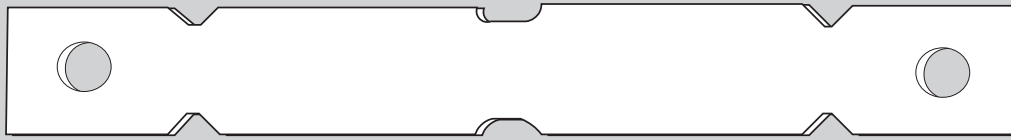


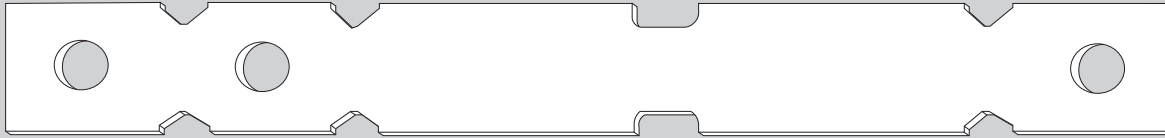
Precise Forms Inc., would like to thank you for the privilege of assisting you with the purchase of your “TrimForm” System. The Precise Forms management team has been designing and manufacturing forms and accessories for concrete construction since 1967. Precise is proud of its products and encourages you to use proper care to ensure the longevity of your equipment. Following the recommended procedures in this manual will greatly extend the life of your forms and provide many trouble free pours.

In the following information, we address procedures and problems which may be encountered on a daily basis. On occasion, your builder or architect will ask for construction designs which require input from a structural engineer with regard to special applications of loads or steel placement. Although we lead the market in form design, we are not building engineers and will defer those questions to such. If you have any questions regarding your new forms or their use, please do not hesitate to contact your sales representative or our home office.

Wall Tie Information



8" Tie



8-10" Tie



8-10-12" Tie

Precise Forms uses the highest quality carbon 50, pickled steel in the production of wall ties. A high standard of quality control has been implemented in which ties are inspected to yield a minimum 7,000 lbs. pull strength. Break-off notches allow the wall tie to break off easily with a single hammer blow.

Wall Tie Sizes

Precise Forms can produce wall ties for every wall thickness. When placing an order, you will need to know which style of tie to order for your job. Wall ties are available in nominal (sometimes referred to as standard), or full exact sizes. The wall thickness should be determined by the engineer of that project.

Nominal / Standard - The nominal tie is the most common size of wall tie used in the residential industry. It will create a wall that is $\frac{3}{8}$ " under size to match lumber dimensions.

Full Exact - This tie will pour the wall thickness to the exact dimension desired if your forms have a .125 face sheet.

If you use multiple sizes of ties and find some ties which have been separated from their bundles you can measure from center of hole to center of hole.

For example:

If the tie measures $13 \frac{11}{16}$ " it is a standard 12" tie which will pour a $11 \frac{5}{8}$ " thick wall.

If the tie measures $14 \frac{5}{32}$ " it is a full exact 12" tie which will pour a 12" thick wall using forms with a .125 face sheet.

A variety of special ties are available for unique projects:

Breakback ties are used when the wall tie must be broken off below the surface of the wall. It allows the tie to be sealed to prevent rust stains. When breaking off breakback ties, make sure to use a vertical hammer blow, as opposed to a horizontal blow with regular ties, otherwise the concrete may become damaged.

Heavy duty ties are recommended for walls that are to be pumped or that are taller than eight feet. It is 40% thicker and stronger than our regular tie but still breaks off easily.

Pull ties can be removed from the finished wall and reused for many pours. This is helpful in the international market where a supplier of ties may not be close.

Preventing Wall Tie Failure

Wall ties were created for one purpose, that of holding forms in appropriate widths in order to pour uniform concrete walls. Our ties are designed and manufactured with critical dimensions and standards. Do not alter the ties in any manner. The punching or drilling of holes, welding of ties together or to other items, bending, or reuse of ties not designed for that purpose will alter their strength. Altering of wall ties will void any warranty or guarantee.

Wall ties are the most critical part of any forming system even though they are usually one of the least expensive items. It is important to take the proper precautions to prevent wall tie failures. Wall ties can fail for many reasons. A faulty wall tie is rare to find in the industry due to strict testing procedures. Many times a wall tie fails due to improper use or treatment of the tie. Here are just a few of the many reasons a wall tie can fail.

Opening Bundles

Proper precautions not to damage the ties must be taken when opening a bundle. The proper way to open a bundle is to untwist or cut (with wire cutters) the wire that hold the ties together. Many contractors will beat a bundle of ties against the corner of the footing or hit the wire tie with the claw of a hammer to break the wire. By opening the bundle improperly you risk damaging the ties. A damaged tie is more likely to fail during the pour.

Re-bar Placement

Sliding re-bar against the tie is another way to easily damage the tie. Precise ties are designed to allow easy separation at the break-off notch after the wall has been poured. When re-bar is slid into a wall, instead of being tied into place before setting the forms, the tip of the re-bar can dent or bend the wall tie causing it to fracture at the break-off notch.

Number of Ties and Tie Placement

Using the proper number and having the proper placement of ties is essential. We have provided recommended tie placement charts at the end of this publication for the most popular hole patterns. These charts are shorter versions of our standard tie placement charts which have a detailed explanation of the loads, pressures, and resulting tie placement advised in accordance with the American Concrete Institute's recommendations. Failure to place the proper number of ties at the stated locations can cause fatigue and damage to the forming system. Examples of damage can range from form deflection to tie failure resulting from inadequate support to the system. The best concept to keep, with regard to the investment of forms that you have made, is that the proper number of ties and proper tie placement is inexpensive insurance. Damage occurring due to the improper number of ties or incorrect tie placement is not covered under the manufacturer's warranty.

Using Multiple Wall Tie Suppliers

Wall tie lengths may vary from one supplier to another. If wall ties from different suppliers are used in the same form joint this could cause the shorter tie to become overloaded and cause a tie failure. It is imperative when setting a wall not to mix ties from different manufacturers.

Moving the Wall Improperly / Misaligned Forms

The safest method of squaring a foundation is to do so prior to setting the forms. Place corner points in the footing and use snapped chalk lines for the wall lines. This is not always the way it is done. Some contractors will set the corners and the wall, squaring afterwards. This method will cause the contractor to slide the wall in different directions in order to accomplish a square foundation. When the wall forms are slid it is very easy to move one side of the wall further or maybe not as far as the other side. If one side of the wall travels a different distance than the other side, the form joints will be misaligned and the wall tie will be at an angle thereby increasing the potential for wall tie failure. It is imperative that you check to make certain that you do not have any bent wall ties in the wall prior to pouring. Make certain that when moving a wall both sides of the wall travel at the same time and the same distance.

Inspection

After the forms have been set and before the wall is poured, it is highly recommended that a visual inspection of the forms be made. You should be looking for damaged wall ties, wall ties that have been left out, and ties that are not pinned on both sides of the wall. If a wall tie is not pinned on both sides of the wall it is the same as not having a wall tie there at all and a failure will surely occur. This inspection may take 10-15 minutes but is the best insurance you can invest in as a wall failure can cost thousands of dollars. Take time to do this thoroughly!! Look at every pin, wedge, wall tie and other vital components to ensure their proper positioning as well as any steps in the footing you may have.

Vibration

A vibrator, when used properly, can be used with the Precise Forms aluminum forming system. Internal vibration is possible as long as the vibration is completed with its intended purpose of consolidating the concrete and *not as a vehicle to move the concrete*. Consolidation can be accomplished with minimal vibration. Improper consolidation techniques can overload the wall ties by tighter compaction, therefore resulting in increased loads. Special precautions must be taken not to hit the face sheet of the form or wall ties with the vibrator head. Never use external vibration as the hardware may work loose.

What To Do In Case Of A Wall Tie Failure

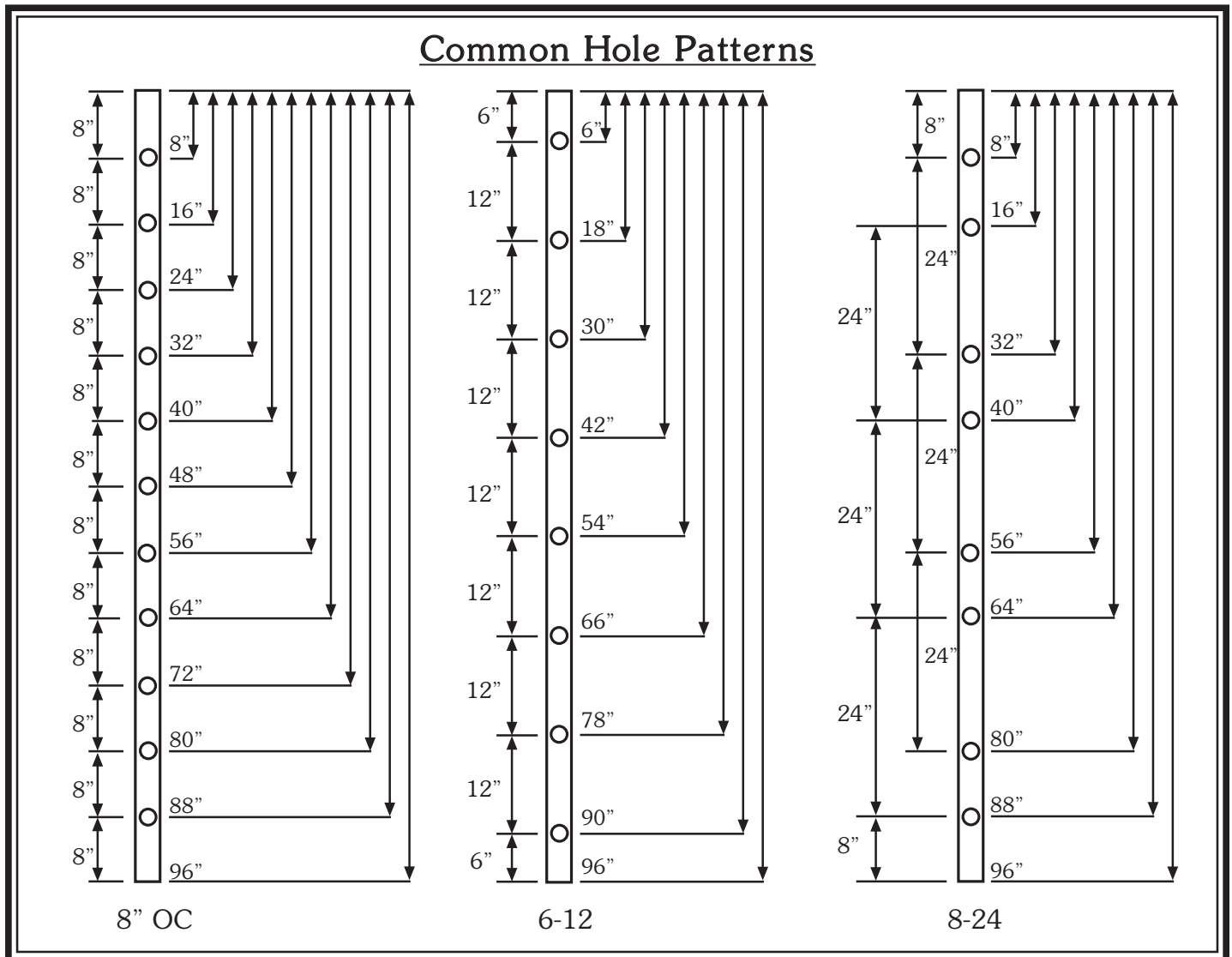
In case of a wall tie failure, gather as much of the broken tie as possible and send it to Precise Forms. Precise has a testing facility that can determine the strength of the tie and whether or not the material was faulty. Please make a note of how many ties were used in the wall and their location. If possible, note the pour rate and the weather conditions. The ambient temperature can have a great deal to do with the maximum rate of pour. A chart is located in this publication concerning the effects of the ambient temperature.

Form Information

Precise manufactures its forms with the accepted industry standard of +/- 1/32" tolerance. The width of our 3 foot form is 35 15/16". This is done to compensate for minimal buildup of concrete that can occur on the side rail. Forms "grow" because of this casual buildup of concrete. By under-sizing our forms, we believe we have found an acceptable solution to this problem.

Determining The Hole Pattern

The proper way to measure the hole pattern is from the end of the side rail to the center of the first pin hole. The remaining holes can be determined by measuring from the right side of one pin hole to the right side of the next. When ordering additional forms to match an existing set it is extremely important to note the correct hole pattern. It is standard policy for Precise to ask the customer to sign a shop drawing on all non-standard items or hole patterns. This ensures that the product is made to the customers specifications.

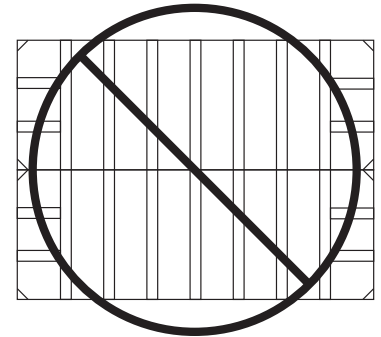


Full VS. Standard Corners, Accessories, And Ties

The option is available to pour either a nominal (standard) wall thickness or a full dimension wall thickness. Each of these wall sizes demand a particular inside and outside corner, as well as wall ties. If you attempt to use a standard corner with a full tie or vice-versa, the corner you set will kink and be difficult to straighten. In measuring your inside corner, place the end of a tape measure on the outside face sheet and measure in to the 90 degree turn of the face sheet. The dimension will be either a 4 3/16" for a standard corner or 4" for a full inside corner. This same application will hold true for other forms and accessories which are affected by wall thickness such as outside corners, attachments, blockbacks, bulkheads, window bucks, and blockdowns.

Stacking Or Laying Down Of Forms And Special Applications

Aluminum forms were created for pouring concrete walls. Misuse of aluminum forms such as using them for walking planks, ladders, prying bars, etc., will be detrimental and shorten the life of your forms. Precise aluminum forms were designed for use in a specific manner. There are certain ways in which forms should not be set when pouring walls. Because of the bracing design, 36"x96" forms cannot be double-stacked horizontally in order to create a 6 foot high wall (Note illustration). This action could result in weld failure or structural deformation.



A Level Foundation Depends On A Level Footing

A level footing is the key to a level foundation. If you begin your job with a level footing there is a very good chance that the entire building will be level. Those who have worked with wood forms and have had the problem of leveling off the top of their forms are in for an easier time. Now, instead of working up on their forms they can come down and work at ground level. There are several ways of putting in a good footing and the techniques to follow largely depend on your area and its unique soil conditions. Your Precise sales representative will be happy to discuss with you the recommended methods for your area.

Placement And Handling Of Forms

Precise aluminum forms are lightweight and easy to transport. Our standard residential smooth aluminum 36"x96" form weighs approximately 83 pounds. Buildup of concrete will quickly add to the weight of any form. For this reason, we recommend a premium form release agent and cleaning of the forms after each use. It is always easier to regularly maintain a panel than it is to clean the concrete buildup off later. An additional factor which may affect weight is the addition of the Captive Pin and Set & Lok System. Even with this consideration a standard 36"x96" aluminum form is comparable in weight to a two foot wide wood form of the same height.

The design of the Precise TrimForm allows several ways of manual transporting. The more common ways are on your shoulder or on your back. There is no absolute perfect method. In most cases it is what works the best for you and your crew. Your Precise salesperson would be happy to demonstrate or discuss the available options. The most current way of placing forms is with a crane and form baskets. The crane allows easy placement and removal of forms with minimum manpower.

Application Of Oil

When forms are unloaded it is best to lay them around the job site where they need to be set. While placing the forms, one individual should be responsible for oiling all of the forms before they are set. The

oil creates a positive barrier between the panel and the concrete which promotes a controlled reaction with the free lime in the concrete. This action provides a quick and clean release preventing concrete buildup. It is a good idea to oil the back of the form every 3-4 pours. This will prevent concrete buildup on the braces. Your crew will be able to work faster saving labor, time, and money by keeping the forms consistently clean.

Rate Of Pour And Ambient Temperature

A wall tie failure can occur when the rate of fill exceeds the ability of the wall tie to withstand the loads subjected to it. The pour rate of 8' per hour or less should be followed as closely as possible. There are several factors that need to be addressed when deciding on your rate of pour. The trapping of concrete in corners near doors or windows will increase the rate of fill and there by increase the liquid head pressure. Special measures, such as slowing the rate of fill, must be taken in these areas. An improper rate of pour can cause damage to the forms or wall tie failure. It is best to address these issues before they happen.

Most wall tie failures occur in the spring and fall. This is the time of the year when the outside air temperature can drop quickly and unexpectedly. The concrete company may not have adjusted for the temperature swings with the addition or deletion of hot water and other stimulants that enhance early setting of the concrete, therefore providing early support and lessening the liquid head pressure. The following information has been extracted from the text; FORMWORK FOR CONCRETE, fourth edition published by the ACI:

Temperature of the concrete at the time of placing has an important influence on pressures because it affects the setting time of concrete. At low temperatures the concrete takes longer to stiffen and therefore a greater depth can be placed before the lower portion becomes firm enough to be self supporting. The greater liquid head thus developed results in higher lateral pressures. It is particularly important to keep this in mind when designing forms for concrete to be placed in cold weather or with fly ash replacement or retarding admixtures used in any weather.

Maximum Lateral Pressure For Design Of Wall Forms						
<i>Please find following pressure formulas for placement at 10 feet per hour or less based on ACI Committee 347.</i>						
<i>NOTE: Do not design pressures in excess of 150 x height of fresh concrete in forms.</i>						
<u>Rate of Placement</u>	<u>90 f</u>	<u>80 f</u>	<u>70 f</u>	<u>60 f</u>	<u>50 f</u>	<u>40 f</u>
1 foot per hour	250	262	278	300	330	375
2 feet per hour	350	375	407	450	510	600
3 feet per hour	450	488	536	600	690	825
4 feet per hour	550	660	664	750	870	1,050
5 feet per hour	650	712	793	900	1,050	1,275
6 feet per hour	750	825	921	1,050	1,230	1,500
7 feet per hour	850	938	1,050	1,200	1,410	1,725
8 feet per hour	881	973	1,090	1,246	1,466	1,795
9 feet per hour	912	1,008	1,130	1,293	1,522	1,865
10 feet per hour	943	1,043	1,170	1,340	1,578	1,935
<i>Maximum lateral pressure, pounds per square foot for temperature indicated</i>						

Stripping and Maintaining Your Forms

It is best to establish a routine of cleaning your forms as they are stripped. It is generally faster to clean off the small amounts of concrete that may exist while the concrete is still green and the oil is still present. A form scraper may be used to clean excess concrete off the face sheet without causing damage to the face sheet. Failure to keep the side rails clean will contribute to lateral form growth and a more difficult time setting the panels on future pours. By keeping your forms in top condition, their life will be extended and they will have a greater re-sale value.

Textured brick forms require the use of form pullers to remove the initial form when stripping. This tool will allow you to safely remove the first panel without damage to the form or wall. After the first form is removed, use one form puller to help remove the remaining forms. Place the puller on the panel's side where it can be used in conjunction with the panel beside it. On the open side to the panel, remove as usual being careful not to scar the freshly poured wall. Precise Stoop Forms have been designed for both strength and ease of stripping. Because of the designed roll on the corners, the brackets will tend to drop off on some occasions so take special precautions when stripping the stoop forms.

Unexpected Results From Your First Few Pours

Aluminum forms, as with any aluminum component, will undergo a chemical reaction with wet concrete. As explained by the American Concrete Institute: *An aluminum form will experience a mild etching on the form surface. When this occurs a tough film of corrosion develops on the face sheet of the form restricting contact with the aluminum and further concrete reactions.* This process will occur during the first several pours. The appearance of both the form and the wall may look unique during this time period. The wall will show streaks or lines where gasses have escaped the face sheet. The condition is purely cosmetic. There is no structural damage to the concrete wall or the aluminum form.

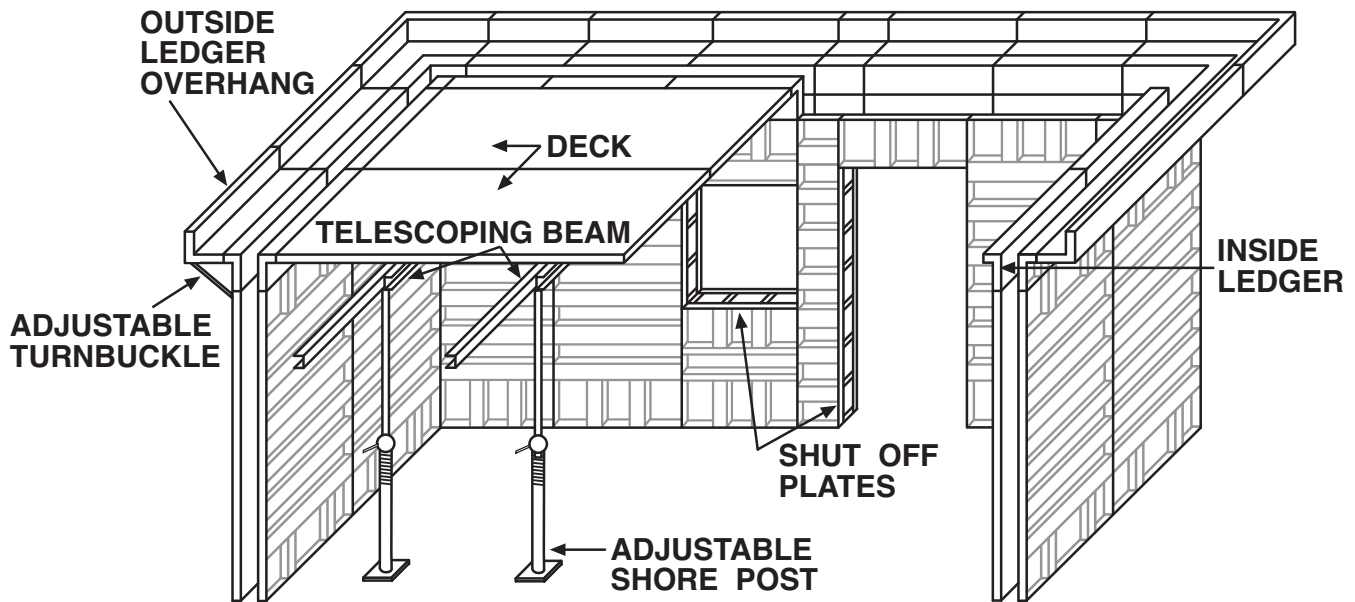
There are procedures that limit the chemical reaction described above. The most common procedure is using a dehydrated lime mixture. Prepare a solution by mixing dehydrated lime and water to the consistency of latex paint. With the panels laying out flat (preferably in the sun) with the face sheet up, mop or brush the mixture over the complete surface of the panel's face sheet. A bubbling action will occur releasing hydrogen gas inherent within the aluminum. When the bubbling action begins to decrease sprinkle the panels with water until this action increases. Never let the mixture completely dry on the face sheet. Repeat this process as often as necessary until the reaction completely stops. Finally, completely rinse the lime off the face sheet of the panels. By using this method you will lessen the chemical reaction that will occur during your initial pours. This method is time consuming and as any method, may have varied results.

Preventing Theft

It is strongly recommended that you identify your forms in some way that will allow you to unmistakably identify them if they were stolen. Some ways this is done is to paint, stamp, or weld the last four digits of your social security number or special number on the back side of the form. Another technique is to punch or drill a special hole in a particular spot on all of your forms. Some contractors have marked their panels by painting the entire backs or edges a special color. Precise would also like to remind you that, like any investment, aluminum forms should be insured against loss. Your local agent can help you or you can contact a local or national poured wall contractors association for advice on this matter.

Monolithic Pours

Precise Forms has been recognized around the world as an innovative leader in monolithically poured structures. The Precise Ledger System enables the contractor to form and pour the walls, beams, columns, and deck in one continuous pour. The window and door openings are cast in place simultane-



ously with the walls and ceilings. With the rising cost of lumber, all concrete structures are a definite alternative. The modular design of the Precise Ledger System permits unlimited configurations and architectural designs. The Precise Ledger System has been utilized very effectively internationally as well as in the earth sheltered and underground home industry. The Precise Ledger System is simple to operate. Few tools are required, unskilled laborers are easily trained, and developers are setting and pouring a unit a day.

Precise Window System

The Precise Window Series offers the easiest after-pour installation on the market. The extruded buck is provided to the customer at no cost to help lower startup expenses. Please note that the buck remains the property of Precise Forms. Precise reserves the right to retrieve the buck at its discretion due to non activity or using windows that were not purchased from Precise or one of its representatives in the opening poured by the buck.

Plastic Plugs are available for installation of the window without drilling the concrete. Place the plugs into the holes on the side of the buck (Illustration 1). Set the buck into the wall and carefully pour the concrete around the buck so as not to prematurely break off the plugs. When you are ready to remove the buck, break off the interior of the plugs (Illustration 2) and tap each of the four corners of the buck. The buck should easily slip out of the opening.

The builder has the option of using either the Precise Vinyl or Aluminum Window since the opening poured by the buck will support both styles. To install the window simply place a line of caulk around the opening in the wall (Illustration 3). Push the window into place and drive the screws into the plastic plugs. If Plastic Plugs were not poured into the wall, tapcons can be used to hold the window into place.

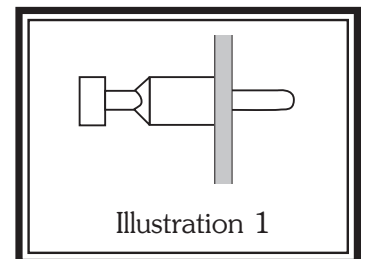


Illustration 1

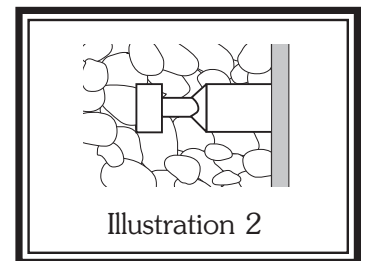


Illustration 2

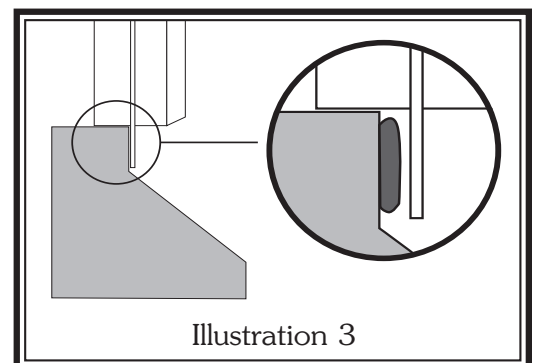


Illustration 3

Frequently Asked Questions

Q What pressures can your form withstand?

A Precise Forms are rated at 1200 P.S.F. The standard ties are rated at 7000 Lbs.

Q What is the cost per square foot of your forms?

A Although some wood systems are priced per square foot, aluminum forms are priced per item due to differing manufacturing costs.

Q Can you pour walls over 8 foot high?

A Precise Forms are stackable allowing commercial or residential "tall" walls to be poured. Our home office is happy to assist with recommended tie placements for your specific jobs.

Q How thick of walls can you pour?

A Precise makes ties for any size wall. Very little lateral pressure is created by a thick wall. Vertical pressure becomes the concern on thick walls and the footing must be reflective of that.

Q Why can't I weld two ties together to make a longer tie?

A This changes the strength of the tie and puts it into a high risk of a blowout. Never apply heat to a tie. Precise can service your needs very quickly and supply you with the proper accessories.

Q How do I attach blockouts to your forms?

A Aluminum forms, like wood, can be nailed. Using a portable drill, holes can be made for attaching wood blockouts with duplex nails. If you prefer not to put holes in your forms fillers can be used to position ties in proper blockout widths. The ties can then be used to attach the blockouts with wire.

Q How do I make 2" and 4" offsets?

A See drawings.

Q How do I run pipes through your system?

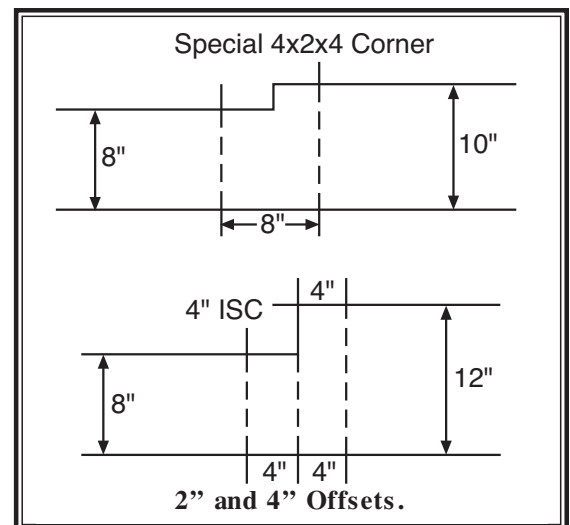
A In the same way as above. Position ties into the proper position and slip an oversized pipe over the tie.

Q What do I do for a radius wall?

A Our staff in Kansas City will help you lay out your difficult projects. Radius walls are no problem and have been done many times in the past.

Q How do I make a one sided wall?

A Our staff in Kansas City can address that question best.



Q I can't afford to buy your forms over wood. They are too expensive.

A You can't afford to buy wood forms. The number of wood form sets you have to buy in proportion to one set of Precise aluminum can be as many as 15 sets. Even if the cost of one set of wood forms is only a third of Precise's cost, you could end up paying almost 5 times as much. An added benefit, aluminum forms retain their basic aluminum value. Lease/Purchase financing is also available from our associates.

Q What is the best way to insulate a wall?

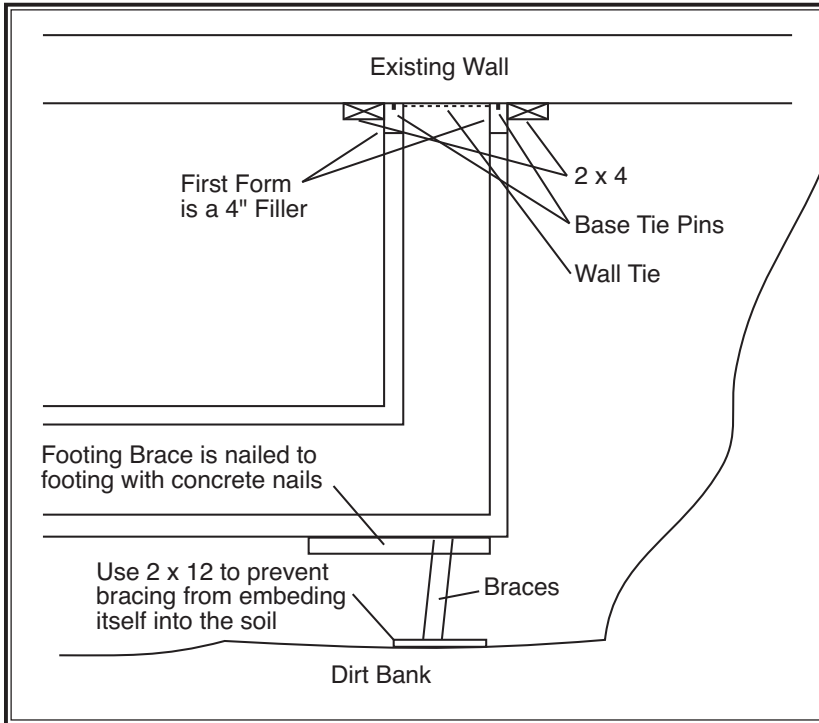
A If the builder does not want the insulation on the outside of the wall but rather in the center of the wall, use a combination tie such as a 6-10" tie. Pour half of the wall with the insulation in place. Then strip half of the wall in order to reset and pour the other half of the wall.

Q My wood forms are fast.

A Aluminum forms are just as fast. There is 50% more square footage of form carried each time and the 3 foot aluminum weighs in most cases the same as a 2 foot wood form.

Q When I need a special filler I just cut it.

A In most cases this is not necessary, but we do offer special custom forms. Our staff would be glad to show you why you wouldn't need a special in most situations.



Q How do I pour against an existing wall?

A Use base tie pins against the existing wall, put your ties in place and set as normal. Beside each panel nail 2 x 4's against the existing wall. Secure the end of the wall with braces so it can not push away from the existing wall.

Q I can buy accessories almost anywhere for my wood forms.

A Precise has many distributors around the country and can react as fast as needed on most items.

Q Is the channel brace as strong as the competition's hat section?

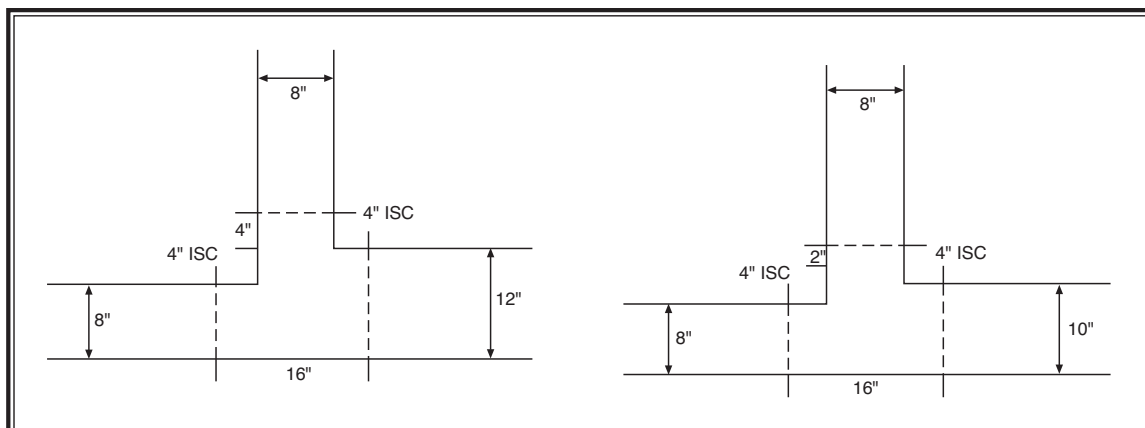
A Independent test results support the fact that the Trimform is stronger in most every way. The results are available upon request.

Q Why doesn't Precise have three grades of forms like other companies?

A It doesn't make sense to build more than one form when the form you manufacture is the strongest in the industry (see independent test results).

Q How do I make an offset T-Wall?

A See Drawings.



Q Why doesn't Precise forms have a striker plate at every hole in the side rail?

A With the .125 thick face sheet there is no need for the striker plate. By welding the striker plate you are heating the face sheet and therefore allowing it to deflect. Other manufactures do not put the plates on some of their .125 face sheet forms.

Q Can I pour full walls with nominal corners?

A This can be achieved by putting a spacer on the outside corner so the wall ties remain straight.

Q What hole pattern do you recommend?

A Either the 6-12 or the 8" on center.

Q Can a 6-12 hole pattern hook up with an 8" on center hole pattern?

A Not unless you punch a filler with a 2" on center hole pattern.

Q Why does the aluminum forming system have fewer accessories than plywood?

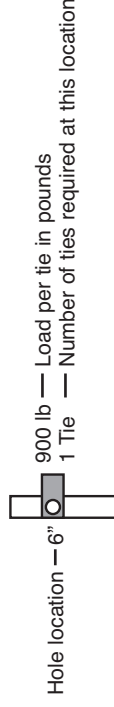
A The aluminum system is a 36" modulation vs. 24". Therefore, 33% fewer accessories.

Recommended Heavy Duty Tie Location

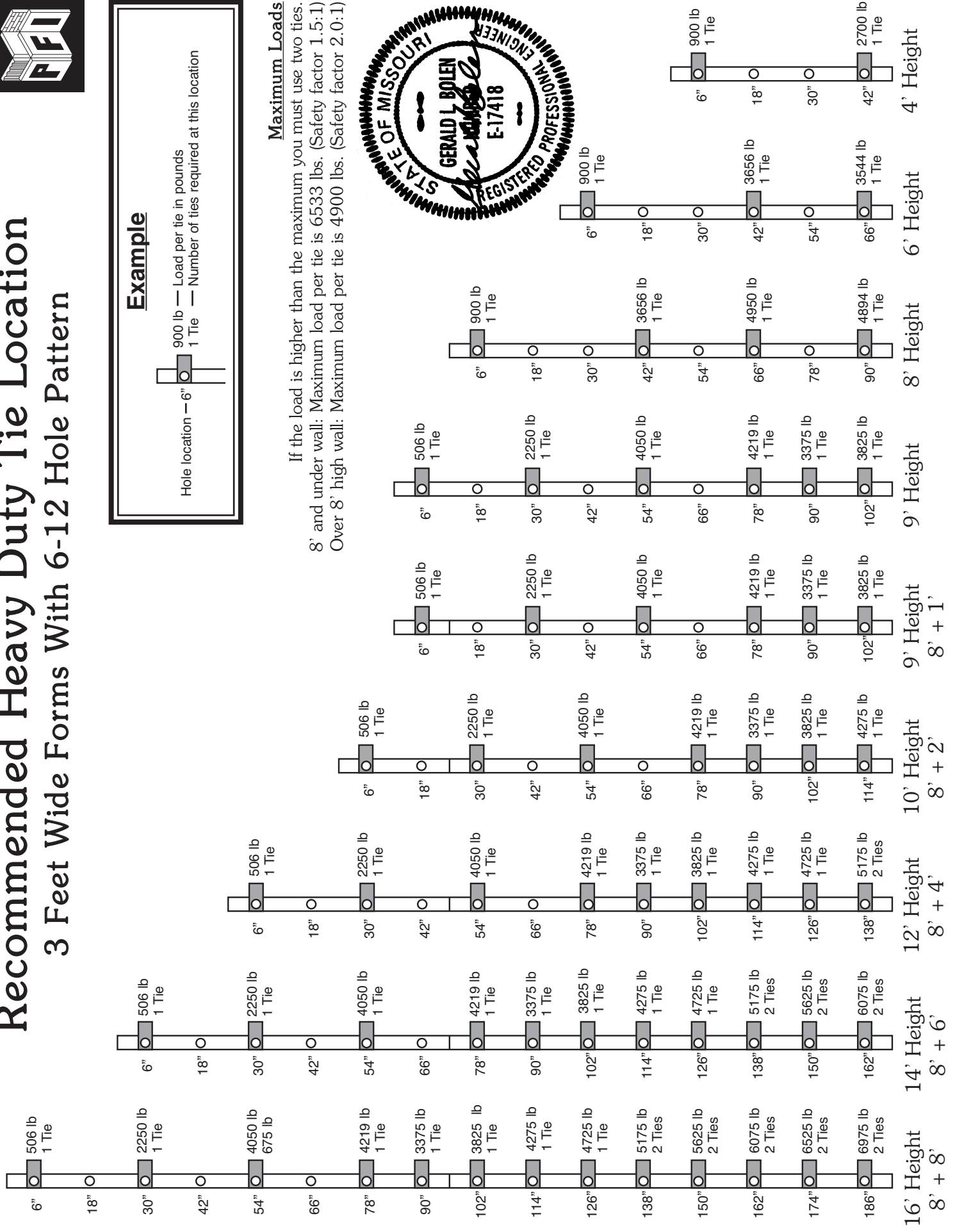
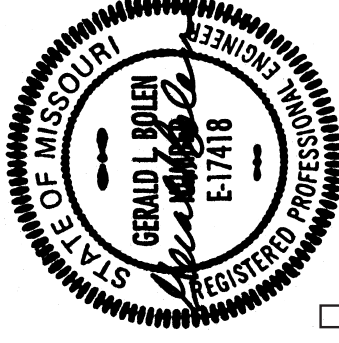
3 Feet Wide Forms With 6-12 Hole Pattern



Example



Maximum Loads
 If the load is higher than the maximum you must use two ties.
 8' and under wall: Maximum load per tie is 6533 lbs. (Safety factor 1.5:1)
 Over 8' high wall: Maximum load per tie is 4900 lbs. (Safety factor 2.0:1)



Recommended Standard Duty Tie Location

3 Feet Wide Forms With 8-24 Hole Pattern

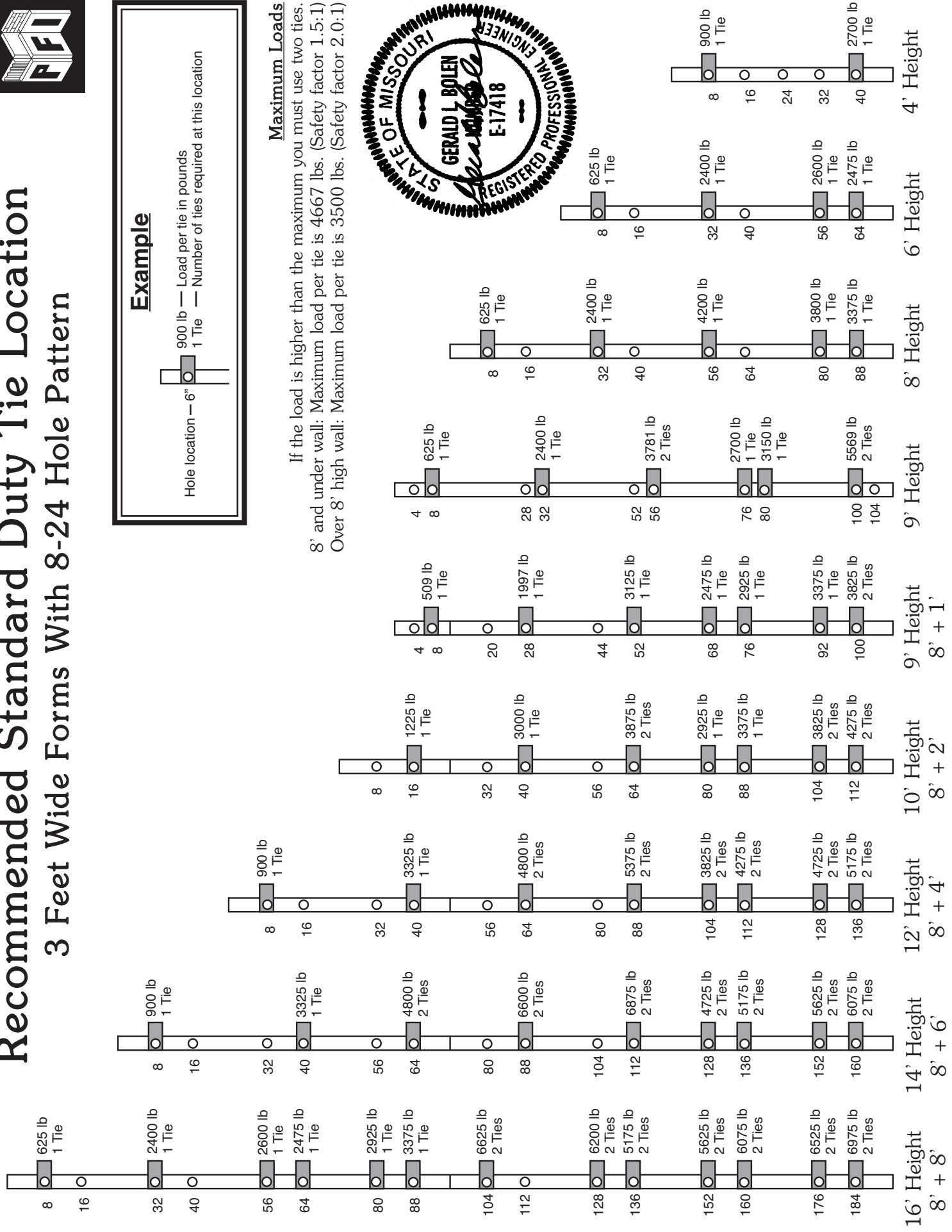
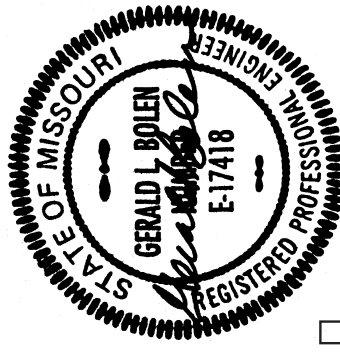


Example

Hole location — 6" — Load per tie in pounds
 900 lb — 1 Tie — Number of ties required at this location

Maximum Loads

If the load is higher than the maximum you must use two ties.
 8' and under wall: Maximum load per tie is 4667 lbs. (Safety factor 1.5:1)
 Over 8' high wall: Maximum load per tie is 3500 lbs. (Safety factor 2.0:1)



Recommended Heavy Duty Tie Location

3 Feet Wide Forms With 8-24 Hole Pattern



Example

Hole location - 6" — Load per tie in pounds
 900 lb — Number of ties required at this location

Maximum Loads
 If the load is higher than the maximum you must use two ties.
 8' and under wall: Maximum load per tie is 6533 lbs. (Safety factor 1.5:1)
 Over 8' high wall: Maximum load per tie is 4900 lbs. (Safety factor 2.0:1)

