necessary to secure formwork to steel members. AR welding lagnuts are extra deep to allow for the welding operation and are only available in 20 mm (3/4") diameter. A licensed certified welder should perform all welding. Field-testing should be conducted to established actual approximate safe working loads.



Diameter	Depth of Lagnut	Safe Working Load	Ultimate
20 mm (3/4")	38 mm (1 1/2")	80 kN (18,000 lbs)	160 kN (36,000 lbs)

APPROXIMATE SAFE WORKING LOAD
2:1 Safety Factor

Product	Size		Ultimate Strength		Page Reference
	mm	(in)	kN	(lbs)	
Lagnut 	13 mm	(1/2")	80 kN	(18,000 lbs)	Refer to page 54
	20 mm	(3/4")	160 kN	(36,000 lbs)	
	25 mm	(1")	333 kN	(75,000 lbs)	
	32 mm	(1 1/4")	435 kN	(98,000 lbs)	
	38 mm	(1 1/2")	Consult the AR Technical Department for details.		
Handle Lagnut 	13 mm	(1/2")	80 kN	(18,000 lbs)	Refer to page 54
	20 mm	(3/4")	160 kN	(36,000 lbs)	
	25 mm	(1")	333 kN	(75,000 lbs)	
	32 mm	(1 1/4")	512 kN	(115,000 lbs)	
	38 mm	(1 1/2")	Consult the AR Technical Department for details.		
Wing Nut 	20 mm	(3/4")	178 kN	(40,000 lbs)	Refer to page 55
	25 mm	(1")	365 kN	(80,000 lbs)	
	32 mm	(1 1/4")	512 kN	(115,000 lbs)	
Flat Washer 	95 x 95 x 6 mm	(3 3/4" x 3 3/4" x 1/4")	60 kN	(13,500 lbs)	Refer to page 56
	125 x 125 x 10 mm	(5" x 5" x 3/8")	222 kN	(50,000 lbs)	
	150 x 150 x 13 mm	(6" x 6" x 1/2")	266 kN	(60,000 lbs)	
	200 x 200 x 19 mm	(8" x 8" x 3/4")	1,110 kN	(250,000 lbs)	
Batter Washer 	13 x 41 mm	(1 1/2" x 1 5/8")	Consult the AR Technical Department for details.		Refer to page 57
Lag Thread Coupler 	13 mm	(1/2")	80 kN	(18,000 lbs)	Refer to page 57
	20 mm	(3/4")	160 kN	(36,000 lbs)	
	25 mm	(1")	334 kN	(75,000 lbs)	
Heavy Hex Rod Coupler 	13 mm	(1/2")	80 kN	(18,000 lbs)	Refer to page 77
	16 mm	(5/8")	134 kN	(30,000 lbs)	
	20 mm	(3/4")	160 kN	(36,000 lbs)	
	22 mm	(7/8")	220 kN	(60,000 lbs)	
	25 mm	(1")	334 kN	(75,000 lbs)	

Taper-Ty System

The AR Taper-Ty System is used where specifications permit the complete removal of the form-tie from the concrete wall. Taper-Tys are available with lag thread and a variety of hardware. While the system is available in the standard diameters shown, variations of these sizes are available on special order. The complete system consists of one Taper Ty, with 2 square or flat washers and 2 nuts, either lag Hex Nuts, special Handle Lagnuts or Malleable Wing Nuts. The standard units are furnished with up to 750 mm of taper. Other taper lengths are available on special order. The larger diameter end has a square wrench end. The smaller diameter end has been designed with a special end for removal without damaging the thread. Other specifications are shown on the detail drawing.

Not recommended where watertight walls are essential such as exterior walls, water reservoirs, treatment plants, etc. Use Waterseal Tyscrus instead.

Diameter (large to small)	Safe Working Loads 2:1 Safety Factor
20 mm to 13 mm (3/4" to 1/2")	40 kN (9,000 lbs.)
20 mm to 23 mm (3/4" to 7/8")	89 kN (20,000 lbs.)
25 mm to 20 mm (1" to 3/4")	84 kN (19,000 lbs.)
32 mm to 25 mm (1 1/4" to 1")	155 kN (35,000 lbs.)
38 mm to 32 mm (1 1/2" to 1 1/4")	253 kN (57,000 lbs.)

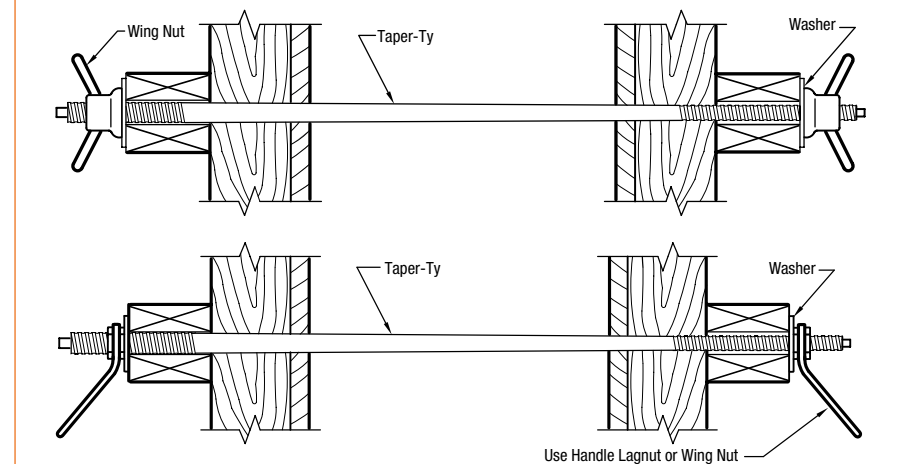
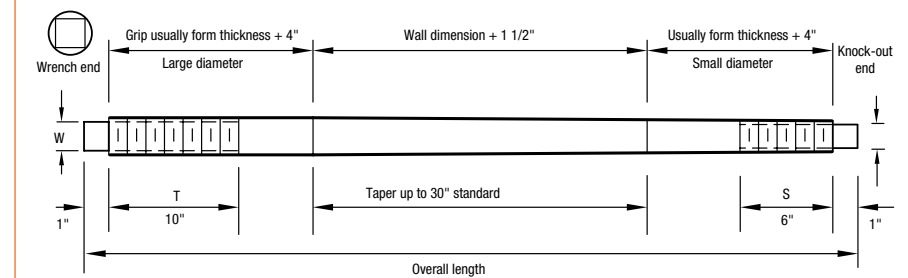
Chart based on standard 825 MPa (120,000 psi) material. Special order materials available on request.



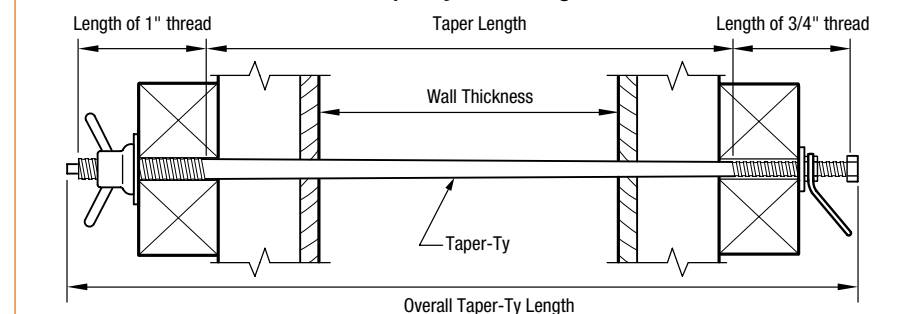
APPROXIMATE SAFE WORKING LOADS 2:1

To order, please specify the following information

EXAMPLE
 Name Taper-Ty
 Nominal Size
 Calculate Length (29 1/2")
 Thread Length
 Large diameter end 250 mm (15")
 Small diameter end 150 mm (6")
 Diameter 20 mm to 13 mm (3/4" to 1/2")
 Quantity 200



Taper Ty Wall Sizing



Taper Ty Wall Sizing

Overall length	Length of Thread		Taper Length	Range of Wall Thickness*
	mm (in)	25 mm (1") 20 mm (3/4")		
953 mm (37 1/2")	250 mm (10")	150 mm (6")	540 mm (21 1/2")	100 mm - 405 mm (4" - 16")
1,067 mm (42")	250 mm (10")	250 mm (10")	560 mm (22")	150 mm - 535 mm (6" - 21")
1,219 mm (48")	250 mm (10")	250 mm (10")	710 mm (28")	300 mm - 660 mm (12" - 26")

*Based on standard forming materials (typical 4x4 studs, walers, 3/4" form ply, plate washer and nut assembly).

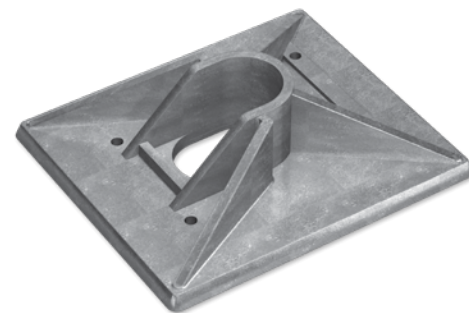
Refer to the Appendix for General Guidelines on page 96, Lateral Pressure information on page 102 and typical Medium and Heavy Formwork beginning on page 108. See page 51 for Approximate Safe Working Load System Chart.

Flat Washer

Refer to page 56

Tilt Washer

The AR Tilt Washer is angularly adjustable up to 45°, eliminating the need for wedging on battered walls or when tying across corners. Nail holes are provided for attaching the Tilt Washer to the waler or strongbacks. Available for 25 mm and 32 mm (1" and 1¼") diameter bolts with nail holes to permit nailing to wales if desired.

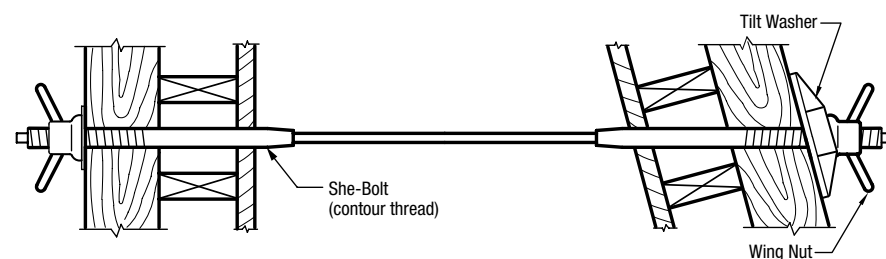


Type	Bolt Diameter		Size	
	mm	(in)	mm	(in)
AR 1	25 mm	(1")	160 mm x 133 mm	(6¼" x 5¼")
AR 1¼	32 mm	(1¼")	175 mm x 150 mm	(7" x 6")

To order, please specify the following information

EXAMPLE

Name Tilt Washer
Nominal Diameter 25 mm (1")
Quantity 200



She-Bolt

AR She-Bolt Assemblies are high strength, adaptable units suitable for medium and heavy concrete construction. Manufactured with external lag threads, they provide a positive system for use with gang forms and/or steel forms. The Inside Rods are manufactured with either national coarse thread or lag thread. If desired, continuous threaded lagstud can be furnished in 1,500 mm or 3,000 mm (5' or 10') lengths for field cutting to required specifications.

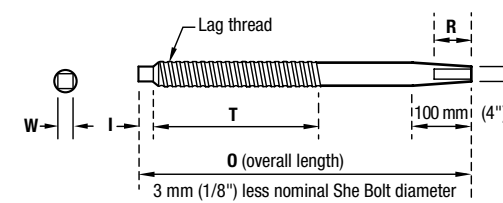


To order, please specify the following information

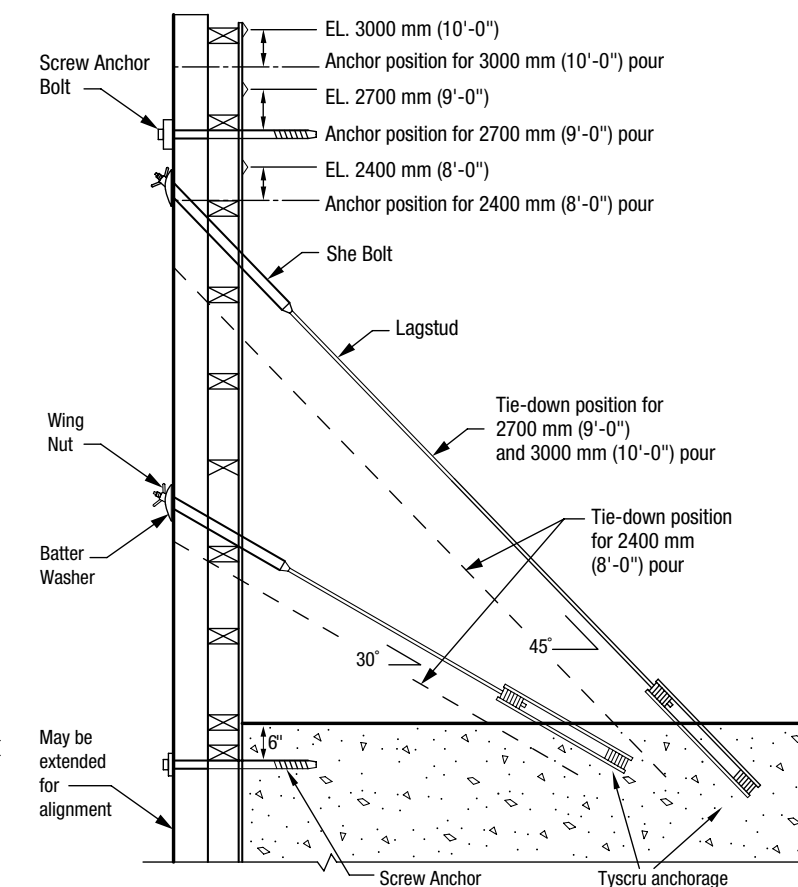
EXAMPLE

Name She-Bolt
Nominal Diameter
Inside Rod Diameter 20 mm (¾")
Overall Length (O) 510 mm (20")
Outside Thread (T) 250 mm (10")
Inside Thread Type (R) lag
Outside Thread Type lag
Quantity 200

APPROXIMATE SAFE WORKING LOAD
2:1 Safety Factor



Variable 2400 mm (8'-0") to 3000 mm (10'-0") Lift Form using She Bolts with High Tensile Lagstud

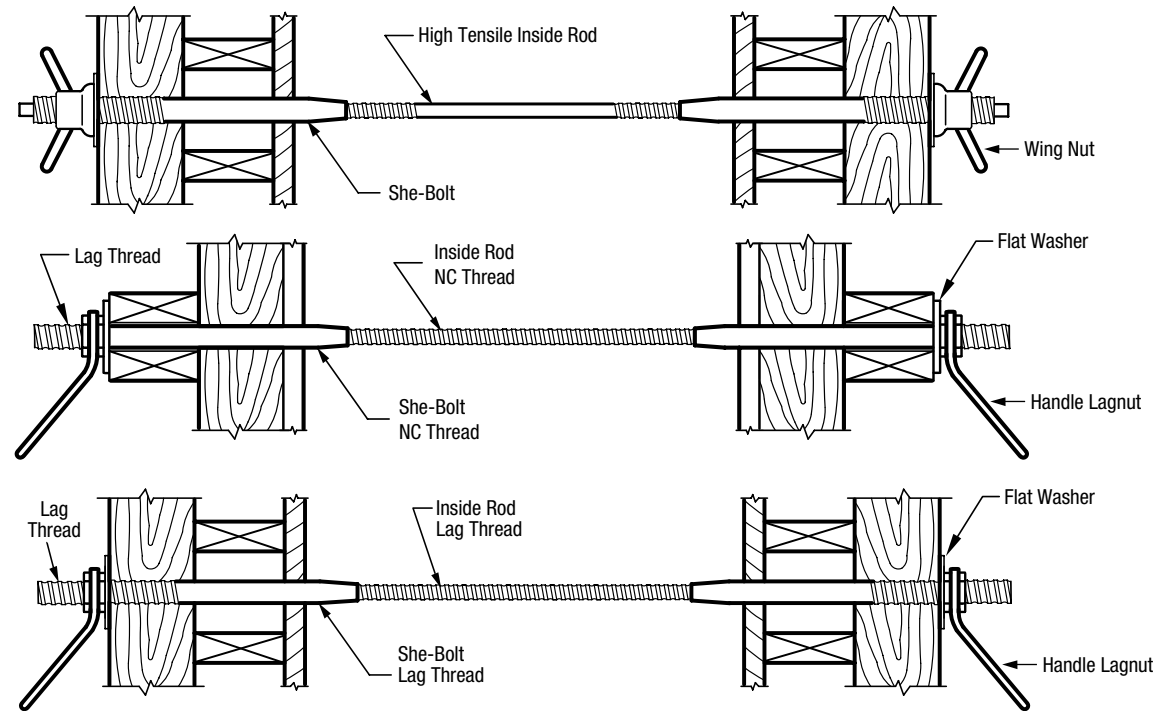


She-Bolt Dimension Data

Nominal Diameter	Internal Thread Diameter	Length O	Thread T	I	W	R
mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)
25 mm (1")	13 mm (½")	500 mm (20")	250 mm (10")	20 mm (¾")	13 mm (½")	2 x diameter plus 6 mm (2 x diameter plus ¼")
29 mm (1⅜")		600 mm (24")	300 mm (12")	20 mm (¾")	20 mm (¾")	
32 mm (1¼")	20 mm (¾")	500 mm (20")	250 mm (10")	25 mm (1")	20 mm (¾")	
35 mm (1⅝")		600 mm (24")	300 mm (12")	25 mm (1")	25 mm (1")	
38 mm (1½")	25 mm (1")	600 mm (24")	250 mm (10")	25 mm (1")	25 mm (1")	
		800 mm (32")	300 mm (12")	25 mm (1")		
			460 mm (18")	25 mm (1")		

Refer to the Appendix for General Guidelines on page 96, Lateral Pressure information on page 102 and typical Medium and Heavy Formwork beginning on page 108. See page 51 for Approximate Safe Working Load System Chart.

She-Bolt



Nominal She-Bolt Diameter mm (in)	Internal Thread Diameter					
	13 mm (1/2")		20 mm (3/4")		25 mm (1")	
	kN	lbs	kN	lbs	kN	lbs
25 mm (1")	40	9,000	80*	18,000	-	-
29 mm (1 1/8")	40	9,000	80*	18,000	-	-
32 mm (1 1/4")	40	9,000	80	18,000	-	-
38 mm (1 1/2")	40	9,000	80	18,000	165*	37,500

APPROXIMATE SAFE WORKING LOAD 2:1 Safety Factor

*Maximum She-Bolt Approximate Safe Working Load capacity at minimum 2:1 Safety Factor which is highly recommended for reusable working parts.

NOTE: 50 mm (2") available as a special order. Consult your AR Sales Representative or AR Technical Department for more information.

High Tensile Inside Rod

AR High Tensile Inside Rods are manufactured with either National Coarse or lag thread. Inside Rods can be manufactured with crimps upon request. Rods up to 600 mm (24") long have 1 crimp. Rods over 600 mm (24") long have 3 crimps.

To order, please specify the following information

EXAMPLE
 Name High Tensile Inside Rod
 Diameter 13 mm (1/2")
 Length 600 mm (24")
 Crimped or non-crimped Crimped
 Type Thread NC
 Length of Thread (each end) 75mm (3")
 Quantity 200



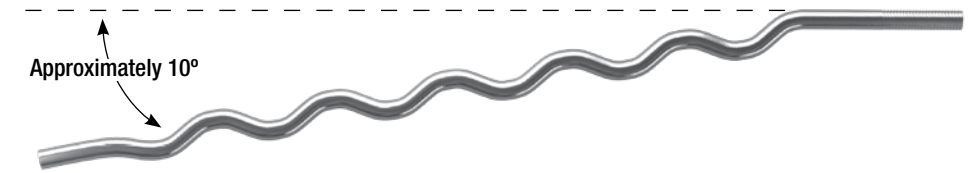
APPROXIMATE SAFE WORKING LOAD 2:1

Diameter mm (in)	Safe Working Load		Ultimate Tension	
	kN	(lbs)	kN	(lbs)
13 mm (1/2")	40	9,000	80	18,000
20 mm (3/4")	80	18,000	160	36,000
25 mm (1")	160	37,500	330	75,000

Refer to the Appendix for General Guidelines on page 96, Lateral Pressure information on page 102 and typical Medium and Heavy Formwork beginning on page 108. See page 45 for Approximate Safe Working Load System Chart.

Crimped Anchor

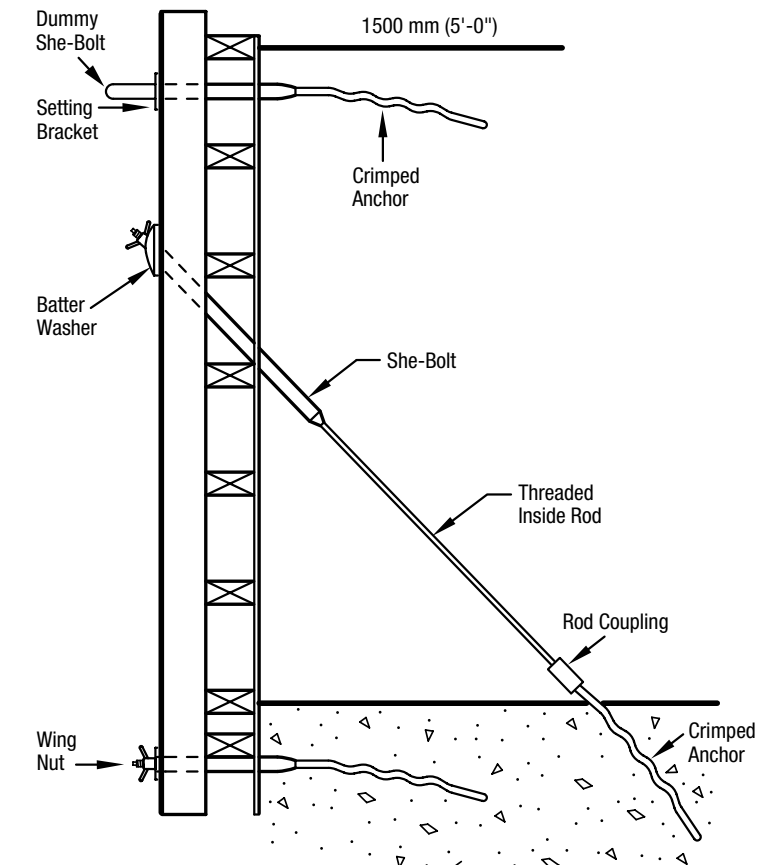
AR Crimped Anchors are used for form anchoring in mass concrete construction. Manufactured in the diameter and lengths shown with either national coarse thread or lag thread.



APPROXIMATE SAFE WORKING LOAD 2:1

To order, please specify the following information

EXAMPLE
 Name Crimped Anchor
 Diameter 13 mm (1/2")
 Length 30 mm (12")
 Type of Thread NC
 Quantity 200



Crimped Anchor Safe Working Loads

Diameter	Safe Working Load	Ultimate
13 mm (1/2")	40 kN (9,000 lbs)	80 kN (18,000 lbs)
20 mm (3/4")	80 kN (18,000 lbs)	160 kN (36,000 lbs)
25 mm (1")	165 kN (37,500 lbs)	330 kN (75,000 lbs)

Thread Diameter	Thread Length	Standard (Overall) Lengths	Set back	Number of Crimps
13 mm (1/2")	32 mm (1 1/4")	450 mm, 600 mm, 750 mm (18", 24", 30")	102 mm (4")	Under 600 mm (24") 3 crimps, Over 600 mm to 916 mm (24" to 36") 6 crimps, Over 900 mm (36") 9 crimps
16 mm (5/8")	38 mm (1 1/2")	600 mm, 750 mm, 900 mm (24", 30", 36")	102 mm (4")	
20 mm (3/4")	45 mm (1 3/4")	750 mm, 900 mm, 1,050 mm (30", 36", 42")	102 mm (4")	
22 mm (1")	50 mm (2")	900 mm, 1,050 mm (36", 42")	102 mm (4")	
25 mm (1 1/4")	57 mm (2 1/4")	900 mm, 1,050 mm, 1,200 mm (36", 42", 48")	102 mm (4")	

Refer to the Approximate Safe Working Loads and Ultimate Capacities calculated for various concrete strengths table on pages 51 and 112 of the Appendix.

Dummy She-Bolt

AR Dummy She-Bolts are manufactured slightly oversize for easy re-entry of standard She-Bolt. Furnished in standard sizes for either National Coarse or lag thread High Tensile Inside Rods or Crimped Anchors.



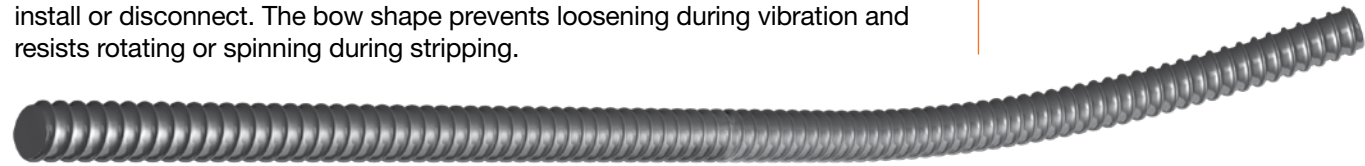
To order, please specify the following information

EXAMPLE
 Name Dummy She-Bolt
 Nominal Diameter Length 500 mm (20")
 Type of inside thread NC
 Quantity 200

APPROXIMATE SAFE WORKING LOAD
 See table on page 74

Bowlag Anchor

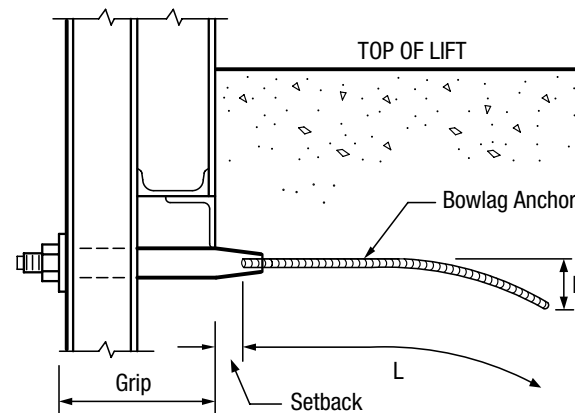
AR Bowlag Anchors provide an effective and efficient She-Bolt reanchorage for cantilever and Ty back lift forms. The continuous lag thread and the bow shape provide good anchorage even in green concrete and consistently outperforms smooth crimped rods and/or pigtails. The lag thread engagement is quick to install or disconnect. The bow shape prevents loosening during vibration and resists rotating or spinning during stripping.



APPROXIMATE SAFE WORKING LOAD 2:1

To order, please specify the following information

EXAMPLE
 Name Bowlag Anchor
 Nominal Diameter 25 mm (1")
 Length 900 mm (36")
 Quantity 200



Anchor diameter	Length "L"	Drop "D"	Working Loads	
			@ 3.5 MPa (500 psi)	@ 4.8 MPa (700 psi)
20 mm (3/4")	600 mm (24")	150 mm (6")	53 kN (12,000 lbs)	71 kN (16,000 lbs)
	750 mm (30")	150 mm (6")	64 kN (14,500 lbs)	80 kN (18,000 lbs)
22 mm (7/8")	750 mm (30")	225 mm (9")	90 kN (20,000 lbs)	102 kN (23,000 lbs)
	900 mm (36")	225 mm (9")	98 kN (22,000 lbs)	111 kN (25,000 lbs)
25 mm (1")	900 mm (36")	225 mm (9")	120 kN (27,000 lbs)	135 kN (30,000 lbs)

Refer to the Approximate Safe Working Loads and Ultimate Capacities calculated for various concrete strengths table on pages 51 and 112 of the Appendix.

Heavy Hex Rod Coupler

AR Heavy Hex Rod Couplers are used to couple two High Tensile Inside Rods of the same diameter. The Coupler is normally supplied with NC thread and is available with lag thread on request. Standard sizes are shown and other sizes are available on request.



APPROXIMATE SAFE WORKING LOAD 2:1

To order, please specify the following information

EXAMPLE
 Name Heavy Hex Rod Coupler
 Nominal Rod Diameter 13 mm (1/2")
 Quantity 200

Rod Diameter	Overall Length	kN	(lbs)
13 mm (1/2")	45 mm (1 3/4")	40 kN	9,000 lbs
16 mm (5/8")	57 mm (2 1/4")	67 kN	15,000 lbs
20 mm (3/4")	57 mm (2 1/4")	80 kN	18,000 lbs
22 mm (7/8")	64 mm (2 1/2")	135 kN	30,000 lbs
25 mm (1")	70 mm (2 3/4")	169 kN	37,500 lbs

Hex Nut

AR Hex Nuts are manufactured with a UNC thread and are available from 13 mm to 38 mm (1/2" to 1 1/2") diameter.



Euro Rod

The AR Euro Rod is a high tensile form tie used in industrial formwork systems, lost anchoring solutions, special connections and applications for cast-in-place. The rod has two flat sides in the thread pattern which provide a self-cleaning feature and allow a gripping surface for turning the bar without damaging the threads. Available in 5/8" and 7/8" bar diameters, in standard 19'-1" lengths. Additional sizes available on request.



APPROXIMATE SAFE WORKING LOAD 2:1

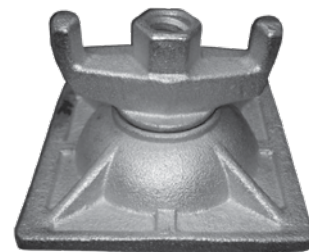
Diameter		kN	SWL (lbs)
mm	(in)		
15	5/8"	19'-1"	22,000
20	7/8"	19'-1"	38,900

Euro Rod Accessories

Euro Rod Combo Plate

APPROXIMATE SAFE WORKING LOAD 2:1

Rod Diameter		Washer Size		SWL (Lbs)
mm	in	mm	in	
15	5/8"	120x120	4-3/4"	21,900
22	7/8"	120x120	4-3/4"	39,200



Euro Rod Single Wing Nut

APPROXIMATE SAFE WORKING LOAD 2:1

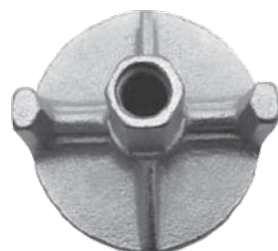
Rod Diameter		Size		SWL (Lbs)
mm	in	mm	in	
15	5/8"	90x60	3-1/2"x2-3/8"	21,900
22	7/8"	90x60	3-1/2"x2-3/8"	39,200



Euro Rod Round Wing Nut

APPROXIMATE SAFE WORKING LOAD 2:1

Rod Diameter		Wing Nut Diameter		SWL (Lbs)
mm	in	mm	in	
15	5/8"	100	4"	21,900
22	7/8"	100	4"	39,200



Euro Rod Accessories

Euro Rod Hex Couplers

APPROXIMATE SAFE WORKING LOAD 2:1

Rod Diameter		Coupler Length		Box Qty
mm	in	mm	in	
15	5/8"	50	2"	75
15	5/8"	100	4"	40



Euro Rod Hex Flange Nuts

APPROXIMATE SAFE WORKING LOAD 2:1

Rod Diameter		Description	Flange Nut Length		Box Qty
mm	in		mm	in	
15	5/8"	With Bottom Flange	25	1"	125
15	5/8"	With Hex End	106	4-1/8"	25



Euro Rod She-Bolt Cones

APPROXIMATE SAFE WORKING LOAD 2:1

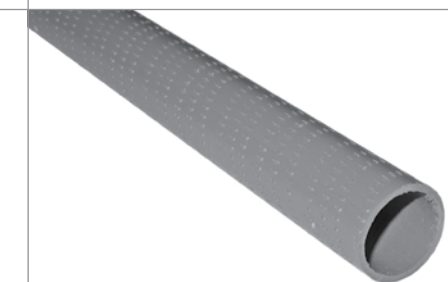
Rod Diameter		Cone Length		Box Qty
mm	in	mm	in	
15	5/8"	75	3"	45
15	5/8"	100	4"	25



Euro Rod Distance Tube

APPROXIMATE SAFE WORKING LOAD 2:1

Rod Diameter		Tube Length	
mm	in	mm	in
15	5/8"	2,000	79"
22	7/8"	2,000	79"



Euro Rod Distance Cones

APPROXIMATE SAFE WORKING LOAD 2:1

Rod Diameter	
mm	in
15	5/8"
22	7/8"

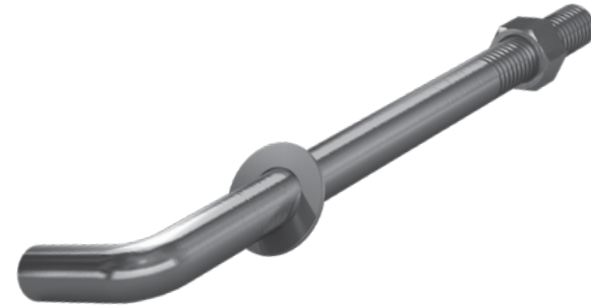


Hook Anchor Bolt

The AR Hook Anchor Bolt is manufactured with either lag thread or national coarse threads and is typically supplied with a 90° radius. AR can supply custom bent bolts when provided with detailed specifications and drawings. AR can accommodate special orders in black, plated, hot dipped galvanized or stainless steel. Available in 13 mm, 20 mm, 25 mm and 32 mm (1/2", 3/4", 1" and 1 1/4") diameter.

To order, please specify the following information

EXAMPLE
 Name Hook Anchor Bolt
 Diameter 25 mm (1")
 Quantity 200

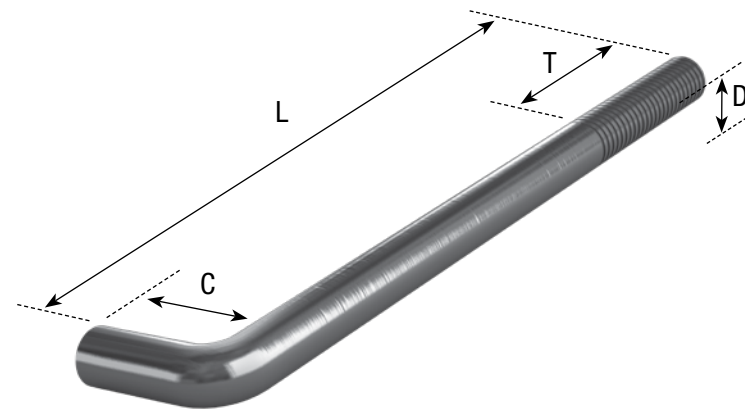


Wall Plate Anchor

AR Wall Plate Anchors are manufactured with Unified National Coarse (UNC) thread and are supplied complete with a nut and washer. AR can accommodate special orders in black, plated, hot dipped galvanized or stainless steel. Available in 10 mm to 50 mm (3/8" to 2") diameter. Custom orders available on request.

To order, please specify the following information

EXAMPLE
 Name Wall Plate Anchor
 Diameter 13 mm (1/2")
 Length 300 mm (12")
 Thread UNC
 Type of steel mild black steel
 Quantity 200



Pig Tail Anchor Bolt

The AR Pig Tail Anchor Bolt is manufactured with either lag thread or national coarse threads. AR can accommodate special orders in black, plated or hot dipped galvanized. Available in 13 mm, 20 mm, 25 mm and 32 mm (1/2", 3/4", 1" and 1 1/4") diameter.

To order, please specify the following information

EXAMPLE
 Name Pig Tail Anchor Bolt
 Diameter 25 mm (1")
 Quantity 200



Post Holders

The AR Post Holders are designed to attach wooden posts to concrete, made of heavy gauge steel and provide strength and stability to outdoor decks. All post holders are coated (black) for corrosion protection and are available in sizes: 4"x4", 4"x6" and 6"x6".

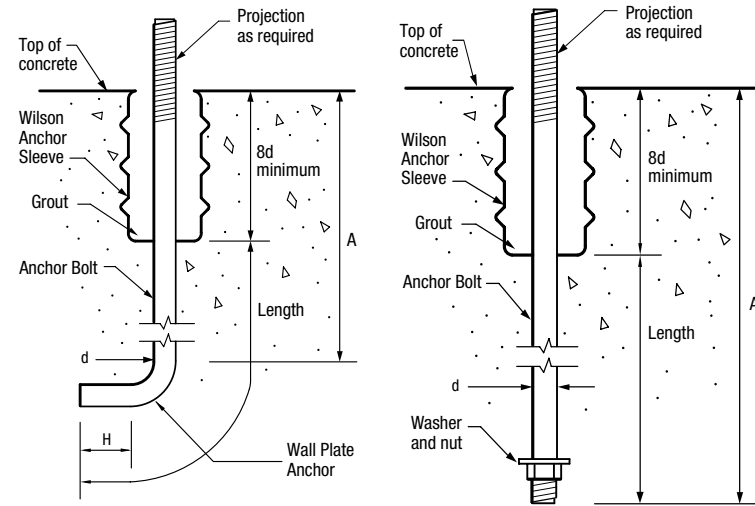
To order, please specify the following information

EXAMPLE
 Name Post Holders
 Size 6" x 6"
 Quantity 20



Anchor Sleeve

AR Anchor Sleeves are a plastic void form made of high density polyethylene that is non-rusting and non-conductive. They expedite the mounting of machinery and equipment, and are maintenance free and easy to use. When using the AR Anchor Sleeve, initial material and installation costs are greatly lowered, and all welding, pipe cutting, packing, bending, forming, cleaning and chipping out are eliminated.



To order, please specify the following information
EXAMPLE
 Name AR Anchor Sleeve
 Anchor Bolt Diameter ... 13 mm (1/2")
 Quantity 200

Material and Testing Data

Plastic:	High density polyethylene
Density, gms/cc:	ASTM D 1505-68 .956
Vicat softening point °F (°C):	ASTM D 1525-70 256°F (124°C)
Brittleness temp. °F (°C):	ASTM D 746-70 -180°F (-119°C)
Torch application:	Slow burn
Compression test:	12.7 kg (180 psi) per square inch

Each Sleeve is approximately twice the bolt diameter with a depth of 8 bolt diameters, minimum.

TABLE — GROUT VOLUME REQUIRED

Bolt Diameter mm (in)	Series	Sleeve Size mm (in)	Litres of grout per shell	Cubic inches per shell	# sleeves per carton	kgs (lbs) per bundle
13 mm (1/2")	AX	50 mm x 130 mm (2" x 5")	.26	15.95	100	4
20 mm (3/4")	AX	50 mm x 130 mm (2" x 5")	.25	15.16	100	4
16 mm (5/8")	A	50 mm x 180 mm (2" x 7")	.35	21.41	100	5
20 mm (3/4")	A	50 mm x 180 mm (2" x 7")	.34	20.50	100	5
25 mm (1")	B	75 mm x 255 mm (3" x 10")	1.06	65.80	50	6
32 mm (1 1/4")	B	75 mm x 255 mm (3" x 10")	1.00	61.40	50	6
38 mm (1 1/2")	C	100 mm x 380 mm (4" x 15")	2.75	167.60	20	6
42 mm (1 3/4")	C	100 mm x 380 mm (4" x 15")	2.60	158.00	20	6
50 mm (2")	D	100 mm x 460 mm (4" x 18")	2.90	176.76	20	7
57 mm (2 1/4")	D	100 mm x 460 mm (4" x 18")	2.66	161.82	20	7
64 mm (2 1/2")	E	150 mm x 610 mm (6" x 24")	9.50	575.28	10	8
76 mm (3")	E	150 mm x 610 mm (6" x 24")	8.80	523.44	10	8

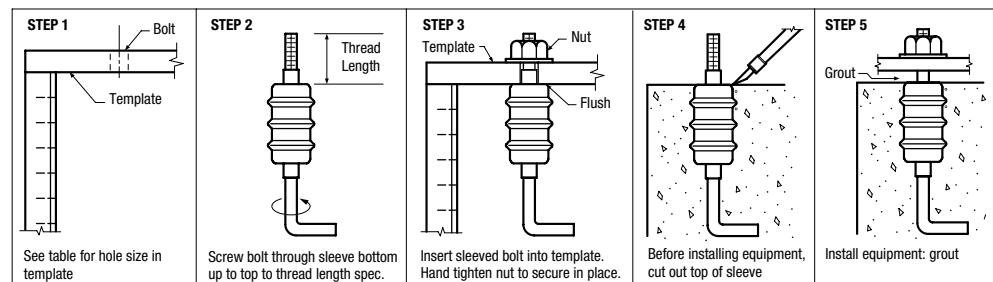
NOTE: Grout estimate based on .46 cu/ft yield per 55 lb of non-corrosive grout.

Preparatory Work: None

Limitations: The AR Anchor Sleeve is not recommended where high heat is used, such as inside an oven.

Caution: When using the AR Anchor Sleeve outdoors or under freezing conditions, the sleeve must be sealed around the bolt to prevent moisture penetration or filled with Antifreeze.

Installation: The bottom of the sleeve is passed over the top of the bolt until the threaded portion engages the self-threading top of the sleeve. The sleeve is turned until the proper projection is obtained. The entire assembly is cast into the concrete, with the top of the sleeve at foundation level. When the anchor bolt is ready for adjustment, the top of the sleeve is cut off and discarded. The bolt may now be adjusted within the sleeve. Expansion or non-shrinking grout is cast into the sleeve around the bolt when equipment is set. Other applications are done in a similar fashion.



AR Form Tubes

AR concrete forming tubes are built to withstand the rigors of construction. Designed to hold the full hydrostatic pressure load of concrete in a single continuous pour, AR tubes have earned their mark as a "go to" standard for the most demanding construction projects. Shields against moisture and adverse weather conditions to help keep the elements from impacting your construction schedule. Manufactured with 100% recycled paperboard. Available in diameters from 6 inches to 60 inches. Standard wall thickness to 12 feet, heavy wall thickness to over 30 feet.



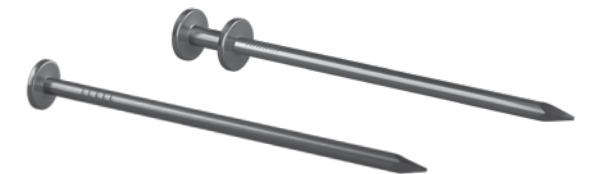
Handyform Tube

AR Handyform tubes are built to be used in smaller projects by contractors and weekend warriors. Designed to hold the full hydrostatic pressure load of concrete in a single continuous pour, AR tubes have earned their mark as a "go to" standard for the most demanding construction projects. Shields against moisture and adverse weather conditions to help keep the elements from impacting your construction schedule. Manufactured with 100% recycled paperboard. Available in diameters from 10 inches to 36 inches, and length of 12 feet.



AR Nails

AR Nails feature a round smooth shank which reduces wood splitting. Nails are available as common nails and duplex (double head) nails, commonly used for interior and exterior construction and framing. Available from 2" to 3 1/2" in 1/4" increments, 50 lb boxes. Nails conform to ASTM F1667 standard.



AR Concrete Nails

AR Concrete Nails feature a round smooth shank which reduces wood splitting. Available in 2" and 3", 4.5 lb packs. Nails conform to ASTM F1667 standard.



Falsework Support Bracket

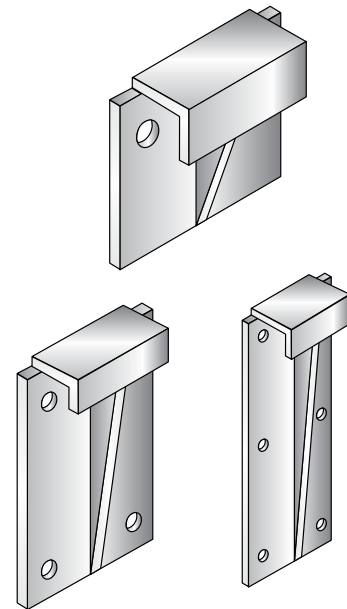
AR Falsework Support Brackets are used with 32 mm (1¼") AR Screw Anchors and Bolts to support pier cap forms. The use of Falsework Support Bracket eliminates posting or scaffolding which can be expensive and time consuming to erect. Brackets can be manufactured with 2, 4 or 6 holes.

Falsework Support Bracket	Safe Working Load kN (lbs)	Required Screw Anchors
2 hole	89 kN (20,000 lbs)	two 32 mm (1¼") diameter
4 hole	178 kN (40,000 lbs)	four 32 mm (1¼") diameter
6 hole	267 kN (60,000 lbs)	six 32 mm (1¼") diameter

APPROXIMATE SAFE WORKING LOAD
3:1 Safety Factor

To order, please specify the following information

EXAMPLE
Name Falsework Support Bracket
Number of Holes 4
Quantity 200



Determining total load

To determine the total load to be supported by each falsework bracket, compute the total mass (weight of concrete) plus the liveload (weight of form and other temporary loads) and divide by the number of brackets to be used.

Example:

The dimension of a concrete beam to be poured over two columns and supported by 4 brackets is as follows:

750 mm wide x 1200 mm high x 18500 mm long (30" wide x 48" high x 740" long)

Density of concrete assumed	=	2,400 kg/m ³	(150 lb/ft ³)
Live load or mass per unit area assumed	=	365 kg/m ²	(75 lb/ft ²)
Mass of beam .75 m x 1.2 m x 18.5 m x 2400	=	39,900 kg	(18,100 lbs)
Mass of live load .75 m x 18.5 m x 365	=	5,065 kg	(2,300 lbs)
		<hr/>	
		44,964 kg	(20,400 lbs)
Force exerted by mass	= 44,964 x .00981	= 441.10 kN	(99,100 lbs)
Force per bracket:	$\frac{441.10}{4}$	= 110.28 kN	(24,800 lbs)

Therefore use 4 hole bracket with four 32 mm (1¼") diameter Screw Anchors.

NOTE: 1 kilogram = .00981 kiloNewtons

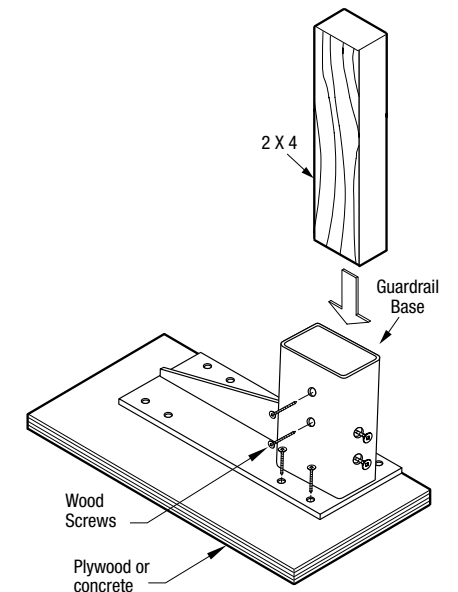
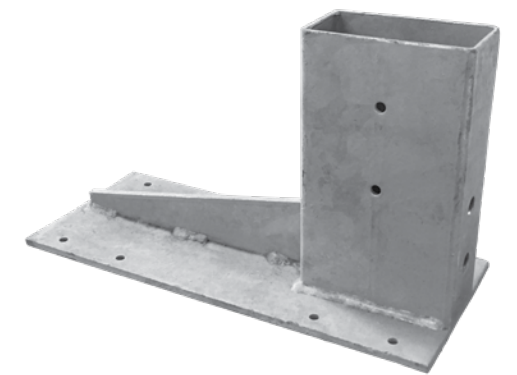
Guardrail Base

The single component AR Guardrail Base provides set back requirements. The solid galvanized steel construction is significantly stronger than typical wood fabrications and adds safety and reliability. The Guardrail Base is reusable and fast and simple to install on plywood or concrete surfaces.

Meets Load Requirements of Section 26.3 of the Ontario Health and Safety Act and Regulations for Construction Projects (ISBN 0-7778-9412-2 Rev 06/00), when assembled with other components to form guardrail system complying with the Act.

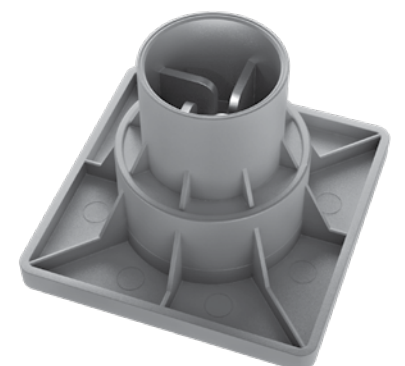
To order, please specify the following information

EXAMPLE
Name Guardrail Base
Quantity 200



AR Anti-Impalement Rebar Cap

The AR Anti-Impalement rebar protection cap is a safety cap with a metal dome plate, used to prevent rebar from impaling workers in case of falls. The cap is OSHA compliant and is available for #3 (10 mm) to #8 rebar (25 mm), 25 pieces per box.



Reinforcing Bar Supports

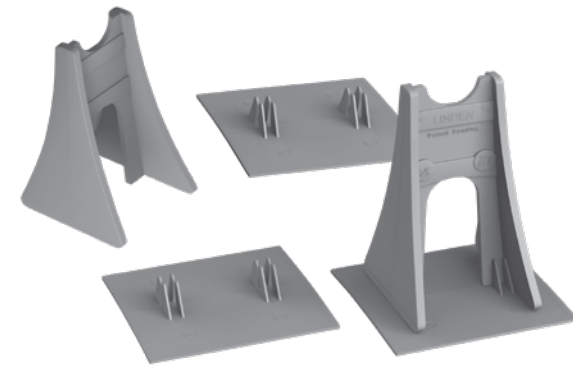
Reinforcing Bar Supports are used to support and space reinforcing steel. AR Bar Supports are manufactured according to specifications published by the Concrete Reinforcing Steel Institute. To eliminate rust spots or similar blemishes on the concrete surface specify AR's Plastic Bar Supports.

Linden Chairs

Corrosion free All Plastic Linden Chairs are used in slabs for supporting all types of reinforcing steel. Excellent for supporting epoxy coated rebar in bridge deck construction, or where-ever a corrosion free support is required. The high sizes have an arch design for straddling lower mats of rebar. The chair is made of High Impact polypropylene and its design gives it the strength of steel. Linden chairs are strong yet light in weight and packaged in poly bags for convenience of carrying around job sites.

LINDEN CHAIRS SIZES AND PACKAGING WEIGHTS

inch	mm	PCS/BAG	LBS/MFT	CTN SKID	SKID QTY
1	25	500	30	40	20,000
1 1/4	32	500	35	40	20,000
1 1/2	40	250	46	40	10,000
1 3/4	45	250	50	40	10,000
2	50	250	62	40	10,000
2 1/4	58	200	78	40	10,000
2 1/2	63	200	82	40	8,000
2 3/4	70	300	84	25	7,500
3	75	300	85	25	7,500
3 1/4	77	300	88	25	7,500
3 1/2	85	300	90	25	7,500
3 3/4	92	200	93	25	5,000
4	100	200	95	25	5,000
4 1/4	108	200	98	25	5,000
4 1/2	110	200	112	25	5,000
4 3/4	120	200	119	25	5,000
5	125	200	120	25	5,000
5 1/4	133	200	125	25	5,000
5 1/2	140	200	130	25	5,000
5 3/4	146	200	148	25	5,000
6	150	100	155	25	2,500
6 1/4	158	100	160	25	2,500
6 1/2	165	100	177	25	2,500
6 3/4	170	100	184	25	2,500
7	175	100	195	25	2,500
7 1/4	183	75	255	25	1,875
7 1/2	190	75	310	25	1,875
7 3/4	195	75	338	25	1,875
8	200	75	343	25	1,875
8 1/4	210	75	350	25	1,875
8 1/2	215	50	365	25	1,250
8 3/4	220	50	378	25	1,250
9	228	50	400	25	1,250
9 1/4	235	50	415	25	1,250
9 1/2	240	50	424	25	1,250
9 3/4	247	50	430	25	1,250
10	254	50	440	25	1,250



LINDEN CHAIR DATA SHEET

Size Available	1-10 inches (25-254 mm) every 1/4" (6 mm)
Colour	concrete grey
Material	reinforced, high impact polypropylene
Strength	a minimum 400 lbs. (180 kg) / chair
Chemical Resistancy	excellent
Packaging	in heavy-duty uv protected poly bags Quantity varies by size
Installation	good for both Black and Corrosion resistant rebar place chairs on deck forms can straddle bottom steel bars spacing depends on loads standard spacing is every 3-4 feet (0.9 - 1.2 m)

(SB) Slab Bolster

Used for supporting lower slab steel from slab form. Corrugations spaced 1" (25 mm) on centres serve as guides for spacing bars. Legs are spaced 5" (127 mm) on centre. Stocked in 3/4", 1", 1 1/2", 2" (20, 25, 38 and 50 mm) in heights in 5' (1525 mm) lengths.



(PSB) Slab Bolster And All Plastic Continuous High Chair

AR Plastic Slab Bolster is used for supporting lower slab steel from slab form. Corrugations spaced 1" (25 mm) on centres serve as guides for spacing bars. Legs are solid plastic 4" (100 mm) on centre. Supporting cross bar is made from high strength plastic coated steel. Corrosion-proof and lightweight for handling.



HEIGHT			
in	(mm)	in	(mm)
3/4	(20)	2 3/4	(70)
1	(25)	3	(76)
1 1/4	(32)	5	(125)
1 1/2	(38)	5 1/2	(138)
1 3/4	(44)	6	(150)
2	(50)	6 1/2	(163)
2 1/2	(63)	7	(175)

(CHC) Continuous High Chair

Continuous High Chairs provide support for upper slab steel from slab form, eliminating carrier bars required with individual supports. Fabricated with plain steel legs (CHC) or with plastic tipped legs (PCHC). Supplied to order in heights from 2" to 12" (50 mm to 300 mm) in 1/4" (5 mm) increments and in 5' (1525 mm) lengths with legs spaced at 6" (150 mm) o.c.



Tie Wire

The AR Tie Wire is a fully annealed wire for use in general construction. It is packaged in Wire Loop Ties and Rolls designed to fit in standard reels. Available in 16 or 16.5 ga.

- 50 lbs. Coils
- 3.5 lbs. Coils
- Wire Loop Ties
- Coated & Uncoated



Tie Wire Twister

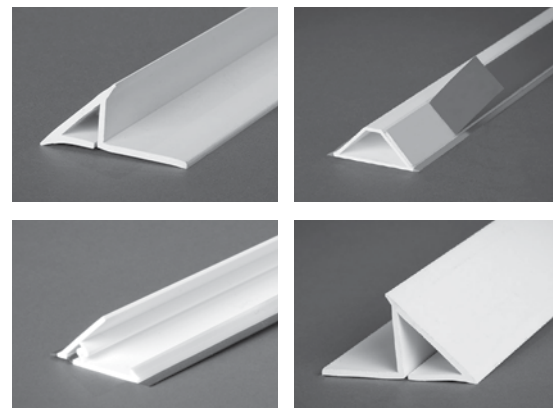
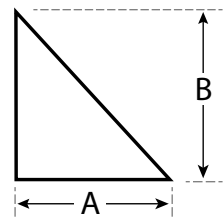
The AR Tie Wire Twister is offered in a compact size that allows the tool to be used in tight spaces. Safely and easily twists wire bar ties with a durable design.



PVC - Single Chamfer

Product Name	Width A	Height B	Chamfer Angle
Snap Single Chamfer 3/4" With Tape	0.75"	0.75"	45°
LC Single Chamfer 3/4" With Tape	0.5"	0.75"	45°
LC Single Chamfer 1/2" With Tape	0.5"	0.5"	45°
Single Chamfer 3/4" Top / Inside Chamfer	0.75"	0.75"	45°
Single Chamfer 1/2" x 45 Degree	0.5"	0.5"	45°
LC Single Chamfer 1" With Tape	1"	1"	45°

NOTE: Wood chamfer also available. Consult your AR Sales Representative or AR Technical Department for more information.



Formwork Pry Bar

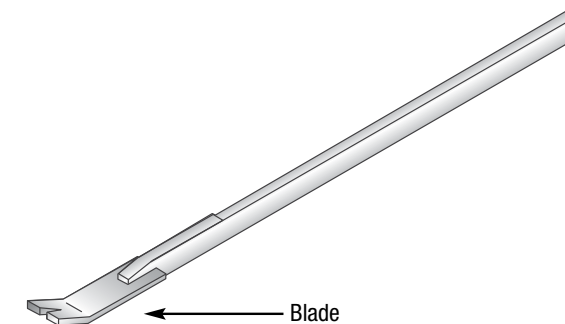
The AR Formwork Pry Bar is a heavy duty pry bar ideally suited for use by tilt-up erectors and form setters to strip forms and to "jockey" a panel into position or assist in removing forms. The Pry Bar is available with a 75 mm (3") blade widths.

To order, please specify the following information

EXAMPLE

Name Formwork Pry Bar

Quantity 2



Blade

Plastic Form Spreader

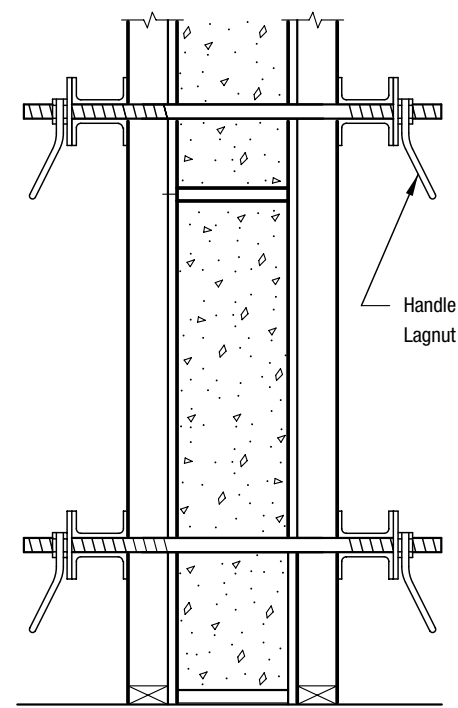
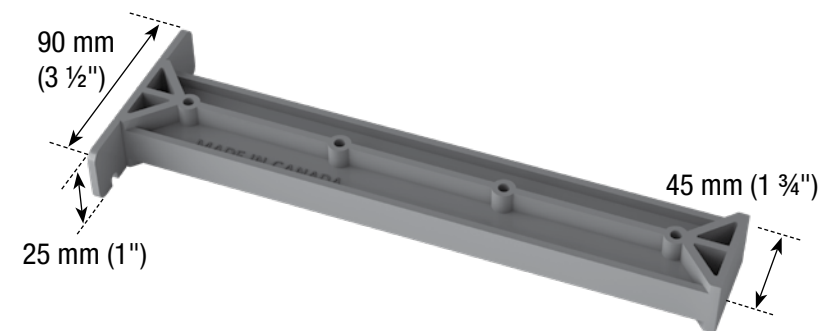
The AR Plastic Form Spreader eliminates the need of cutting and placing wood strips and reduces patching and grouting needs. The Form Spreader is corrosion free and reduce water penetration. Available in 150mm, 200 mm, 250 mm and 300 mm (6", 8", 10" and 12").

To order, please specify the following information

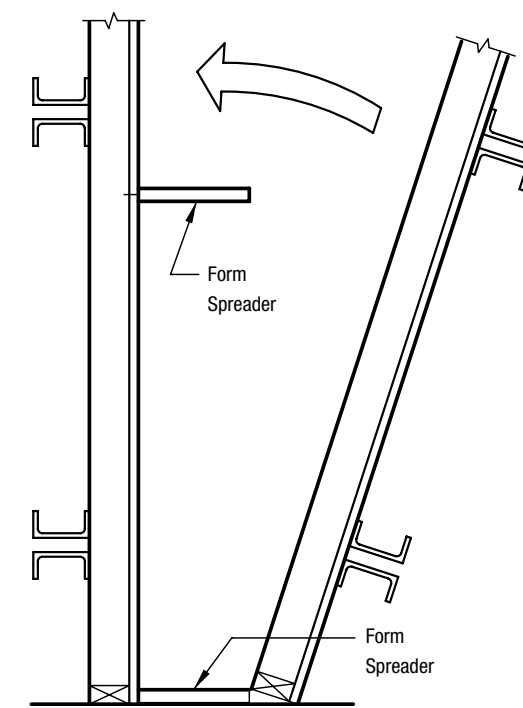
EXAMPLE

Name Plastic Form Spreader

Quantity 200



DURING POUR



SETTING FORMWORK

Rich-Cote Form Release - Summer & Winter Grade

A premium liquid debonding agent developed especially for concrete. Through a chemical reaction, RICH-COTE™ produces a smooth, white, flat concrete surface which is free of voids and will bond with paint, plaster, tiles and any other coating applied directly to the concrete. RICH-COTE™ reacts positively with the alkalis in the concrete forming a water resistant barrier with the concrete that prevents it from binding to the forms.

RICH-COTE™ waterproofs plywood forms preventing the alkalis in the concrete from being absorbed and rotting the wood. It is compatible with any pre-oiling done at the mill or any other substance previously used for treating forms. It will not wick out or wash off. Continued use makes forms completely waterproof and extends their life considerably.

RICH-COTE™ can be sprayed at sub-freezing temperatures. It will not stain and will reduce finishing time by 50%. RICH-COTE™ makes form stripping easier and faster. For the most effective and economical method of application use the AR Form Sprayer.

Drying Time:

1 - 2 hours — leaving a completely workable, non-slip surface.

Coverage:

12-18 square metres per litre on most forms.

18 - 25 square metres per litre on plastic coated and steel forms.



Form Sprayer

The AR Form Sprayer is an industrial style Tri-Poxy coated metal unit with a capacity of 13.2 litres. The AR Form Sprayer comes complete with:

- 1200 mm (48") heavy duty hose
- 600 mm (24") brass extension
- three point closures
- lock-in features for continuous spray
- threaded fitting for easy changing of hose, shut-off and nozzle

To order, please specify the following information

EXAMPLE

Name Form Sprayer
Quantity 2



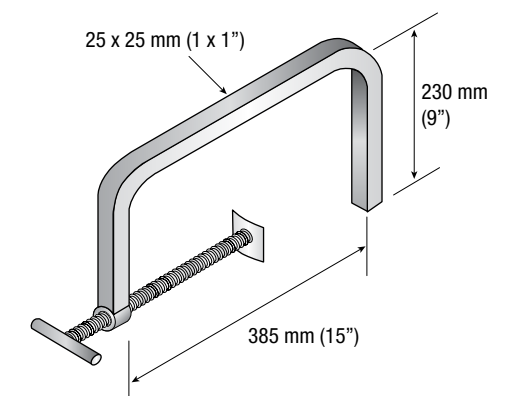
Curb Clamp

AR Curb Clamps are strong and durable with special fast thread for adjustment up to 385 mm (15") for securing curb on gutter forms. Custom sizes are available on request.

To order, please specify the following information

EXAMPLE

Name Curb Clamp
Quantity 200



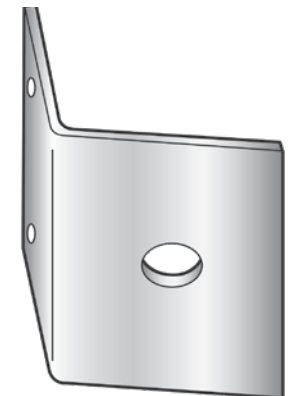
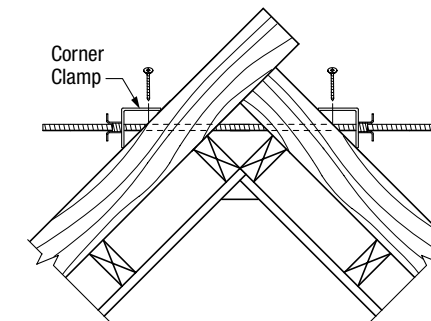
Corner Clamp

The AR Corner Clamp is fabricated of 6 mm x 95 mm (1/4" x 33/4") flat steel washer stock bent to form a wedge block with ample bearing flanges drilled for nailing to the wales. Its principal use is to provide bearing against the wales for the Tyholders on a diagonal corner tie. Most commonly used with Lag Rods.

To order, please specify the following information

EXAMPLE

Name Corner Clamp
Quantity 200



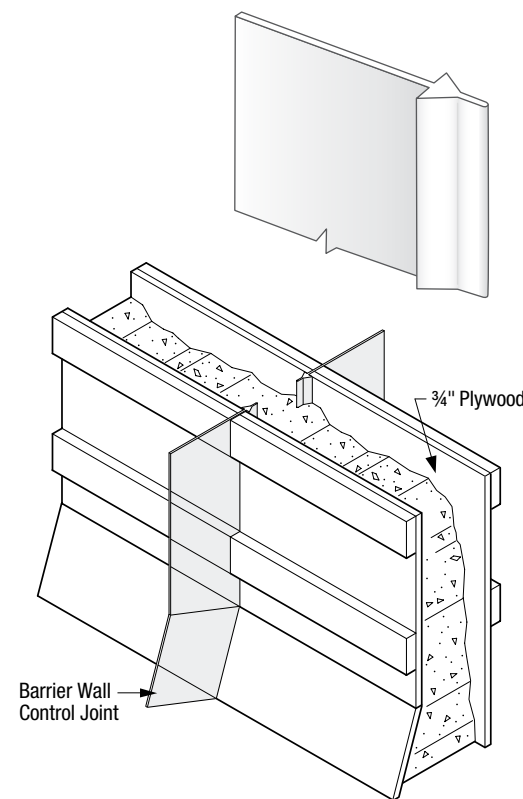
Barrier Wall Control Joint

The AR Barrier Wall Control Joint is a pre-manufactured extruded PVC forming insert used in controlling the location of shrinkage cracks in concrete barrier walls. The Barrier Wall Control Joint is installed by mechanically attaching it to the edge of the concrete form at a predetermined joint spacing specified by the engineer. The spacing and location of the Barrier Wall Control Joint is calculated based on the concrete mass and length of wall cast. Comes as a 3 metre (10') length. Available in steel as a special order upon request.

NOTE: If properly installed may be reused a number of times. Referred in the OPSS904 specification as special provision 109S25.

To order, please specify the following information

EXAMPLE
Name Barrier Wall Control Joint
Quantity 200

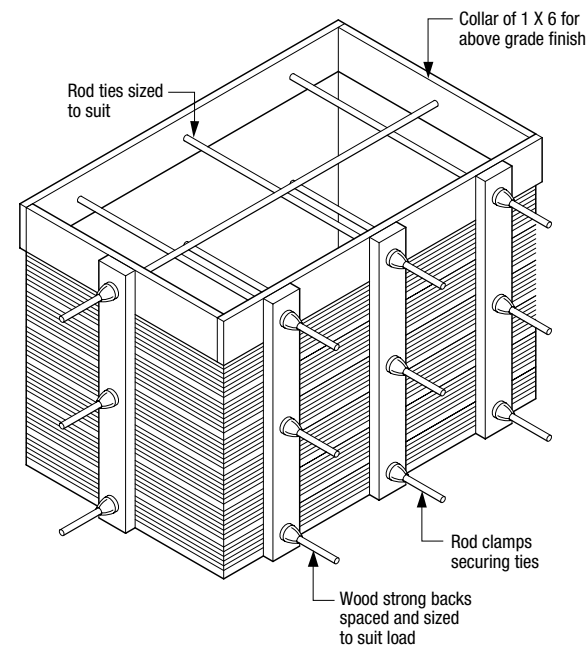
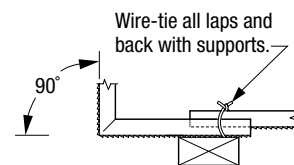


Expanded Metal Form

AR Expanded Metal Form is adaptable to site conditions for stay-in-place forming. Use in applications such as bulkheads, blind sided walls, grade beams and pile caps. Expanded Metal Form reduces labour costs in difficult forming applications. Supplied pre-galvanized for job site storage.

Expanded Metal Form sheet size:
685 mm x 244 mm (27" x 8'-0")

For corners, notch ribs 3/8" deep with "V" contoured rotary cut-off blade and bend to 90 degrees.



To order, please specify the following information

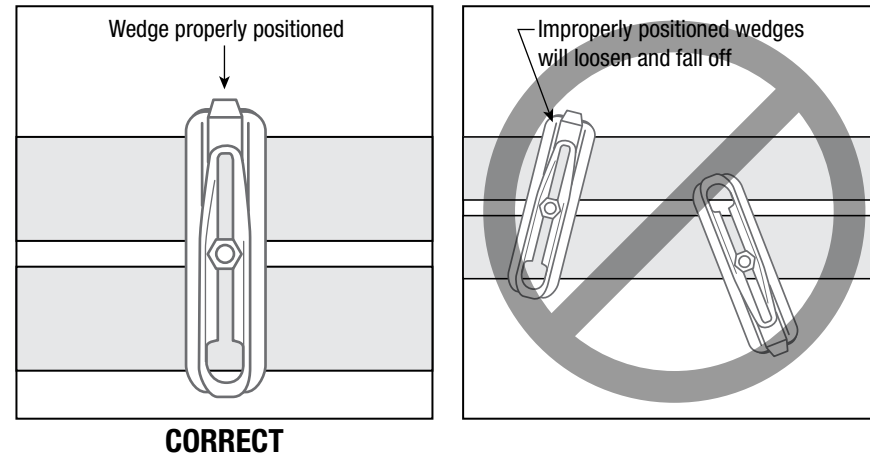
EXAMPLE
Name Expanded Metal Form
Quantity 10 sheets

APPENDIX

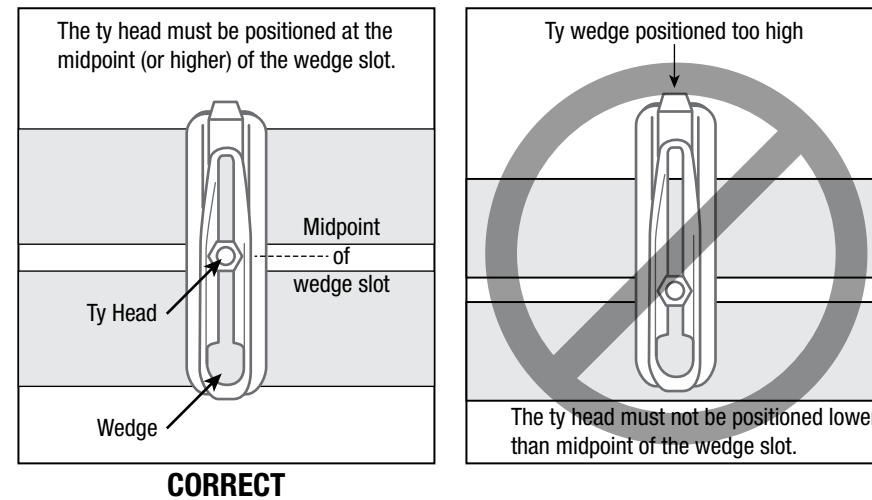
General Guidelines and Conditions

Approximate Safe Working Loads: The Approximate Safe Working Loads published in this brochure can only be obtained when AR products and accessories are used together. Products must be installed correctly to obtain the full strength development as illustrated below.

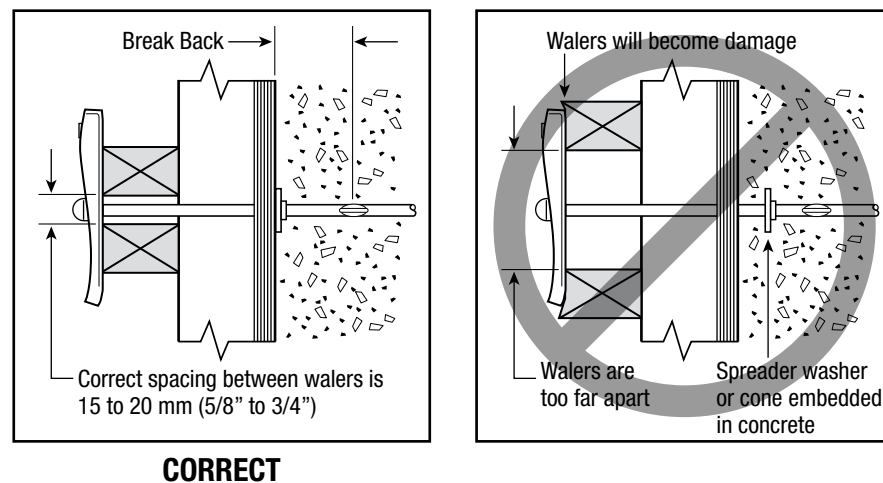
Ensure that internal vibration has not caused Snap-Ty Wedges to bounce around, loosen or fall off. It is important to properly position the Snap-Ty head and the wedge.



The Ty Head must not be positioned lower than the midpoint of the wedge. The proper Ty Head position is at the midpoint of the wedge slot, or higher.

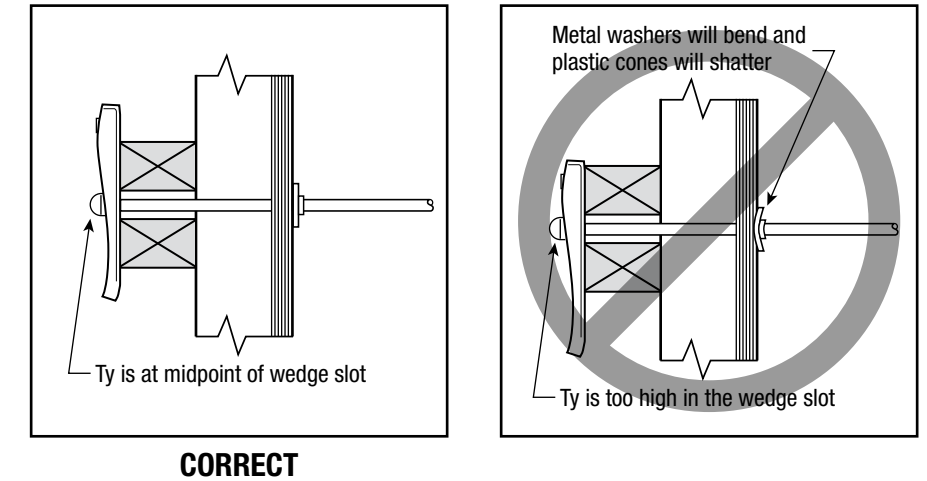


Walers spaced too far apart may cause crushing of the wales or bending of the wedge, causing the form to bulge outward. Incorrect wall thicknesses will result and cause the Ty Spreader Washers or Cones to become embedded in the concrete. Embedded Ty Washers or Cones will make it difficult to break back the Tys.

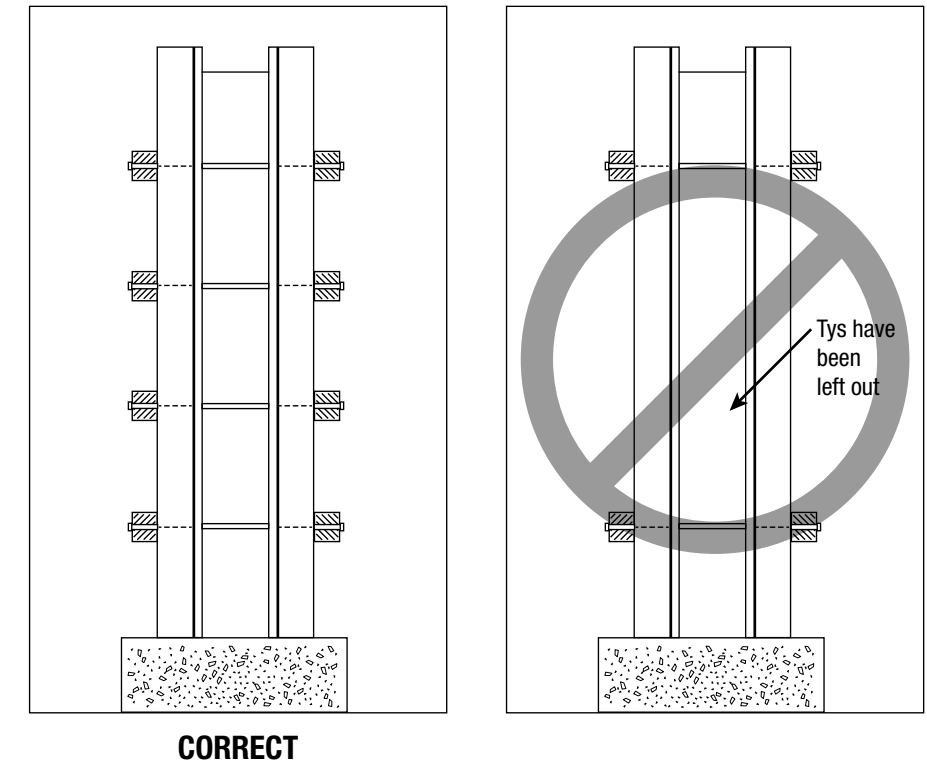


General Guidelines and Conditions

Ty cones and metal washers are used to act as form spreaders only. The wedge should not be overtightened by any method. Attempting to draw-up warped wales with the wedge should not be attempted. Metal spreader washers will bend out of shape and plastic cones will break if over tightening is attempted, resulting in incorrect wall thickness.

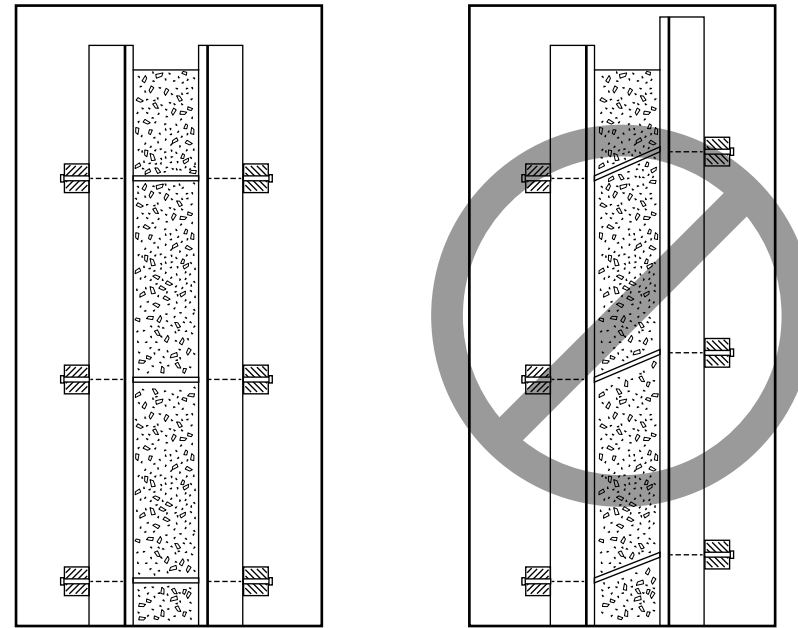


To achieve proper form structures, it is important that all form tys are installed and used properly. Excessive loads will be transferred to adjacent tys and can result in form failure if tys and/or their required hardware are omitted. Ensure that form tys are properly aligned. Increased loads placed on form tys because of misalignment may cause form failure to occur. Also, reduced load capacities can result from form tys damaged because of misalignment during installation.



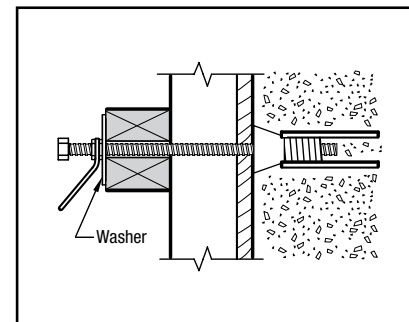
General Guidelines and Conditions

The maximum space between double walers should be 13 mm ($\frac{1}{2}$ " more than the nominal diameter of a forming device being used i.e. He-Bolts, Taper-Tys, She-Bolts and Lagstud Bolts.

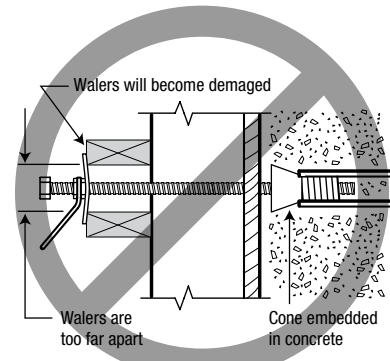


CORRECT

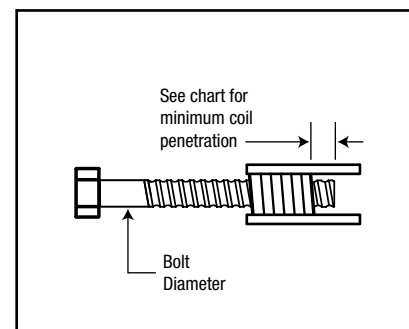
Wales may be crushed or washers may bend if too much space is allowed between the walers. Too much space causes the form to move outward and will result in incorrect wall thickness and spreader cones becoming trapped in the concrete. Incorrect wall thickness can also be caused from washers being deflected due to the increased lateral form pressure.



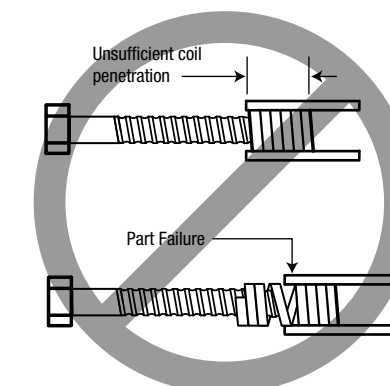
CORRECT



Lag stud bolts and other lag thread products must have proper lag penetration. A minimum of one diameter of the bolting device past the coil is the proper penetration. As an example, a lagstud bolt that is 25 mm (1") in diameter should extend a minimum of 25 mm (1") past the coil. Form failure can result if threaded items are penetrated incorrectly. Excessive wear on the bolt's first few threads are caused from improper penetration and the entire bolt load is placed on a smaller portion of the coil welds. The coil welds can fail and cause form failure because of this increased load.



CORRECT



General Guidelines and Conditions

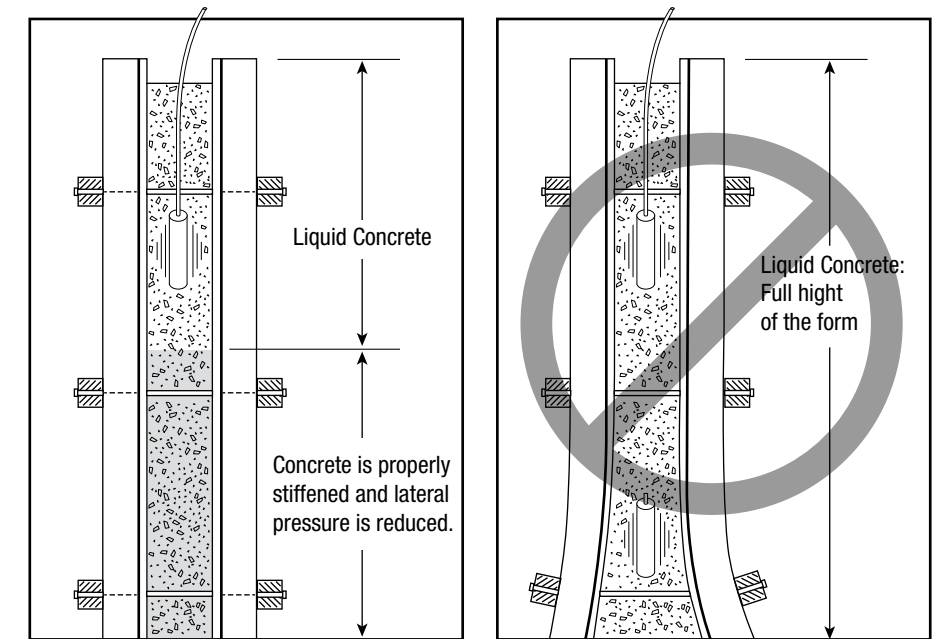
Do not force tys into position. Forcing the tys may damage the ty and result in form failure.

Do not use incorrect length Tys and do not mix incorrect form Ty lengths with correct ones. Doing so will cause a transfer of lateral pressure to adjacent tys and may result in form failure.

Do not use the form tys for climbing.

Impact wrenches should not be used to tighten form tying devices.

Do not vibrate the concrete excessively or the concrete at the bottom of the form will stay in liquid state longer than should be expected. The liquid state will cause a higher than expected lateral form pressure and could cause a form failure.



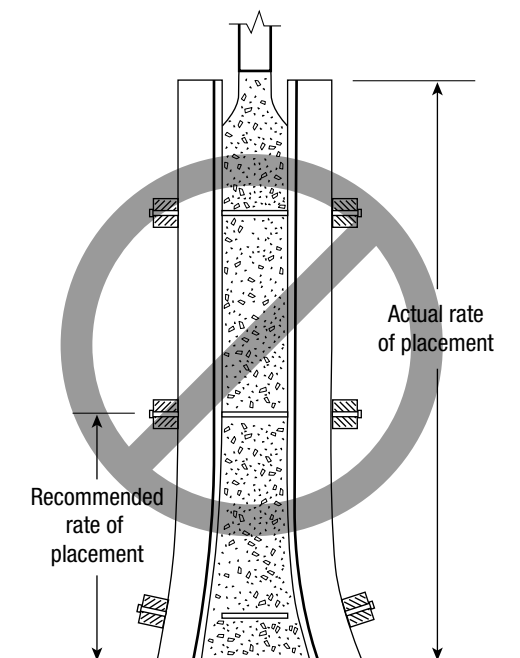
CORRECT

The recommended rate of placement should not be exceeded. If the concrete at the bottom of the form is still in liquid state do not continue to place concrete. Form failure may result.

Working parts below the specified requirements should not be used with forming accessories.

Use accessories and hardware of proper length, diameter and capacity. If it is necessary to use a greater safety factor, the safe working load must be reduced accordingly.

Use caution when welding any forming system component. Material properties may be affected by welding and result in lower product performance. A good working knowledge of materials, heat treating and welding procedures is required before welding any forming accessory. National Concrete Accessories does not guarantee any product altered in any way after leaving the factory.

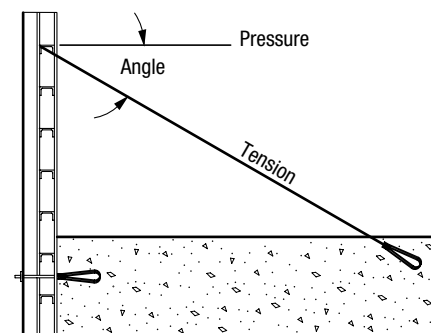


Induced Tension Loads

Induced Tension Loads

When tying at an angle be aware that an increase in the tension applied to an angled ty is increased. Sample angles and the corresponding multiplication factors for calculating the tension load on an angled ty are shown in the table.

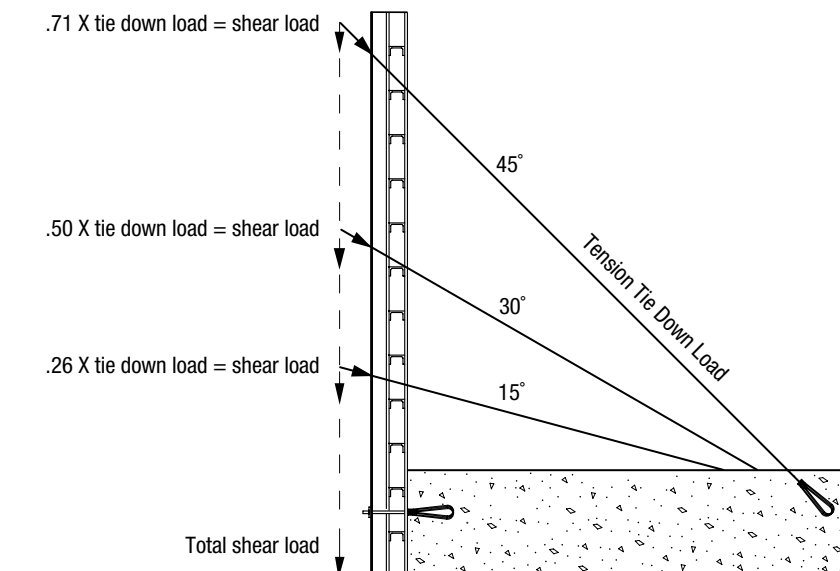
Angle	Multiplication Factor
15°	1.04
30°	1.16
45°	1.42
60°	2.00



Induced Shear Loads

It is important to note the illustration showing ty downs placed at an angle and the shear loads produced. Total shear load may be many times greater than the shear load produced by the form weight alone.

When deciding which form ty system to use for a forming application, consider both the tension and the shear load.



Combined Shear and Tension Loads

The equation shown should be satisfied for form accessories and inserts subjected to combined shear and tension loading.

$$\left(\frac{f_t}{F_t}\right)^{\frac{5}{3}} + \left(\frac{f_v}{F_v}\right)^{\frac{5}{3}} \leq 1.0$$

Where:

f_t = induced tension load

F_t = insert tension Approximate Safe Working Load or bolt tension Approximate Safe Working Load, whichever is less

f_v = induced shear load

F_v = insert shear Approximate Safe Working Load or bolt shear Approximate Safe Working Load, whichever is less

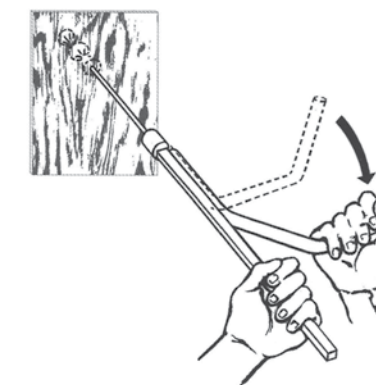
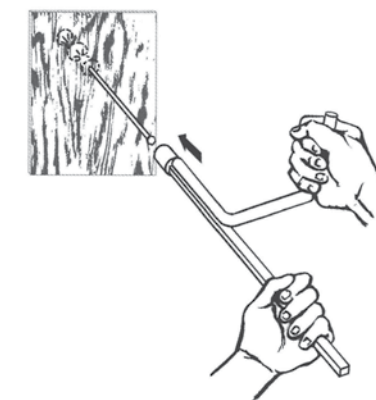
Stripping of Snap-Tys and guidelines for break back

AR Snap-Ty break backs are manufactured to exacting standards that ensure that they perform to load requirements while providing a consistent and reliable breaking point. However, many factors affect the performance of the break backs.

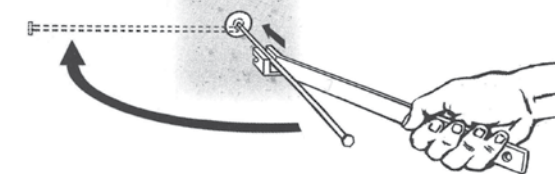
- Snap-Tys must not be bent during installation as the break back could be adversely affected.
- For best results, Tys are not to be removed until concrete has gained sufficient strength to prevent the Ty upset from rotating — typically 2 to 3 days. Attempting to break the Ty in green concrete may result in the Ty rotation in the concrete and make it difficult to break the Ty.
- Only Space-Tys have a guaranteed break back.
- Other Snap-Ty products are designed to provide a consistent break back, but can be affected by the concrete, which could generate difficulties in achieving a consistent break back.
- Products like the Steel Washer, No Washer and No Spreader Snap-Tys where the break back could be contained within the concrete require extra attention. With increased bond length AR cannot guarantee that the Ty will consistently provide the proper break back. For these products, this is especially important where break backs of over ¾" (20 mm) are desired. A good quality release agent/grease (acceptable non-staining) applied between the break back and the face of formwork (grease wire to be embedded, that will be removed — do not grease head area) may facilitate more consistent results. On site tests should be conducted to identify if consistent results can be achieved with the concrete mix and Ty.
- If the washer or cone is not free of the concrete, chip away the concrete using a hammer, screwdriver or drill to free the embedded components. Failure to free up the embedded components could result in the break back closer to the surface of the concrete instead of the desired break back location.

Use of the AR Snap-Ty and Space-Ty wrenches will assist with consistency, reduce risk of injury and speed up removal (see pages 22 and 23).

If in doubt, contact AR's technical department for assistance.



Space-Ty Wrench



Snap-Ty Wrench

Concrete lateral pressures for wall form design - PUMPED

— Table conforms to CAN/CSA-S269.3-M92.

PUMPED

Rate of pour		CONCRETE TEMPERATURE DURING POUR					
		5° C (40° F)		10° C (50° F)		15° C (60° F)	
		kPa	PSF	kPa	PSF	kPa	PSF
1 metre per hour	3'0" per hour	86	1810	72	1500	62	1290
1.5 metre per hour	4'0" per hour	92	1900	77	1550	67	1325
2 metres per hour	5'0" per hour	99	1975	82	1625	71	1410
2.5 metres per hour	6'0" per hour	106	2075	88	1680	76	1460
3 metres per hour	7'0" per hour	112	2125	93	1760	81	1525
3.5 metres per hour	8'0" per hour		2250	132	1840	113	1590
4 metres per hour	9'0" per hour		2331	144	1910	128	1640
4.5 metres per hour	10'0" per hour		2425		1975	144	1675

Rate of pour		CONCRETE TEMPERATURE DURING POUR					
		20° C (70° F)		25° C (80° F)		30° C (90° F)	
		kPa	PSF	kPa	PSF	kPa	PSF
1 metre per hour	3'0" per hour	48	1000	48	1000	48	1000
1.5 metre per hour	4'0" per hour	58	1000	48	1000	48	1000
2 metres per hour	5'0" per hour	63	1130	48	1000	48	1000
2.5 metres per hour	6'0" per hour	67	1290	51	1000	48	1000
3 metres per hour	7'0" per hour	71	1350	63	1130	51	1000
3.5 metres per hour	8'0" per hour	100	1400	88	1260	81	1000
4 metres per hour	9'0" per hour	112	1440	101	1290	91	1000
4.5 metres per hour	10'0" per hour	126	1460	112	1300	101	1000

NOTES: The above table is controlled rate of pours (concrete using type 10 or 30 cement, with no admixtures, ie. superplasticizer) plus 25% for pumped concrete.

Concrete lateral pressures for wall form design - BUCKET

— Table conforms to CAN/CSA-S269.3-M92.

BUCKET

Rate of pour		CONCRETE TEMPERATURE DURING POUR					
		5° C (40° F)		10° C (50° F)		15° C (60° F)	
		kPa	PSF	kPa	PSF	kPa	PSF
1 metre per hour	3'0" per hour	69	1450	58	1200	50	1030
1.5 metre per hour	4'0" per hour	74	1520	62	1240	54	1060
2 metres per hour	5'0" per hour	79	1580	66	1300	57	1130
2.5 metres per hour	6'0" per hour	85	1660	71	1350	61	1170
3 metres per hour	7'0" per hour	90	1700	75	1410	65	1220
3.5 metres per hour	8'0" per hour	128	1800	106	1470	91	1270
4 metres per hour	9'0" per hour	144	1870	120	1530	103	1310
4.5 metres per hour	10'0" per hour		1940	134	1580	115	1340

Rate of pour		CONCRETE TEMPERATURE DURING POUR					
		20° C (70° F)		25° C (80° F)		30° C (90° F)	
		kPa	PSF	kPa	PSF	kPa	PSF
1 metre per hour	3'0" per hour	48	1000	48	1000	48	1000
1.5 metre per hour	4'0" per hour	48	1000	48	1000	48	1000
2 metres per hour	5'0" per hour	51	1000	48	1000	48	1000
2.5 metres per hour	6'0" per hour	54	1030	48	1000	48	1000
3 metres per hour	7'0" per hour	57	1080	51	1000	48	1000
3.5 metres per hour	8'0" per hour	80	1120	71	1010	65	1000
4 metres per hour	9'0" per hour	90	1150	81	1030	73	1000
4.5 metres per hour	10'0" per hour	101	1170	90	1040	81	1000

NOTES: The above table is controlled rate of pours (concrete using type 10 or 30 cement, with no admixtures, ie. superplasticizer).

Maximum lateral pressure for design of COLUMN FORMS

— Based on ACI Committee 347 pressure formula

Applies only for normal weight concrete made with type 1 cement, no admixtures or pozzolans, slump no more than 4 inches and vibration depth limited to 4 feet or less.

P. maximum lateral pressure, psf, for temperature indicated.

Rate of placement	40° F	50° F	60° F	70° F	80° F	90° F
1 foot per hour						
2 feet per hour						
3 feet per hour	825	690				
4 feet per hour	1050	870	750	664		
5 feet per hour	1275	1050	900	793	712	650
6 feet per hour	1500	1230	1050	921	825	750
7 feet per hour	1725	1410	1200	1050	938	850
8 feet per hour	1950	1590	1350	1178	1050	950
9 feet per hour	2175	1770	1500	1307	1163	1050
10 feet per hour	2400	1950	1650	1436	1275	1150
12 foot per hour	2850	2310	1950	1693	1500	1350
14 feet per hour		2670	2250	1950	1725	1550
16 feet per hour		3000	2550	2207	1950	1750
18 feet per hour			2850	2464	2175	1950
20 feet per hour			3000	2721	2400	2150
22 feet per hour				2979	2625	2350
24 feet per hour				3000	2850	2550
26 feet per hour					3000	2750
28 feet per hour						2950
30 feet per hour						3000

NOTE: Form pressure is based on concrete weighing 150 lb/ft².

Do not use design pressures in excess of 150 x height of fresh concrete in forms.

Maximum lateral pressure for design of WALL FORMS

— Based on ACI Committee 347 pressure formula

Applies only for normal weight concrete made with type 1 cement, no admixtures or pozzolans, slump no more than 4 inches and vibration depth limited to 4 feet or less.

P. maximum lateral pressure, psf, for temperature indicated

Rate of placement	40° F	50° F	60° F	70° F	80° F	90° F
1 foot per hour						
2 feet per hour						
3 feet per hour	825	690				
4 feet per hour	1050	870	750	664		
5 feet per hour	1275	1050	900	793	712	650
6 feet per hour	1500	1230	1050	921	825	750
7 feet per hour	1725	1410	1200	1050	938	850
8 feet per hour	1795	1466	1246	1090	973	881
9 feet per hour	1865	1522	1293	1130	1008	912
10 feet per hour	1935	1578	1340	1170	1043	943

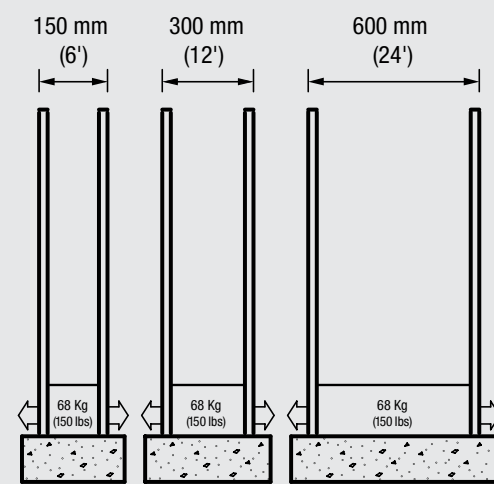
NOTE: Form pressure is based on concrete weighing 150 lb/ft².

Do not use design pressures in excess of 150 x height of fresh concrete in forms.

	ACISpec	CAN/CSA-S269.3-M92
Wall up to 7 feet	$150 = (9000 \cdot R)/T$	$150 + (43400/T) = (2088 \cdot R)/T$
Wall between 7 and 10 feet	$150 + (43400/T) = (2088 \cdot R)/T$	$150 + (43400/T) = (2088 \cdot R)/T$
Maximum form pressure	2000 PSF	3000 PSF
Minimum form pressure	600 PSF	1000 PSF
Up to 4'-0" wall	$600/150 = 4$ feet Full Liquid Head	Pour Full Liquid Head
Comments	ACI formula for pour rate up to 7 feet/hour is more conservative Lower maximum form pressure Lower minimum form pressure	Higher form pressure between 0 to 7 feet/hour Higher maximum form pressure Higher minimum form pressure

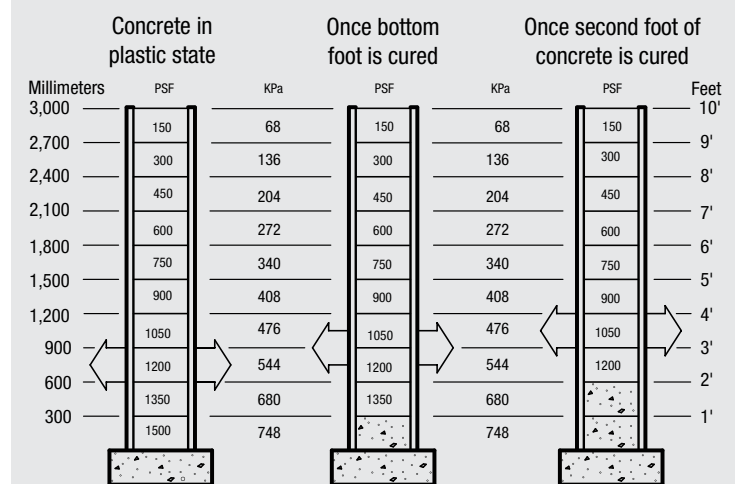
Lateral Pressure

Wall Thickness



Plastic concrete exerts the same pressure on forms regardless of their width.

As Concrete Cures



Lateral pressure decreases from bottom as concrete cures.

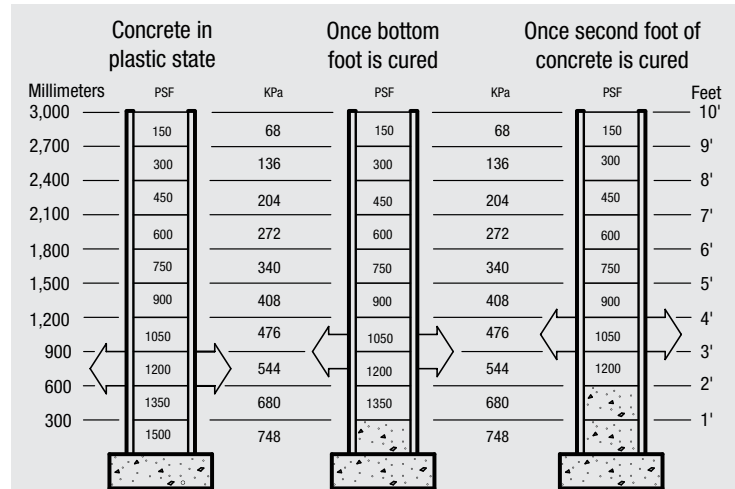
Increased Wall Height

Millimeters	Feet	PSF	KPa
3,000	10'	150	68
2,700	9'	300	136
2,400	8'	450	204
2,100	7'	600	272
1,800	6'	750	340
1,500	5'	900	408
1,200	4'	1,050	476
900	3'	1,200	544
600	2'	1,350	612
300	1'	1,500	680

As you increase the height of plastic concrete to the forms, the pressure will build at a rate of 150 PSF per foot of depth. This will be true as long as all concrete remains in a plastic state.

Example: Ten feet of fluid or plastic concrete bears on the bottom foot of forms with a pressure of 10 X 150 lbs/ft³ or 1500 PSF.

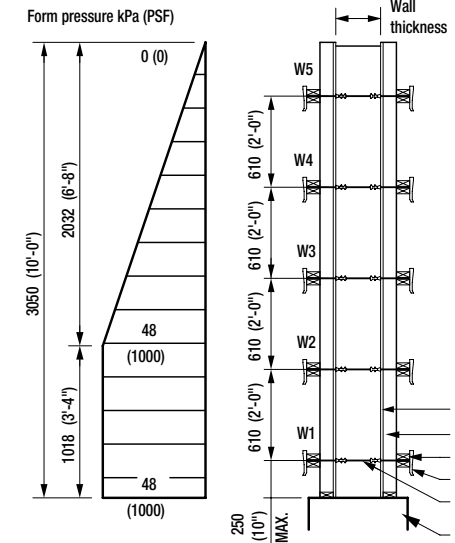
As Concrete Cures



Lateral pressure decreases from bottom as concrete cures.

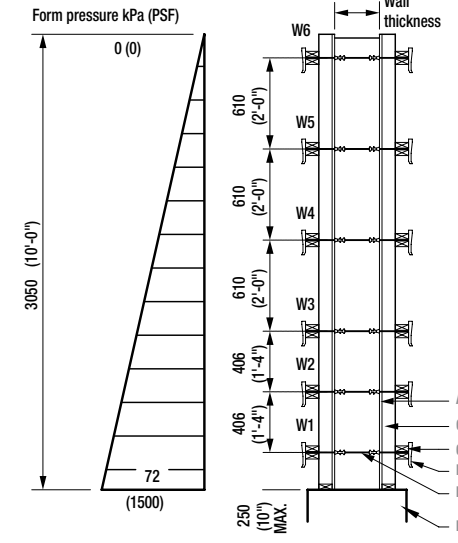
Light Formwork

Typical 3050mm (10'-0") High Wall Formwork, CONTROLLED RATE OF POUR



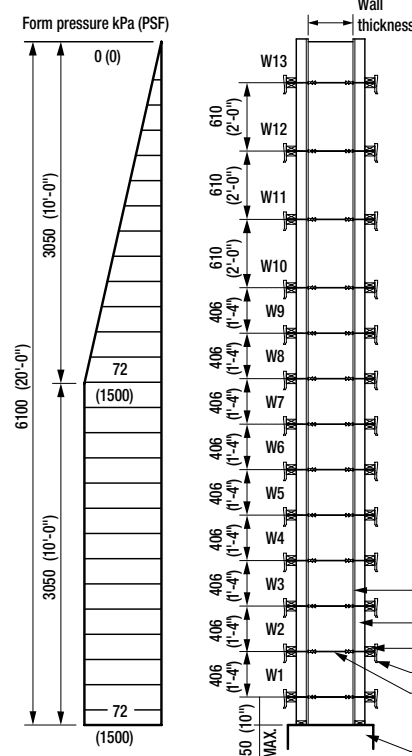
Snap-Ty
10 kN (2,250 lbs) spacing:
W1, W2 and W3 @ 305 (12") on centre
W4 and W5 @ 610 (2'-0") on centre
Space-Ty™
13.4 kN (3,000 lbs) spacing:
W1, W2 and W3 @ 406 (1'-4") on centre
W4 and W5 @ 610 (2'-0") on centre

Typical 3050 mm (10'-0") High Wall Formwork, FULL LIQUID HEAD



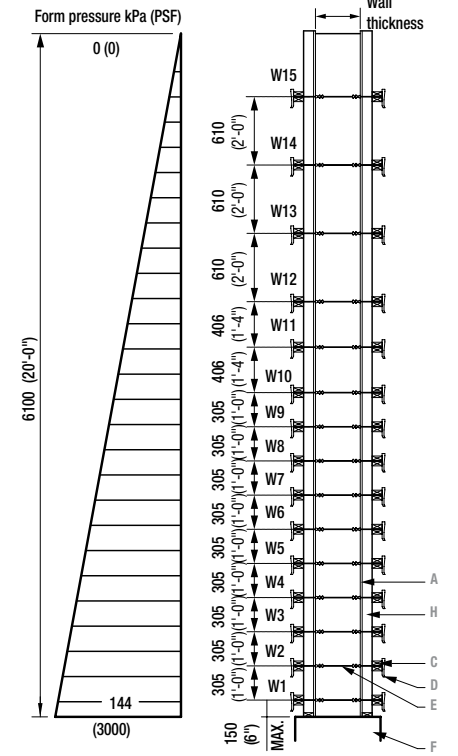
Snap-Ty
10 kN (2,250 lbs) spacing:
W1, W2 and W3 @ 305 (12") on centre
W4 @ 406 (1'-4") on centre
W5, W6 @ 610 (2'-0") on centre
Space-Ty™
13.4 kN (3,000 lbs) spacing:
W1, W2 and W3 @ 406 (16") on centre
W4, W5 and W6 @ 610 (2'-0") on centre

Typical 6100 mm (20'-0") High Wall Formwork, CONTROLLED RATE OF POUR



Snap-Ty
10 kN (2,250 lbs) spacing:
W1 to W10 @ 305 (12") on centre
W11 @ 406 (1'-4") on centre
W12 and W13 @ 610 (2'-0") on centre
Space-Ty™
13.4 kN (3,000 lbs) spacing:
W1 to W11 @ 457 (1'-6") on centre
W12 and W13 @ 610 (2'-0") on centre

Typical 6100 mm (20'-0") High Wall Formwork, FULL LIQUID HEAD



Space-Ty™
13.4 kN (3,000 lbs) spacing:
W1 to W12 @ 305 (12") on centre
W13 @ 406 (1'-4") on centre
W14 and W15 @ 610 (2'-0") on centre

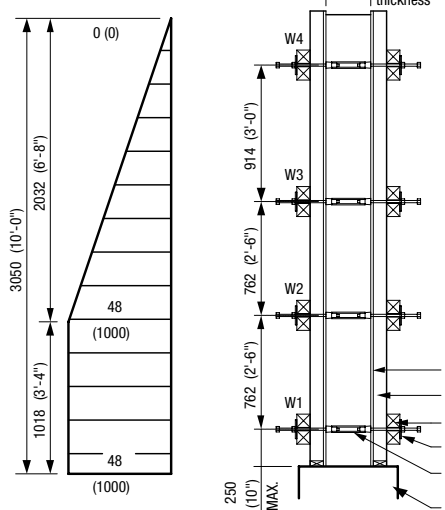
SEE LEGEND ON PAGE 109
SEE GENERAL NOTES ON PAGE 109

CHART — MAXIMUM RISE OF CONCRETE IN FORMS IN METRES (FEET) PER HOUR

Liquid Head	5°C (40°F)	10°C (50°F)	15°C (60°F)	20°C (70°F)	25°C (80°F)
3050 mm (10'-0") High Wall, Controlled Rate of Pour	N/A	N/A	1 (3)	2 (5)	3.5 (8)
3050 mm (10'-0") High Wall, Full Liquid Head	N/A	N/A	N/A	N/A	N/A
6100 mm (20'-0") High Wall, Controlled Rate of Pour	N/A	N/A	2 (6)	3.5 (8)	4.5 (10)
6100 mm (20'-0") High Wall, Full Liquid Head	N/A	N/A	N/A	N/A	N/A

Medium Formwork

Typical 3050 mm (10'-0") High Wall Formwork, CONTROLLED RATE OF POUR
Form pressure kPa (PSF)



TY and WALER OPTIONS

Waler Options	Tyscru spacing			
	T2	T2	T2	T2
	4.5 M	6.75 M	9 M	18 M

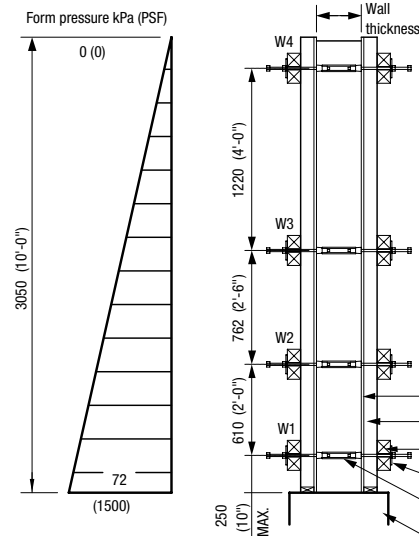
3050 mm (10'-0") High Wall Controlled Rate of Pour

Two 89x89 (4x4)	610 (2'-0")	-	-	-
Two Aluminum Channel Beams	-	762 (30")	-	-
Two C4 x 5.4 lb/ft	-	-	914 (36")	1220 (48")

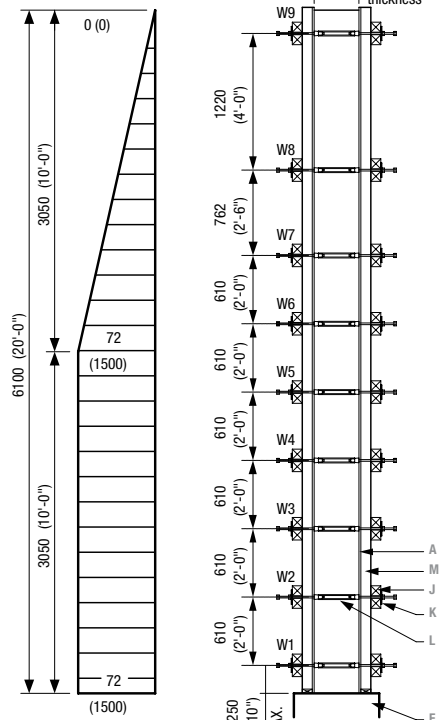
3050 (10'-0") mm High Wall Full Liquid Head

Two 89x89 (4x4)	457 (1'-6")	610 (2'-0")	-	-
Two Aluminum Channel Beams	-	762 (2'-6")	-	-
Two C4 x 5.4 lb/ft	-	-	914 (3'-0")	1220 (4'-0")

Typical 3050 mm (10'-0") High Wall Formwork, FULL LIQUID HEAD
Form pressure kPa (PSF)



Typical 6100 mm (20'-0") High Wall Formwork, CONTROLLED RATE OF POUR
Form pressure kPa (PSF)



6100 (20'-0") mm High Wall Controlled Rate of Pour

Two 89x89 (4x4)	457 (1'-6")	610 (2'-0")	-	-
Two Aluminum Channel Beams	-	762 (2'-6")	-	-
Two C4 x 5.4 lb/ft	-	-	914 (3'-0")	1220 (4'-0")

6100 (20'-0") mm High Wall Full Liquid Head

Two 89x89 (4x4)	457 (1'-6")	610 (2'-0")	-	-
Two Aluminum Channel Beams	-	762 (2'-6")	-	-
Two C4 x 5.4 lb/ft	-	-	914 (3'-0")	1220 (4'-0")

SEE LEGEND ON PAGE 109

SEE GENERAL NOTES ON PAGE 109

Typical 6100 mm (20'-0") High Wall Formwork, FULL LIQUID HEAD
Form pressure kPa (PSF)

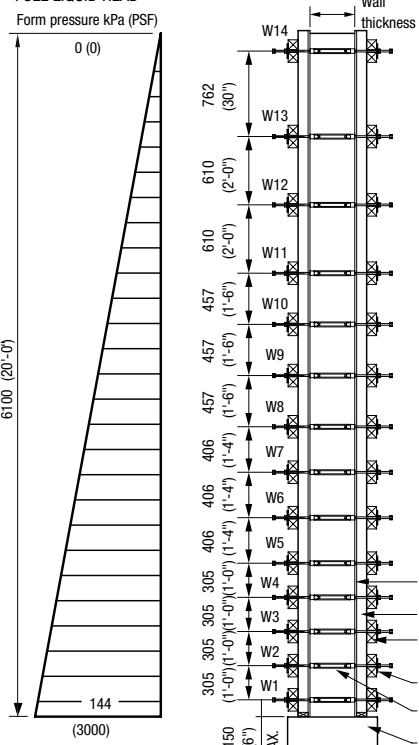
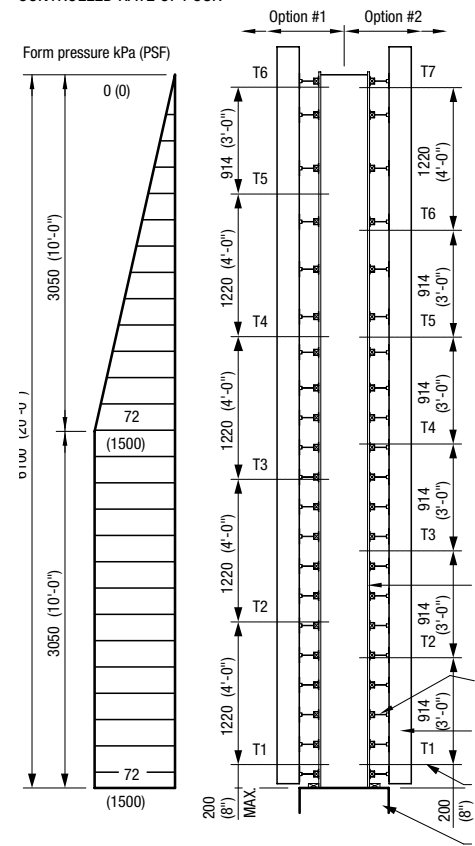


CHART — MAXIMUM RISE OF CONCRETE IN FORMS IN METRES (FEET) PER HOUR

Liquid Head	5°C (40°F)	10°C (50°F)	15°C (60°F)	20°C (70°F)	25°C (80°F)
3050 mm (10'-0") High Wall, Controlled Rate of Pour	N/A	N/A	1	(3)	(8)
3050 mm (10'-0") High Wall, Full Liquid Head	N/A	N/A	N/A	N/A	N/A
6100 mm (20'-0") High Wall, Controlled Rate of Pour	N/A	N/A	2.5	(6)	(10)
6100 mm (20'-0") High Wall, Full Liquid Head	N/A	N/A	N/A	N/A	N/A

Heavy Formwork

Typical 6100 mm (20'-0") High Wall Formwork, CONTROLLED RATE OF POUR



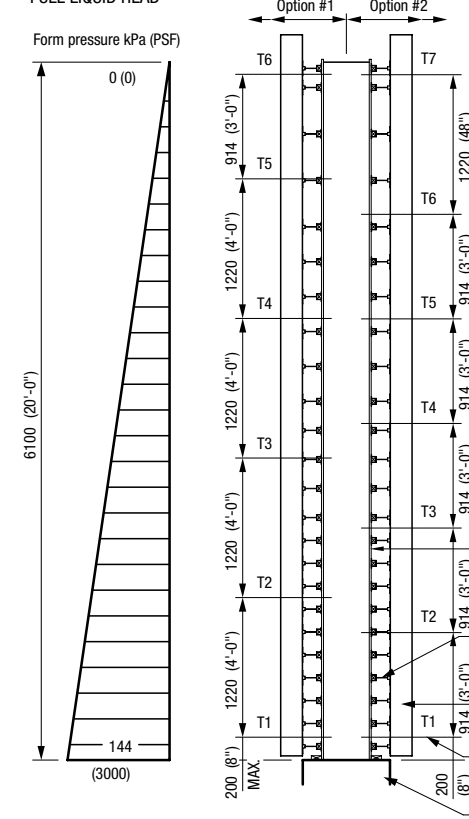
LAYOUT and TY OPTIONS: 6100 mm (20'-0") High Wall Controlled Rate of Pour

Layout Options	Diameter of Ty Options	
	Tyscru	Taper Ty
Option #1	T4-27M	25 - 32 (1"-1¼")
Option #2	T4-18M	20 - 25 (¾"-1")

6100 mm (20'-0") High Wall Full Liquid Head

Layout Options	Diameter of Ty Options	
	Tyscru	Taper Ty
Option #1	T4-27M	25 - 32 (1"-1¼")
Option #2	T4-18M	20 - 25 (¾"-1")

Typical 6100 mm (20'-0") High Wall Formwork, FULL LIQUID HEAD



LEGEND A = 19mm (¾") plywood B = 38X89 (2X4) studs @ 200 (8") on centre C = Two 38X89 (2x4) walers D = Tywedge (swag-H) E = Snap-ty or Space-Ty™ F = Footing G = 38X89 (2x4) studs @ 150 (6") on centre H = 38X89 (2x4) studs @ 100 (4") on centre I = 89X89 (4x4) studs @ 250 (10") on centre J = Double waler K = Lagstud bolt, Washer and Nut L = Cone-Tight Tyscru M = 89X89 (4x4) studs @ 200 (8") on centre N = 89X89 (4x4) studs @ 150 (6") on centre O = Aluminum horizontal walers @ 254 (10") on centre P = Double strongbacks @ 1220 (4'-0") on centre Q = Form-ty (refer to Laout Options in table above) R = Aluminum beam or CB walers @ 200 (8") on centre S = Double strongbacks @ 610 (2'-0") on centre

CHART — MAXIMUM RISE OF CONCRETE IN FORMS IN METRES (FEET) PER HOUR

Liquid Head	5°C (40°F)	10°C (50°F)	15°C (60°F)	20°C (70°F)	25°C (80°F)
6100 mm (20'-0") High Wall, Controlled Rate of Pour	N/A	N/A	2.5	(6)	(10)
6100 mm (20'-0") High Wall, Full Liquid Head	N/A	N/A	N/A	N/A	N/A

NOTES:

- All lumber to be SPF, No. 2 grade or equal except for 4"x4"s and 2"x4"s to be SPF, construction grade or equal.
- Construction live load not to exceed:
 - 75 PSF (3.6 KPa) on deck
 - 50 PSF (2.4 KPa) on work platform
- Contractor to verify with structural engineer the capacity of structure to sustain imposed loads.
- Wallform concrete pour design based on full liquid head pressure (unrestricted rate of pour) unless indicated otherwise at pouring information below.

- Wood design is based on CAN3-086-M84 Engineering Design in Wood (working stress design).
- Formwork design based on CAN/CSAS269.3- M92 concrete formwork — National Standard of Canada.
- Wallform Pouring Information Form**
Tys are spaced for maximum concrete pressure of 1500 PSF at safe load values of Tys. Assumed pouring rate for "Portland Cement" concrete only at various temperatures as indicated in above charts. Estimated time of set for charts: 1.75 hours @ 40° to 50° F, 1.25 hours @ 60°

- to 70° F, 1.5 hours @ 50° to 60° F, 1 hour @ 70° to 80° F
- Wallform and product design is based on the following assumptions:
 - Concrete is placed by bucket from top of form (not pumped)
 - Concrete pressures are full liquid head unless a maximum concrete pressure is specified above
 - Concrete mix using type 10 or type 30 cements maximum slump of 100mm (4") for controlled pours
 - Compliance with "Concrete Formwork" standard CAN/CSA-S269.3-M92

Approximate Safe Working Loads & Ultimate Capacities calculated for various concrete strengths

Approximate Safe Working Loads & Ultimate Capacities calculated for various concrete strengths

Type of Anchor		Anchor Dimension		3.4 MPa (500 psi) Concrete Strength				4.8 MPa (700 psi) Concrete Strength				10.3 MPa (1500 psi) Concrete Strength				
				Safe Working Load 2:1		Ultimate		Safe Working Load 2:1		Ultimate		Safe Working Load 2:1		Ultimate		
				kN	lbs	kN	lbs	kN	lbs	kN	lbs	kN	lbs	kN	lbs	
 Tyloop	Flared 4 strut	25 x 375	1" x 15"	Not recommended in weak concrete				Not recommended in weak concrete				66	15,000	133	30,000	 Tyloop
		25 x 450	1" x 18"									75	17,000	151	34,000	
	 Flared 4-strut and Offset	32 x 375	1 1/4" x 15"									66	15,000	133	30,000	 Tyloop
32 x 450		1 1/4" x 18"	75	17,000	151	34,000										
Offset 4-strut		32 x 600	1 1/4" x 24"	106	24,000	213	48,000									
	32 x 750	1 1/4" x 30"	133	30,000	266	60,000										
	32 x 900	1 1/4" x 36"	133	30,000	266	60,000										
 Ty-anchor	2-strut	25 x 300	1" x 12"	Not applicable				60	13,500	120	27,000	 Ty-anchor				
		32 x 375	1 1/4" x 15"	53	12,000	68	24,000	68	15,500	138	31,000					
		32 x 435	1 1/4" x 18"	68	15,500	137	31,000	86	19,500	173	39,000					
		32 x 500	1 1/4" x 20"	100	22,500	200	40,000	120	27,000	240	54,000					
	4-strut	32 x 600	1 1/4" x 24"	111	25,000	222	50,000	151	34,000	302	68,000	 Ty-anchor				
 Crimped Anchor <i>Loads based on mechanical properties only</i>		19 x 600	3/4" x 24"	80	18,000	160	36,000	80	18,000	160	36,000	 Crimped Anchor <i>Loads based on mechanical properties only</i>				
		19 x 750	3/4" x 30"	80	18,000	160	36,000	80	18,000	160	36,000					
		19 x 900	3/4" x 36"	80	18,000	160	36,000	80	18,000	160	36,000					
		32 x 1050	3/4" x 42"	80	18,000	160	36,000	80	18,000	160	36,000					
		Not applicable				120	27,000	240	54,000	120	27,000		240	54,000		
		25 x 750	1" x 30"	120	27,000	240	54,000	120	27,000	240	54,000					
		25 x 900	1" x 36"	120	27,000	240	54,000	120	27,000	240	54,000					
		25 x 1050	1" x 42"	120	27,000	240	54,000	120	27,000	240	54,000					
		25 x 1200	1" x 48"	120	27,000	240	54,000	120	27,000	240	54,000					
 Tybow	T2	20 x 450	3/4" x 18"	44	10,000	88	20,000	15,000	184	30,000	 Tybow					
		25 x 450	1" x 18"	44	10,000	88	20,000	15,000	184	30,000						
		32 x 450	1 1/4" x 18"	44	10,000	88	20,000	15,000	184	30,000						
	T4	32 x 450	1 1/4" x 18"	60	13,500	120	27,000	23,000	204	46,000						
		34 x 600	1 1/2" x 24"	88	20,000	177	40,000	30,000	204	60,000						
	T6	38 x 600	1 1/2" x 24"	120	27,000	240	54,000	36,000	324	72,000						
 Bow-lag		19 x 600	3/4" x 24"	53	12,000	106	24,000	71	16,000	142	32,000	 Bow-lag				
		19 x 750	3/4" x 30"	64	14,500	128	29,000	80	18,000	160	36,000					
		22 x 750	7/8" x 30"	88	20,000	177	40,000	102	23,000	204	46,000					
		22 x 900	7/8" x 36"	97	22,000	196	44,000	111	25,000	222	50,000					
		25 x 900	1" x 36"	240	54,000	240	54,000	133	30,000	266	60,000					

Consult the National Concrete Accessories Technical Department (www.nca.ca) when concrete strengths are less than 3.4 MPa (500 psi). Estimated practical load values are shown for various strengths of concrete. Safety factors (ultimate load: working load) is determined at 2:1.

Use lighter anchor unit in concrete above 4.8 MPa (700 psi) for same load capacity.

A good forming practice is to preload re-anchorage units to safe working load prior to pouring lift. Slippage will indicate inadequate concrete strength. This practice is especially critical in concrete under 3.4 MPa (500 psi).

These are guide figures drawn from comprehensive tests and accumulated data, and performance will vary somewhat under different conditions. For specific job conditions a check test is recommended under field conditions after a selection is made. It is not considered desirable to plan cantilever operation below 2.7 MPa (400 psi). Type 50, cement jobs have run as low as 450 psi @ 7 days. Below 400 psi, cycle increases for 400 psi minimum are indicated as good procedures.

CONVERSIONS

CONVERSION CHART

Area of rectangle = length x width

Area of triangle = base x 1/2 altitude

Area of parallelogram = base x altitude

Area of trapezoid = altitude x 1/2 the sum of parallel sides

Circumference of circle = diameter x 3.1416

Diameter of circle = circumference x 0.3183

Radius of a circle = circumference x 0.159155

Area of a circle = square of diameter x 0.7854

APPROXIMATE WEIGHT OF DRY MATERIALS

Materials	Per Cubic Metre	Per Cubic Yard	Per Cubic Foot
Sand	1600 kg	2700 lbs.	100 lbs.
Gravel	1760 kg	3000 lbs.	110 lbs.
Crushed Stone	1475 kg	2500 lbs.	92 lbs.
Slag	1185 kg	2000 lbs.	74 lbs.
Cinders	770 kg	1300 lbs.	48 lbs.
Limestone	1715 kg	2900 lbs.	107 lbs.
Cement	1505 kg	2550 lbs.	94 lbs.
Concrete:			
Cinder	1361-1762 kg	2300-3000 lbs.	85-110 lbs.
Gravel or Limestone	2400 kg	4050 lbs.	150 lbs.
Trap Rock	2485 kg	4200 lbs.	155 lbs.
Slag	2240 kg	3800 lbs.	140 lbs.

CONCRETE ESTIMATOR

One Cubic Metre of Concrete Will Place

Thickness	m ²	Ft ²	Thickness	m ²	Ft ²	Thickness	m ²	Ft ²
25mm (1")	39.4	424	125mm (5")	7.9	85	225mm (9")	4.4	47
50mm (2")	19.7	212	150mm (6")	6.5	70	250mm (10")	3.9	42
75mm (3")	13.1	141	175mm (7")	5.6	60	275mm (11")	3.6	38
100mm (4")	9.8	106	200mm (8")	4.8	52	300mm (12")	3.2	35

CONVERSIONS

METRIC CONVERSION FACTORS

APPROX. CONVERSION TO
METRIC MEASURES

When You Know	Multiply By	To Find
Length		
inches	2.5	centimetres
feet	30.0	centimetres
yards	0.9	metres
miles	1.6	kilometres

Area

sq. inches	6.5	sq. centimetres
sq. feet	0.09	sq. metres
sq. yards	0.8	sq. metres
sq. miles	2.6	sq. kilometres
acres	0.4	hectares

Mass (weight)

ounces	28.0	grams
pounds	0.45	kilograms
short tons	0.9	metric ton

Volume (U.S. measure)

cubic inches	16.0	millilitres
fluid ounces	30.0	millilitres
cups	0.24	litres
pints	0.47	litres
quarts	0.95	litres
gallons	3.8	litres
cubic feet	0.03	cubic metres
cubic yards	0.76	cubic metres

Pressure

p.s.f.	47.8802	Pa
k.s.i.	6.89475	MPa
Kips	4.44822	kN

Torque

Foot-Pounds	1.35581	Nm
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Temperature (exact)

$$^{\circ}\text{F} = \frac{^{\circ}\text{C} \times 9}{5} + 32$$

APPROX. CONVERSION FROM
METRIC MEASURES

When You Know	Multiply By	To Find
Length		
centimetres	0.4	inches
metres	3.3	feet
metres	1.1	yards
kilometres	0.6	miles

Area

sq. centimetres	0.16	sq. inches
sq. metres	10.76	sq. feet
sq. metres	1.2	sq. yards
sq. kilometres	0.4	sq. miles
hectares	2.5	acres

Mass (weight)

grams	0.035	ounces
kilograms	2.2	pounds
metric ton	1.1	short tons

Volume (U.S. measure)

millilitres	0.06	cubic inches
millilitres	0.03	fluid ounces
litres	0.036	cups
litres	2.1	pints
litres	1.06	quarts
litres	0.26	gallons
cubic metres	35.0	cubic feet
cubic metres	1.3	cubic yards

Pa	0.020885	p.s.f.
MPa	0.145	k.s.i.
kN	0.2248	Kips

Nm	0.73776	Foot-Pounds
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Temperature (exact)

$$^{\circ}\text{C} = \frac{(^{\circ}\text{F} - 32) \times 5}{9}$$

CONVERSIONS

CONVERSIONS

Surface d'un rectangle = longueur x largeur

Surface d'un triangle = base x 1/2 hauteur

Surface d'un parallélogramme = base x hauteur

Surface d'un quadrilatère irrégulier = hauteur x la 1/2 de la somme des côtés parallèles

Circonférence d'un cercle = diamètre x 3.1416

Diamètre d'un cercle = circonférence x 0.3183

Rayon d'un cercle = circonférence x 0.159155

Surface d'un cercle = carré du diamètre x 0.7854

POIDS APPROXIMATIF DES MATÉRIAUX SECS

Matériaux	Par mètre cube	Par verge cube	Par pied cube
Sable	1 600 kg	2 700 lb	100 lb
Gravier	1 760 kg	3 000 lb	110 lb
Pierre concassée	1 475 kg	2 500 lb	92 lb
Scories	1 185 kg	2 000 lb	74 lb
Mâchefer	770 kg	1 300 lb	48 lb
Chaux	1 715 kg	2 900 lb	107 lb
Ciment	1 505 kg	2 550 lb	94 lb
Béton:			
mâchefer	1 361-1 762 kg	2 300-3 000 lb	85-110 lb
gravier ou chaux	2 400 kg	4 050 lb	150 lb
basalte	2 485 kg	4 200 lb	155 lb
scories	2 240 kg	3 800 lb	140 lb

ESTIMATION POUR BÉTON

Un mètre cube de béton couvrira

Épaisseur	m ²	pi ²	Épaisseur	m ²	pi ²	Épaisseur	m ²	pi ²
25mm (1 po)	39.4	424	125mm (5 po)	7.9	85	225mm (9 po)	4.4	47
50mm (2 po)	19.7	212	150mm (6 po)	6.5	70	250mm (10 po)	3.9	42
75mm (3 po)	13.1	141	175mm (7 po)	5.6	60	275mm (11 po)	3.6	38
100mm (4 po)	9.8	106	200mm (8 po)	4.8	52	300mm (12 po)	3.2	35

CONVERSIONS

FACTEURS DE CONVERSIONS MÉTRIQUES

CONVERSIONS APPROXIMATIVES
JUSQU'ÀUX MESURES MÉTRIQUES

Si vous connaissez	Mult. pour trouver par	
Longueur		
les pouces	2.5	les centimètres
les pieds	30.0	les centimètres
les verges	0.9	les mètres
les milles	1.6	les kilomètres

Surface

les pouces carrés	6.5	les centimètres carrés
les pieds carrés	0.09	les mètres carrés
les verges carrés	0.8	les mètres carrés
les milles carrés	2.6	les kilomètres carrés
les acres	0.4	les hectares

Poids (masse)

les onces	28.0	les grammes
les livres	0.45	les kilogrammes
les tonnes courtes	0.9	les tonnes métriques

Volume

les pouces cubes	16.0	les millilitres
les onces liquides	30.0	les millilitres
les tasses	0.24	les litres
les chopines	0.47	les litres
les pintes	0.95	les litres
les gallon	3.8	les litres
les pieds cubes	0.03	les mètres cubes
les verges cubes	0.76	les mètres cubes

Pression

lb/po	47,8802	Pa
k/po ²	6,89475	MPa
Kip ²	4,44822	kN

Torque

livre-pied	1.35581	Nm
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Température (exacte)

$$^{\circ}\text{F} = \frac{^{\circ}\text{C} \times 9}{5} + 32$$

CONVERSIONS APPROXIMATIVES
À PARTIR DES MESURES MÉTRIQUES

Si vous connaissez	Mult. pour trouver par	
Longueur		
les millimètres	0.04	les pouces
les centimètres	0.4	les pouces
les mètres	3.3	les pieds
les mètres	1.1	les verges
les kilomètres	0.6	les milles

Surface

les centimètres carrés	0.16	les pouces carrés
les mètres carrés	10.76	les pieds
les mètres carrés	1.2	les verges carrés
les kilomètres carrés	0.4	les milles carrés
les hectares	2.5	les acres

Poids (masse)

les grammes	0.035	les onces
les kilogrammes	2.2	les livres
les tonnes métriques	1.1	les tonnes courtes

Volume

les millilitres	0.06	les pouces cubes
les millilitres	0.03	les onces liquides
les litres	0.036	les tasses
les litres	2.1	les chopines
les litres	1.06	les pintes
les litres	0.26	les gallons
les mètres cubes	35.0	les pieds cubes
les mètres cubes	1.3	les verges cubes

Pa	0,020885	lb/po
MPa	0,145	k/po ²
kN	0,2248	kip ²

Nm	0,73776	livre-pied
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Température (exacte)

$$^{\circ}\text{C} = \frac{(^{\circ}\text{F} - 32) \times 5}{9}$$

Round Fibre Forming Tube - Pouring Rate

SUGGESTED RATE OF POUR - PER HOUR

	Heavy Wall	Light Wall
Up to 12" ID	Pour at any convenient rate	
Up to 24" ID	18 ft/hour	15 ft/hour
Up to 36" ID	11 ft/hour	9 ft/hour
Up to 42" ID	7 ft/hour	6 ft/hour
Up to 48" ID	6 ft/hour	5 ft/hour

Slump should not exceed 6" - max. pour height on light wall - 12 ft

CONCRETE REQUIREMENTS

Tube Diameter	Cubic Yards Concrete per Foot of Column Height
6"	.0073
8"	.0129
10"	.0202
12"	.0291
14"	.0396
16"	.0571
18"	.0654
20"	.0808
22"	.0978
24"	.1164
26"	.1368
28"	.1584
30"	.1818
36"	.2618
48"	.4654

For total concrete requirements per column:
take figure beside diameter of tube and multiply by column height.

Tube de Formation de Fibres Rondes - Taux de Coulée

TAUX DE DIFFUSION SUGGÉRÉ - PAR HEURE

	Murs Lourds	Murs Léger
Jusqu'à 12" ID	Verser à n'importe quel taux convenable	
Jusqu'à 24" ID	18 ft/heure	15 ft/heure
Jusqu'à 36" ID	11 ft/heure	9 ft/heure
Jusqu'à 42" ID	7 ft/heure	6 ft/heure
Jusqu'à 48" ID	6 ft/heure	5 ft/heure

La profondeur ne doit pas dépasser 6" - max. verser la hauteur sur un mur léger - 12 ft

BÉTON EXIGENCES

Diamètre du Tube	Cubic Yards Béton par ft de hauteur de colonne
6"	.0073
8"	.0129
10"	.0202
12"	.0291
14"	.0396
16"	.0571
18"	.0654
20"	.0808
22"	.0978
24"	.1164
26"	.1368
28"	.1584
30"	.1818
36"	.2618
48"	.4654

Pour les besoins totaux en béton par colonne:
Utiliser la figure à côté du diamètre du tube et multiplier
par la hauteur de colonne.

GENERAL INFORMATION

1. A qualified person must accurately calculate the applied loads and select the appropriate form tying products and determine compatible tie spacings.
2. In form tying operations, proper installation practices must be maintained. Failure to follow approved practices, such as missing form ties, misalignment of form ties, incorrect form tie lengths, excessive pour rates, etc., can cause form failure.
3. AR recommends the user of the information contained herein and the installer of our products adhere to the Canadian Standards Association CAN /CSA - S269.3 -M92 Concrete Formwork and American Concrete Institute -ACI 347 Guide to Formwork. The applied safety factor for a product will depend on the degree of hazard or risk involved in the product application. This safety factor is governed by National Codes, local codes and / or by design professionals. With regards to concrete construction, onsite conditions such as, poor concrete placing technique, concentrated loads on the formwork, improper use of cranes or concrete pumping could increase the degree of risk. If such site conditions exist, the user must increase the safety factor to compensate. For most applications AR suggests a minimum 2:1 safety factor for hanging accessories and stresses that this safety factor should be strictly adhered to or the application be reviewed by a design professional. The material included in this publication indicate the safety factor for convenience but also provides the ultimate capacities so other safety factors may be used where applicable. *WARNING: Improper, careless and/or haphazard use of the products shown in this document can expose workers to extreme danger, injury and death. If uncertain about installations or use of any AR product, contact the nearest AR Sales office or Technical Department for explanations and/or recommendations.* National Concrete Accessories products are manufactured according to strict specifications and are subject to numerous tests under a stringent quality control program. These products are designed to be capable of meeting or exceeding all necessary safety requirements for the concrete construction and forming industry. All product test data shown, were obtained through an independent testing facility or tests conducted by AR. However, the performance of a quality product can be affected by the manner in which it is used in the field. Therefore, the following precautions should be taken by all involved persons.
4. To avoid crushed wales and/or bent Tyholders when using a double waler system, maintain a spacing between the walers comparable to the tie diameter being used plus 13 mm (1/2").
5. Any welding should be performed by a certified welder. Bending or welding of high tensile steel products should not be permitted. Welding of precast accessories can be dangerous and should not be. *Note: AR does not warrant any product that has been welded, altered or modified in any way after leaving an AR plant or warehouse. After final inspection of location and alignment, telltale devices should be installed in strategic places on the formwork to facilitate detection of formwork movement during concrete placement.* During concrete placement, the formwork should be continuously monitored by competent persons. These monitors should have a reasonable area of safety and a means of communicating problems or emergencies to the placement crew.
6. Never exceed listed product approximate safe working loads. Note that all product load ratings shown in this bulletin are ratings for new or "as new" products only. Extreme caution must be exercised when using any product that is in other than new condition. Any reusable product that shows wear, misuse, overloading, corrosion or any other factor that would compromise its approximate safe working load should be discarded.
7. Caution must be exercised when using washer devices to span double wales. Waler gaps are excessive when the washer device does not bear directly on the primary waler members.
8. AR products are not to be applied or installed until the user and/or the installer has a clear understanding of the information contained within the appropriate product publication. All contractors must instruct their employees in the appropriate use and installation of AR products. To avoid injury and possible form tie problems DO NOT CLIMB ON FORM TIES. Over-vibration or re-vibration will cause lower concrete to remain in a liquid state for an extended period of time. This can cause excessive lateral form pressure and possible form failure Plumbing of the form, after concrete placement, should not be attempted. It is virtually impossible to force a form back into position if it is misaligned or has bulged during concrete placement. Runways for moving equipment should be provided with struts or legs as required and be supported directly on the formwork or structural member. Formwork must be suitable to support such runways without intolerable deflection, vibration or lateral movement.
9. Do not interchange products supplied by other manufacturers with those supplied by AR. AR cannot guarantee that products supplied by others will be compatible and/or interchangeable with AR's quality concrete accessories.
10. Drawings and/or sketches shown in this bulletin are for illustrative purposes only. Check actual forming conditions for specific applications. Metric values listed are a soft conversion of imperial values.

GENERAL INFORMATION

PRODUCT SAFETY AND INSTALLATION

The approximate safe working loads included in this publication were established based on all items are new or "as new" condition. Inserts are installed correctly and embedded in sound concrete suited for the application so that the vertical axis of the insert is perpendicular to the lifting surface. Installed hardware shall have full bearing on the concrete surface. Caution must be taken to prevent side loading which will cause additional stresses. Attachment and erection bolt must be installed using the proper length and penetration to prevent hardware accessories from slippage or bending. Caution must be observed and loads not imposed until such time as the concrete strength has reached the specified strength required for the insert. Inserts must be properly situated in relation to the edge, corner and openings so as to achieve the full capacity of concrete shear cone. The tensile loads applied to the insert included both axial and transverse loads transferred to the hardware from crane cables. Impact wrenches are not to be used for pre cast elements. Welding may cause embrittlement and could result in sudden failure. A metallurgical engineer must approve the process prior to any welding is undertaken. AR will not warrantee any modification or alterations made to its products.

SAFETY FACTOR

The following chart is the suggested Safety Factors used by industry standard for the degree of risk for the application. For the precast industry, the degree of risk involved can increase because of the adhesion to the form, jerking movement, transportation over rough terrain or roads. Safety Factors should be increase to suit the conditions. The minimum Safety Factors as suggested by OSHA (Occupational Safety and Health Administration), ANSI (American National Standards Institute and the CPCI (Canadian Precast Prestress Concrete Institute) is as followed:

SAFETY FACTOR	INTENDED PRODUCT USE
2 to 1	Brace Anchors
3 to 1	Permanent Connection
4 to 1	Insert used for lifting and handling
5 to 1	Hardware used for lifting and handling

For Safety Factors requirement that are different than included in this publications, approximate safe working loads must be adjusted by the user. The following equation is used to increase or reduce the approximate safe working load by the following: $SWL + \text{Publication Factor of Safety} = \text{New approximate safe working load Required Factor of Safety}$.

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- Bridge deck forming hardware

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