



**PERFORM
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PRECISION**

TILT-UP HANDBOOK

**CONCRETE
CONSTRUCTION
PRODUCTS**

 **DAYTON[®]
SUPERIOR**



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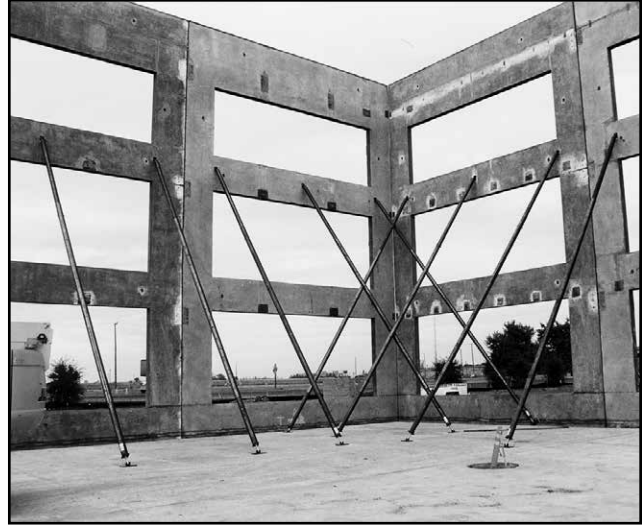
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Tilt-Up Construction

Tilt-up is a job-site form of precast concrete construction. It involves prefabricating concrete wall sections (panels) flat on either the building floor slab or on a temporary casting slab, then lifting or tilting them up and carrying them to their final position with a mobile crane. Once they are in position, the panels are temporarily braced until they are tied into the roof and floor system and become an integral part of the completed structure.

It is a fast, simple, and economical method of construction, which has been used extensively for one-story buildings and has most recently been adapted successfully to multi-story structures. Today, walls of up to four stories in height are being cast and tilted into position. Currently there have been several instances of wall panels as high as six stories being cast and erected as a unit by the tilt-up method of construction.

The economy of tilt-up lies in its simplicity of construction. The critical factors in this method of construction are handled in the pre-construction planning stage. Skill in laying out panel erection sequences and designing safe lifting elements which fully utilize crane time will provide for the fast and safe completion of the job.



Early History of Tilt-Up

Robert Hunter Aiken erected the earliest known tilt-up building around 1893, at Camp Logan, Illinois located just north of the town of Zion. As mobile cranes were not available during this time-period, Mr. Aiken used a specially designed tipping table on which to cast and erect the wall panels.

Mr. Aiken is recognized by many as being the father of what is now known as tilt-up construction. In addition, Mr. Aiken developed the first insulated tilt-up wall panels, which consisted of 2" of concrete, 2" of sand and 2" of concrete. As the panels were tipped into position, workers washed the sand from between the concrete wythes, leaving an insulating center air space.

In an article published around 1910, Mr. Aiken reported that two men were able to erect a wall, in one hour, that was 76 feet long by 27 feet tall and weighed 76 tons. In this same article, Mr. Aiken stated he had used his tipping table method of construction to erect fifteen structures in five different states. His method of construction was known as the "Aiken method of house building."

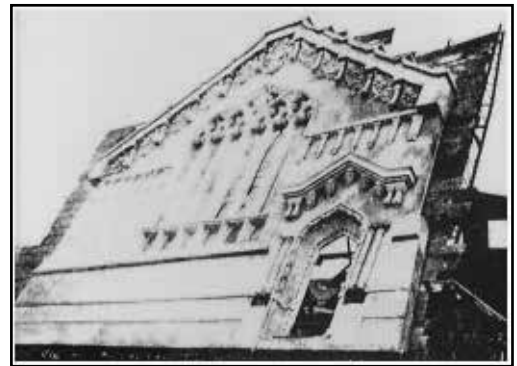
Only two mid-western buildings constructed using Mr. Aiken's "method of house building" are known to survive. They are the Memorial United Methodist Church of Zion, IL and the Camp Perry Commissary Building 2009 located near Port Clinton, Ohio. The Zion church was erected in 1906 and the Commissary in 1908. Both buildings stand today as monument to the longevity of tilt-up construction.

In 1911, Robert Aiken and his Aiken Reinforced Concrete Company, Inc. used his innovative construction method to erect 111-foot x 644-foot Paint Shop building, containing 36 rail car bays, for the Los Angeles Railway Company. The building's 106-foot long, 100-ton wall sections were cast horizontally and then tipped into position. This building is undoubtedly the largest of its era to employ tilt-up construction.

Also in Los Angeles, Mr. Thomas Fellows, developed a variation of the Aiken system in 1910 and used it to construct a low-cost demonstration house. Mr. Fellows cast the modular wall units horizontally on the ground and later lifted them into place using a mechanical crane.

In 1912, a San Diego based architect, Mr. Irving Gill used the Aiken tipping wall technology in the Banning House in Los Angeles and in the large La Jolla Women's Club building of 1913. In 1912, Mr. Gill purchased the patent rights of the bankrupt Aiken Reinforced Concrete Company and formed his own Concrete Building and Investment Company. However, the Aiken method was determined not to be very useful in concrete construction and Gill did not employ it much after 1913.

Although Mr. Aiken, Mr. Fellows and Mr. Gill pioneered tilt-up construction, modern day tilt-up's popularity is based on two WW II era developments, the introduction of the ready-mix concrete batch plant and mobile cranes.



Dayton Superior's Role in the Development of Tilt-Up

Since the beginning of tilt-up construction, Dayton Superior has been instrumental in developing and manufacturing the hardware necessary for safety and economy in the most critical steps for this method of construction — that of lifting the wall panel and placing it in place without damage. The embedded coil insert pioneered by Dayton Superior was an important development in tilt-up techniques. A major breakthrough resulted in the mid-sixties with the design of the Twist-Lift insert and lifting hardware. The Twist-Lift System was one of the simplest and most economical lifting systems on the market for many years. The Twist-Lift System was a quick connect-release system and was the forerunner of today's ground release systems.

Further innovations have been made through research and development of the Ground Release Swift Lift System for tilt-up construction. This system offers tilt-up contractors the advantage of being able to release of the lifting hardware from the ground with a simple pull on a release line. Worker safety was greatly improved as the Ground Release Swift Lift System eliminated the need for workers to climb a ladder to remove the lifting hardware from the panel.

Dayton Superior has continued to strive to provide the contractor with a variety of options for lifting panels, developing the Gyro Tilt Plus System, the Tilt-Up 3 Lifting System and recently introduced the Superior Lift Tilt-Up System. Our product development team continues to strive to provide a complete package for economical and safe construction of tilt-up buildings.

Technical Assistance

The Dayton Superior Technical Assistance is based on approximately 50 years experience involved in detailing several million panels of all shapes, sizes and degree of difficulty. Using computer aided design, the following services are provided to serve the needs of the Tilt-Up Construction Industry. Services include:

- Consultation/recommendations
- Panel erection details
- Wind bracing requirements
- Additional reinforcement, if necessary
- Strongback requirements, if necessary
- Rigging methods
- Material takeoffs

General Tilt-Up Considerations

Tilt-up construction involves the following considerations:

- The tilt-up concrete panel is partially supported by the ground or slab during tilting.
- The concrete panel is usually handled only once.
- After tilting, the panel is only raised two to three feet and is generally not moved very far by the crane.

At the time of initial lift, the face lift inserts and bolts/hardware are in tension or in a combination of tension and shear. As the panel is rotated and raised, tension decreases and shear increases as the entire load is transferred to the inserts (when the panel is in a vertical position).

Tilt-up panels must be reinforced with no less than the minimum steel required by the latest edition of the American Concrete Institute, Building Code Requirements for Reinforced Concrete (ACI 318). As a general rule, #4 bars at 12" O.C. in both directions will satisfy the requirement. If flexural stress limits will be exceeded during lifting, additional reinforcing steel, or strongbacks must be added to the panel.

Definitions

Rated Load	The maximum load that should be applied to an anchor, insert, coil bolt, brace or lifting hardware unit. Safe Working Load, Safe Load Carrying Capacity or SWL are other terms used in this handbook for the term Rated Load.
Ultimate Load	The average load or force at which the item fails or no longer will support or carry a load.
Dynamic Load	A resulting load from the rapid change of movement, such as the sudden stopping, jerking or impacting a static load. A dynamic load may be several times a static load.
Safety Factor	A term denoting theoretical reserve capability which has been determined by dividing the ultimate load of the product by its rated load. This is expressed as a ratio; for example, 2 to 1.

Safety Notes and Product Application

Dayton Superior publishes the safe working loads and the associated minimum safety factors of its products and strongly advises that the minimum safety factors displayed not be exceeded. When there are unusual job conditions, minimum safety factors must be increased to accommodate unusual conditions. Refer to the provisions of the American National Standards Institute (ANSI A 10.9), Occupational Safety and Health Administration (OSHA) Act, Part 1910, the American Concrete Institute (ACI) *Tilt-Up Concrete Structures (ACI 551)* and *Recommended Practice for Concrete Formwork (ACI 347)* and the *Tilt-up Concrete Association's Guideline for Temporary Wind Bracing of Tilt-Up Concrete During Construction*, when considering safety factors.

Warning: Dayton Superior strives to ensure that all products it supplies meet or exceed all safety requirements. However, the performance of a product may be affected by the manner in which the product is used. It is imperative that the user be familiar with the proper installation and use of the products displayed in this publication prior to job application. Failure to properly install and use the products displayed in this publication may lead to serious accidents and/or deaths.

Safety Notes and Product Application:

All safe working loads shown in this publication were established with the following factors considered:

1. All products are in new or "as new" condition. The safe working load is considered the greatest load that will be applied to a product.
2. Inserts are correctly embedded in sound concrete and are firmly bolted or wired in place so that the vertical axis of the inserts is perpendicular to the lifting surface.
3. Concrete compressive strength (f'c) at time of initial lift is at least the strength listed in the insert selection chart for the insert being used.
4. Bolted hardware has full bearing on the concrete surface, and attachment bolts bear fully on the hardware.
5. Caution must be taken so that the hardware is not subjected to a side loading that will cause an additional, unintended loading.
6. Erection and attachment bolts are the proper length and are well tightened to prevent hardware slippage and bolt bending.
7. Coil bolts have minimum coil penetration through the insert coil, but are not bearing on concrete at the bottom of the void.
8. Inserts are properly located in relation to edges, corners and openings, and are at distances that permit the development of a full shear cone. Minimum edge distances are noted throughout this publication.
9. The applied load on an insert is calculated to include the effect of both axial and transverse loads.
10. Electroplated inserts have been properly baked to relieve brittleness. Failure to do so may result in premature failure.
11. No field welding to the lifting inserts or lifting hardware has taken place. Welding may cause brittleness and result in premature failure. Since Dayton Superior cannot control field conditions or field workmanship, Dayton Superior does not guarantee any product altered in any way after leaving the factory.

Safety Factors

Dayton Superior recommends the following minimum safety factors identified by Occupational Safety and Health Administration (OSHA), Act Part 1910 and American National Standards Institute (ANSI 10.9). Tilt-up construction may require additional safety considerations. Many field conditions may warrant higher safety factors, i.e., adhesion of the panel to the casting surface, jerking the crane during lift, inadequate crane size, improper handling of an erected panel, transporting an erected panel over rough surfaces, exceeding boom capacity, etc. The minimum safety factors listed below should be adjusted accordingly when any of the above conditions are known to exist. If a different safety factor is required for any reason, the published safe working load must be adjusted. The following equation is used to adjust a safe working load:

Safety Factor	Intended Use of Product
1.5 to 1	Tilt-Up Wall Braces
2 to 1	Floor and Wall Brace Anchors
2 to 1	Lifting Inserts
3 to 1	Permanent panel Connections
4 to 1	Handling Panels Multiple Times
5 to 1	Lifting Hardware and/or Reusable Hardware

$$\text{New Safe Working Load} = \frac{\text{Old Safe Working Load} \times \text{Old Safety Factor}}{\text{New Safety Factor}}$$

Warning: New Safe Working Load must not exceed the product's Mechanical Capacity — New Safety Factor. Contact Dayton Superior Technical Assistance for determining product mechanical capacity.

Lifting Stresses and Concrete Design

Lifting and rotating a wall panel creates high stresses that may exceed in-place construction values. A tilt-up wall panel with low concrete compressive strength is more susceptible to failure by erection stresses.

The maximum erection stress occurs as the horizontal panel is tilted into a vertical position. These applied stresses happen early in the construction sequence, before the concrete has attained full strength.

As the panel is tilted, the dead weight of the panel induces a flexural moment with associated stresses. The stress level is dependent on the size and weight of the panel, the number of openings, the number of lifting inserts and locations, and the type of rigging and cable lengths used. The lifting stresses are controlled with proper insert design and placement, strongback options, various reinforcing techniques and/or by increasing the compressive strength of the concrete at the time of lift.

Concrete is weak in tension, therefore induced tensile stresses are limited to values below the tensile resistance of the concrete. The table below lists various safe tensile stress limits.

Concrete Weight	Allowable Tensile Stress
150 PCF	$6\sqrt{f'_c}h$
Greater than 110 PCF and less than 150 PCF	$0.85 \times 6\sqrt{f'_c}h$
110 PCF	$0.75 \times 6\sqrt{f'_c}h$

Note: f'_c refers to the actual concrete compressive strength at time of lift.

Safe Working Load Reduction Factors for Lightweight Concrete

Safe working loads for the products shown in this publication were derived from analysis and testing using reinforced normal weight concrete (150 pcf). The safe working load of an insert is dependent on the compressive strength and density of the concrete in which it is embedded. Therefore, when Dayton Superior tilt-up inserts are used in "lightweight" concrete tilt-up panels, the safe working load must be recalculated to compensate for the reduction in concrete density. Multiply the published safe working load by the reduction factor shown in the table to obtain the corrected safe working load.

Concrete Type	SWL Reduction Factor
Normal Weight	1.0
Sand-lightweight Concrete	0.70
All-lightweight concrete	0.60
For all-lightweight concrete with a weight of 110 pcf or less	0.60

Interested readers are referred to section 11.2 of the American Concrete Institute's "Building Code Requirements for Reinforced Concrete (ACI 318)" for additional information.

Anchor/Insert Capacity

Anchors/Inserts are designed to resist loads applied as direct tension, shear or a combination of the two. The following equations have been developed to predict concrete capacity of anchors/inserts and are applicable to anchors/inserts that are properly embedded in unconfined concrete. Confinement of the concrete, either from an applied compressive force or reinforcement is known to increase the load carrying capacity of concrete. At this time, design equations for anchors/inserts, which include reinforcement confinement, have not been developed.

The Strength of the Concrete

When a load is applied to an insert embedded in concrete, it induces a corresponding resistive force in the concrete. Insert failures can be predicted with a reasonable degree of accuracy by using the following equation for concrete breakout from ACI 318 Appendix D.

f'_c = Compressive strength of the concrete at time of lift

$$P_{concrete} = 0.75 \times \phi_{c,N} \times \lambda \times 24 \times \sqrt{f'_c} h_{ef}^{1.5}$$

$P_{concrete}$ = Maximum tension load carried by concrete and;

λ = Reduction factor for use with lightweight concrete, see next page;

$\phi_{c,N}$ = Factor for cracked concrete: 1.0 if cracked and 1.25 if uncracked.

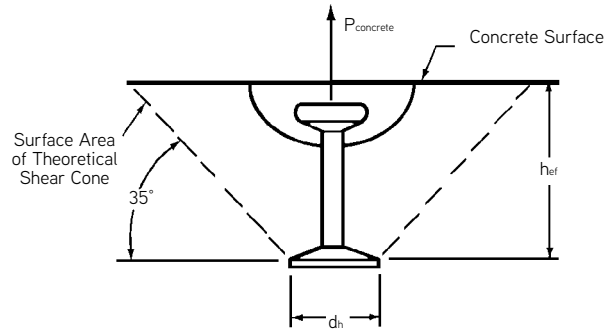


Illustration A2

Combined Shear and Tension Interaction

Anchors/inserts and bolts that are subjected to combined shear and tension loading should satisfy the following equation:

Where:

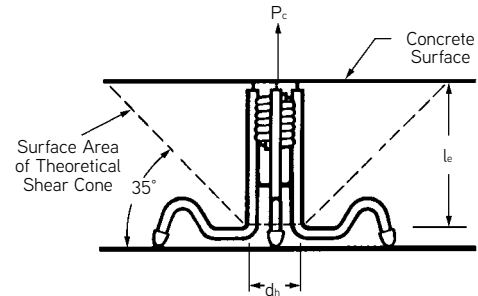
f_v = applied shear load

F_v = shear safe working load

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

f_t = applied tension load

F_t = tension safe working load



Edge and Shear Loading

Another condition frequently encountered is an insert embedded near a free edge or corner and loaded in a direction transverse to the axis of the bolt, toward the free edge. Edge lift panels are examples of this condition.

Many tests have shown that edge inserts loaded transversely to destruction (see Illustration L) finally fail because of an initial failure of the concrete over the coil. This initial failure transfers the entire load to the insert struts. If the load is large enough, the struts will fail in bending or shear or both.

An analysis of tests indicates that the ultimate load on edge inserts loaded in the direction of the free edge is a function of the distance from the insert to the free edge. The effect of bolt diameter and insert configuration appears to be of secondary and negligible importance. For conditions where shear loading must be considered, it is appropriate to use the following equation from ACI 318 Appendix D:

$$\text{Shear Safe Working Load (lbs.)} = \frac{\psi_c \cdot \lambda \cdot 7 \left(\frac{l_e}{n \cdot d_o} \right)^{0.2} \cdot \sqrt{n \cdot d_o} \cdot \sqrt{f'_c} \cdot (c_{a1})^{1.5}}{\text{Appropriate Safety Factor}}$$

With the maximum shear safe working Load.

load equal to, or less than, the insert's tension Safe Working

Where:

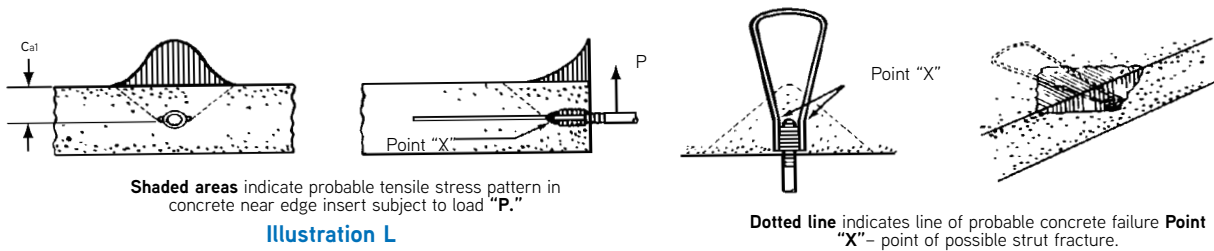
- ϕ_c = Cracked concrete factor: 1.0 for cracked concrete and 1.4 if uncracked.
- λ = Reduction factor for lightweight concrete, see page 6.
- l_e = Minimum of embedment length or $8 \times (n \times d_o)$.
- n = Number of struts on the insert.
- d_o = Diameter of the insert struts.
- f'_c = Specified concrete compressive strength.
- c_{a1} = Distance from centerline of the insert to the edge.

For conditions where a corner or thickness in direction of embedment is less than $1.5 \times c_{a1}$ or an adjacent insert is closer than $3 \times c_{a1}$ contact Dayton Superior Technical Assistance for insert capacities.

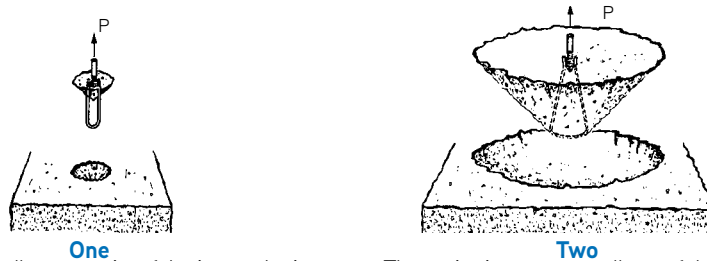
For cases where increased shear capacity is required, the addition of pre-formed shear bars over the top of the insert will greatly increase the distribution of the load. Shear bars, when used, must be in solid contact with the insert to be effective.

If accurate capacities of inserts are desired, several inserts with shear bars should be tested in job size panels.

Anchor/Insert Failure



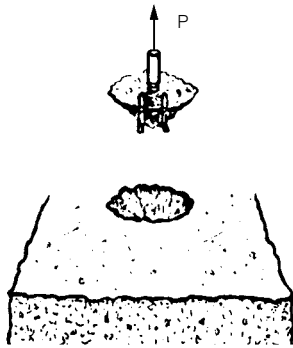
Coil Bolt/Coil Insert Failure



When the applied load P exceeds the pullout capacity of the insert, the insert will fail in one of four ways:

The entire insert may pull out of the concrete, with little apparent damage to the concrete. Such failures are rare and when they do occur, are the result of bond failure between the concrete and insert. These failures usually occur in green, or low strength concrete.

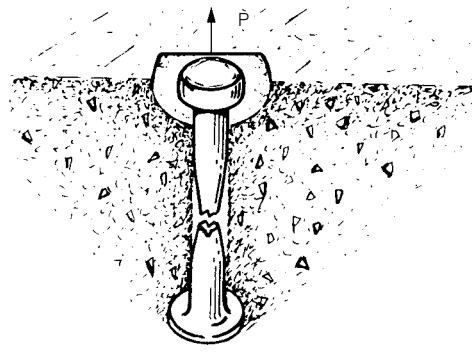
The entire insert may pull out of the concrete bringing with it a cone of concrete having its apex slightly above the most deeply embedded part of the insert. Such failures usually occur when the tensile strength of the shear cone surrounding the insert is not as great as the mechanical strength of the insert itself.



Three

A ductile failure may occur in the insert. Coil type inserts will usually fail at a point just below the helically wound wire coil. A small cone of concrete will usually be pulled out of the concrete surface. This cone will have its apex at a point just below the coil. Its base diameter will be approximately twice its cone height.

“Headed” type inserts will exhibit a ductile failure through the shaft diameter of the insert.



Four

These failures usually occur in higher strength concrete or adequate embedments when the concrete resistance is greater than the mechanical strength.

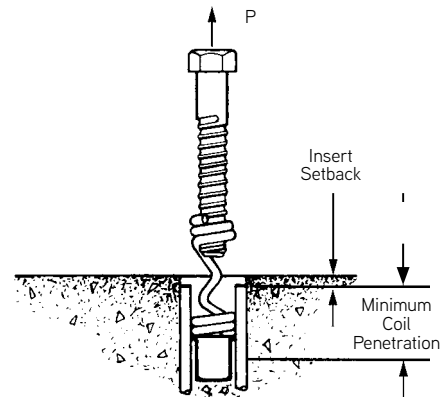
Failures of this type are due to a definite overload being applied to the inserts. Such failures can be prevented by choosing inserts of capacity suitable to job conditions or by increasing the number of inserts used to lift the tilt-up panel.

Insert Placement

Warning! When bolting coil type inserts, the bolt should always extend at least the proper amount beyond the bottom of the insert coil. Failure to do this causes the entire bolt load to be transferred to fewer turns of the coil, causing an increased load per weld contact point. The coil will then unwind much like a corkscrew, resulting in a premature failure.

Bolt Diameter	Minimum Coil Penetration
3/4"	2-1/4"
1"	2-1/2"
1-1/4"	2-1/2"
1-1/2"	3"

See “Minimum Insert Distances” in the Superior Lifting Systems section for proper method of determining bolt lengths.



Tilt-up lifting inserts are generally categorized in two types, face lift and edge lift. Both types of inserts must be placed accurately and positioned properly. Safe working load of the insert may decrease considerably if the insert is not positioned perpendicular to the bearing surface. All Dayton Superior lifting inserts are designed for easy positioning and securing to the reinforcement steel.

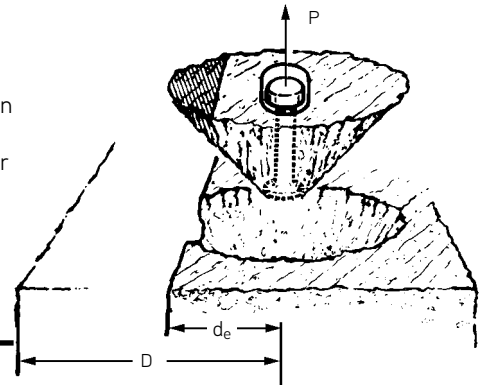
It is also important that all coil style lifting inserts be placed so the depth of thread is constant throughout the job, minimizing improper bolt engagement. Keep all lifting inserts free of dirt, ice and other debris that may interfere with hardware engagement.

Insert Edge Distances

Embedment of inserts closer to any edge; construction joint; window or door opening than the minimum edge distances shown in this handbook will greatly reduce the effective area of the resisting concrete shear cone and thus reduce the insert's tension safe working load. The shaded area of the shear cone indicates the extent to which this area is reduced. Tension safe working loads of inserts near a free edge or corner must therefore be reduced in proportion to the reduction in effective shear cone area.

d_e = Actual edge distance

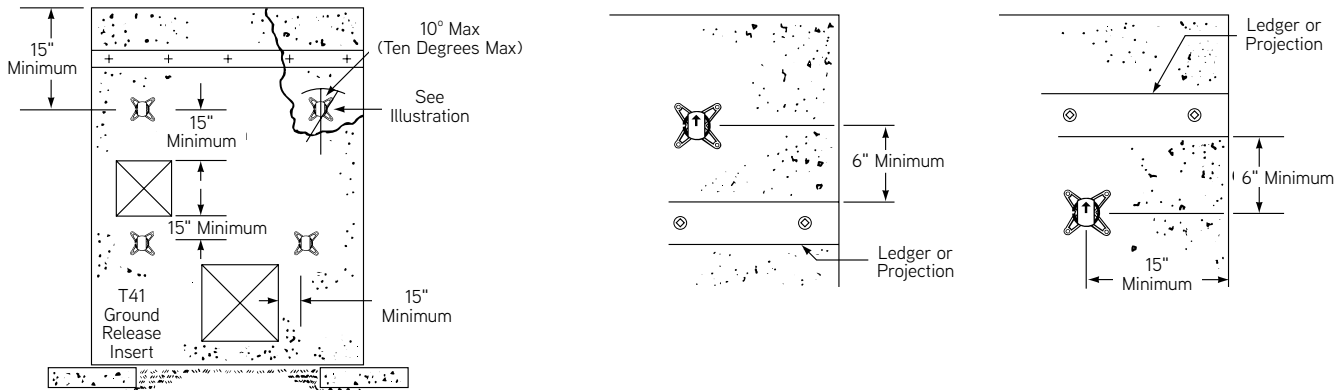
D = Minimum edge distance required to develop insert's SWL



Minimum Insert Distances

Loading Conditions

Safe working loads shown in this publication are for static load conditions and must never be exceeded. If dynamic forces or impact



Warning! All Lifting Inserts must be properly located in relation to the center of gravity of the panel. As shown on the Dayton Superior Technical Service panel drawings.

load conditions are anticipated, the safe working loads must be reduced accordingly.

Care must be exercised to ensure that all inserts and hardware are properly aligned, all lifting plates and bolts are properly secured, all rigging is equalized and that proper size crane cables are used. The centerline of the spreader bar and hook must be on the centerline of the panel and the crane cables must be of proper size and length.

Warning! Users of Dayton Superior products must evaluate the product application, determine the appropriate safety factor, calculate the applied loads and control all field conditions to prevent excessive product loading.

When uncertain about proper installation or use of a Dayton Superior product, contact Dayton Superior for clarification. Failure to do so may expose workers to hazards which could result in serious injury or death.

Tilt-Up Problem Areas

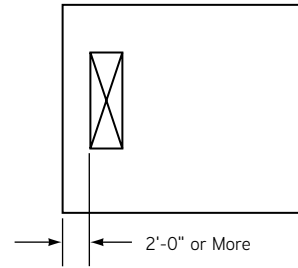
Field Conditions, Equipment and Panel Sizes

Become familiar with field conditions and equipment available for the tilt-up project. As a rule of thumb, crane capacity should be 2 to 3 times the maximum panel weight. Actual crane capacity depends on crane location and the panel's center of lift.

For rigging and lifting efficiency, Dayton Superior recommends the following: Panel heights up to 24'-0", width should be 36'-0" or less. Panel heights up to 36'-0", width should be 24'-0" or less.

Panel Openings

Position openings in the center of the panel. If this is not possible, maintain a 2'-0" leg of concrete. Less than 2'-0" of concrete will usually require strongbacks or additional reinforcing.



Pier Heights

When pier heights vary, always keep the bottom of the panel parallel to the horizon (see Fig. 1). Avoid panel designs similar to Figures 2 and 3. Designs such as these will require strongbacks and/or special handling to prevent panel twisting and spalling.

Headers

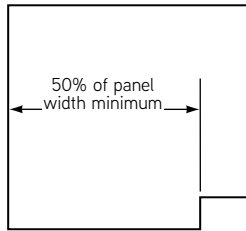


Fig. 1

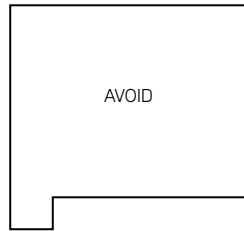


Fig. 2

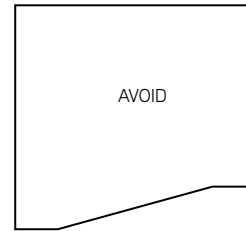
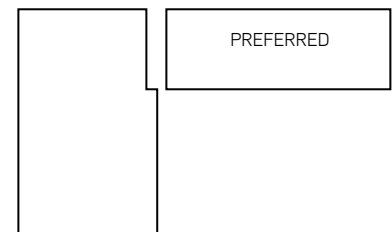
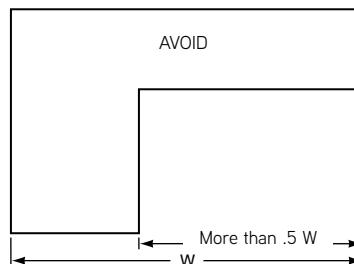


Fig. 3

Avoid panel designs that have large center of gravity shifts. If a header is required, the example on the right is the preferred design.



Hardware Inspection

All reusable products supplied by Dayton Superior are subject to wear, misuse, corrosion, alteration and other factors which may affect product safe working loads.

Dayton Superior recommends that all users of Dayton Superior tilt-up hardware establish a quality control program to monitor and inspect their tilt-up hardware.

The frequency of inspections is best determined by the user and is dependent on the frequency of use, duration of use and the environmental conditions during use.

Tilt-Up Construction Sequence

General

The nature of tilt-up construction dictates the need for thorough preplanning. The economy and success of tilt-up construction is realized by efficient on-site production operation and careful planning with each step of the construction sequence building on the previous step. The following sequence is offered as a planning aid for a typical tilt-up project.

Site Access and Job Conditions

It is advisable to investigate regulations on daily start up times, noise and dust control and job site perimeter fencing. Check job site restriction on tonnage or limitations on access to the site. As an example, special permits are common requirement for schools and churches.

Scheduling

The construction sequence and scheduling must be constantly monitored and controlled. A function performed out of sequence usually prevents the next scheduled function from proceeding.

The following is a construction sequence for a typical tilt-up project:

1. Complete the site preparation.
2. Install underslab plumbing and electrical.
3. Cast and cure interior column footings.
4. Cast and cure interior floor slab.
5. Form, cast and cure exterior footings.
6. Form, cast and cure tilt-up panels.
7. Erect and brace panels.
8. Construct the roof structure/diaphragm.
9. Cast and cure the "leave out" strip between the floor slab and the panels.
10. Remove the braces.
11. Schedule other trades for painting, landscaping, interior framing and interior finish.

This sequence is only meant as a guide and may vary from job to job.

Slab as a Work Platform

Initial grading of the site should include completion of all subgrade work for the building floor, and parking and truck areas. A roadbed and an accessibility ramp to the subgrade should also be completed at this time. Emphasis must be placed on having a strong, well compacted subgrade. Regardless of how much effort goes into producing a good slab, the slab will only be as good as its subbase.

The panel contractor should make plans for stubbing all electrical and plumbing items below the finished floor level. This provides additional floor space for casting panels, and provides an obstacle free area for crane movement.

The quality of the floor slab in a tilt-up constructed building is extremely important. The tilt-up panels are normally cast on the floor slab of the building and any imperfection in the floor slab will be mirrored in the panel. For best results, the floor slab should have a hard, dense, steel trowel surface.

The panel contractor should try to layout the panel forms so that no panels are cast over a floor slab construction or control joint. Should a panel have to be cast over a joint, there are several ways to minimize the transfer of the joint image to the panel. The most popular is to fill the joint with drywall compound. Drywall compound readily disintegrates after the panel is lifted and leaves a relatively clean joint that can be blown free of residue, if joint sealing is required. An effective method for eliminating a control joint image from a panel is to utilize the Dayton Superior T Strip. The T Strip is inserted into the control joint at the time the joint is saw cut. It provides spalling protection for the joint and will leave only a small rounded depression in the tilt-up panel. The small rounded depression is then easily eliminated with a later skim coating of Dayton Superior Sure finish.

The floor area at a column block-out can be made available for casting by filling the block-out with sand to about three inches from the floor surface and then finish filling it with concrete. The block-out image will be transferred to the panel, so choose a panel to cast over the block-out that is not critical to the building's aesthetics.

Bondbreaker and Curing Compounds

Bondbreakers and curing compounds are among the most critical materials used on a tilt-up project. These products should have their performance criteria carefully evaluated. The application of the curing compound on the floor slab is the most critical step in the preparation process. The application should begin immediately after the hard steel troweling and the dissipation of the excess bleed water. A cure coat applied too late may render the slab highly permeable, leading to bondbreaker absorption and poor parting characteristics.

Typically, look for the following cure characteristics:

1. A well cured casting slab.
2. Excellent parting characteristics of the bondbreaker.
3. Good drying characteristics of the bondbreaker.
4. Clean appearance of the finished panel and floor slab.
5. Good compatibility with subsequent floor treatments and/or floor coverings.
6. Good compatibility with wall finishes such as paint, elastomeric coatings, sealants, adhesives, etc.

There are three basic types of bondbreakers:

1. Membrane forming.
2. Non-membrane forming — reactive.
3. Combinations of membrane forming and reactive.

Since the membrane forming materials rely on crude petroleum resins and waxes to form a water insoluble barrier between the freshly cast wall panel and the casting slab, they are prone to leave residue on both the panel and the slab. Under optimum conditions of temperature and sunlight, they will usually dissipate in approximately 90 days. Varying environmental and/or application conditions may result in residue being present much longer. Residue may discolor the concrete and interfere with subsequent surface treatments.

Reactive materials work with the excess lime available to create crude soaps. These soaps provide a moisture barrier to prevent the migration of the cement matrix into the casting slab.

A final note: whenever there is doubt about sufficient bondbreaker on the casting slab, always apply more. It is the cheapest insurance available for a successful tilt-up job. Refer to the Dayton Superior brochure *"Use and Application of Bondbreakers"* for more information.

Shop Drawings

A complete set of detailed panel drawings is required for every tilt-up project. If the drawings are not part of the plans prepared by the engineer of record, then the panel contractor should prepare the set and submit them to the engineer for approval. The detailed panel drawings should contain the following information:

1. Panel identification.
2. All pertinent dimensions.
3. All physical characteristics, including weight.
4. All reinforcing steel.
5. Location and identification of all embedded items.
6. Finishes and textures.
7. Rigging and bracing information.

Panel Casting Layout

The panel contractor should consult with the erection contractor in the development of a good casting layout. For a smooth construction sequence, two important criteria must be met:

1. The panels must be located for efficient casting.
 2. The panels must be located for safe and efficient erection.
- The panel layout should provide accessibility to the panel forms for the ready mix trucks and crane.

Tilt-up panels should be cast as near as possible to their final location in the structure. An effort should be made to place as many side by side as possible. If a panel must be "walked" to its final position, try to keep the distance as short as possible. "Walking" the panels should be avoided, if possible.

Panel Construction

After the floor slab has been cleaned, the tilt-up panels are outlined directly on the floor slab with chalk. The chalk lines can be sprayed with a coat of bondbreaker to prevent rain from washing them away. The panel edge forms, and any opening forms can then be set in place.

Fog the casting area with clean, potable water prior to application of the bondbreaker. The fogging should saturate the slab, but any standing water must be removed before the bondbreaker is applied. The bondbreaker should be applied in a two-coat application; the first coat of the material sprayed in one direction and the second coat sprayed perpendicular to the first. Be sure to let the first coat dry before applying the second coat. Applying the bondbreaker in this manner will help ensure a smooth, uniform coating.

Check the slab and bondbreaker before pouring any concrete. The slab should have a slightly tacky, soapy feeling. Bondbreaker can be tested by dropping a small amount of water on the casting bed, from a height of about 24" above to allow it to splatter. If the bondbreaker is applied correctly, the water will bead into small droplets as it would on a freshly waxed automobile. If the water does not bead, respray all of the suspected areas of the casting slab.

When all of the panel preparations are complete and the panel is ready for placement of the concrete, the entire panel area should be fogged with potable water to be certain that the pores of the concrete slab have been properly saturated. Make sure there is no standing water, and proceed with the concrete placement.

The panel concrete must be properly consolidated using an appropriate concrete vibrator. It is preferable to use the vibrator in an up and down motion. Laying the vibrator horizontal and dragging it along the reinforcing steel will often leave the pattern of the rebar visible on the down side face of the panel. Avoid overvibration; it may cause segregation of the aggregate and bring excess water to the surface.

Preparation for Lifting

Clean the panel and the surrounding floor slab area. Locate and prepare all pertinent embedded devices that are accessible. Do any dressing or patching that can be accomplished on the ground. Attach all pipe braces and strongbacks as required.

Each panel should be numbered and clearly identified according to the panel layout/erection sequence plan. Place the identifying mark in a position that will not be exposed when the structure is completed. The structure footing should also be marked with the corresponding identifying numbers to give the erection crew clear indication where each panel goes. The footing should be appropriately marked to show the proper position of each panel on the footing.

All lifting inserts should be uncovered, cleaned out and tested with a hardware unit several days prior to erection day. Rotary hammers, drills, leveling shims, cutting torch, steel wedges, pry bars, level and plumb bob and a full set of hand tools should be available at the job site.

Panel Erection Techniques

The following panel erection techniques are suggested as an aid for the safe and efficient erection of tilt-up wall panels.

- **Layout** — Prior to the day of erection, the panels should be laid out on the exterior foundations and the exterior wall line established.
- **Alignment** — One method of alignment is to mark the limits of each panel, then drill 3/4" holes into the foundation approximately 5" deep. Install two #5 rebars (approximately 10" long) on each side of each panel.
- **Leveling** — Prior to day of erection, install leveling shims with a level so that the top of all panels are in line. Grout should be installed around the shims to hold them in position.
- **Grout** — After panels are erected and aligned, grout as specified should be placed under each panel. Grouting should be accomplished as early as possible after panel erection. Care should be taken to make certain the grout fills the void between bottom of panel and top of footing.

After the Lift

When constructing the floor slab, a perimeter strip, generally three to five feet wide is often open to facilitate the footing excavation. This excavated area can be up to five or six feet deep, depending on the building design, and won't be backfilled until after the wall panels have been erected. The perimeter strip must be backfilled and compacted very carefully to avoid movement or bending of the panels.

Usually there are reinforcing steel bars projecting from the slab into the perimeter area which will overlap the bars that project from the panels. If the panel is a "dock-high" panel, it may be best to weld the floor rebar to the panel rebar. After the backfill is in place and properly compacted, concrete is placed into the perimeter strip to connect the floor slab to the wall panels.

Wall braces should never be removed until all structural connections are complete. Note that the perimeter strip between the floor slab and the wall panels is considered a structural connection.

If the building's structural drawings do not indicate when the braces can be removed, the engineer of record should be consulted.

Panel Analysis

As the tilt-up panel is rotated from the horizontal to the vertical, the panel is subjected to bending that causes both compressive and tensile stresses that must be resisted by the concrete, reinforcing steel, or a method of strongbacking that prevents the initial bending.

The lifting inserts are normally located so that the overhanging portions of the panel sides or top will reduce the bending moments between pickup points, thereby reducing the compressive and tensile stresses in the concrete.

Tilt-up panels are usually thin and very seldom do they contain two layers of reinforcing steel. It is, therefore, necessary to allow some tensile stress in the concrete to be introduced in the tension areas. The value of allowable tensile stress in the concrete is a function of the modulus of rupture and the safety factor used. A conservative value appears to be approximately $6\sqrt{f'_c}$.

Since the typical reinforcing in a panel is #4 bars at 12 in. o.c., both horizontally and vertically, it is important to be sure of the compressive strength of the concrete at the time of erection. In turn, the concrete must have sufficient tensile strength to provide the resisting strength necessary to erect the panels without cracking. This concrete quality can be obtained by having a proper mix proportion and a curing process that minimizes moisture loss. Strength tests using compression cylinders, Test Beam Break (modulus of rupture), or a Split Cylinder Test are methods of determining the value of the concrete strength and/or tensile strength of the concrete at the time of erection.

It is normal to have a minimum concrete compressive strength of 2,500 psi before the tilting operation commences. Generally, the ultimate tensile stress would be 375 psi or greater with an allowable stress of 300 psi. This assures a good tilting sequence with no cracking from tilting although some shrinkage cracks may appear.

Depending upon the quality of bond breaker used and the care taken in application, the amount of "bond" between the panel and the base slab can be from negligible to significant. Initially, a suction force must be overcome at the time of release from the base slab and estimates of this force vary considerably. Panel size, interface texture, and water between the panel face and the base slab all contribute to this additional load that is applied to the inserts and the surrounding concrete. Estimates vary from negligible to 20 psf of panel area. Experience has shown that the safety factor between the design stress and the ultimate tensile stress is sufficient to absorb the additional stresses without cracking the panels.

Minor impact loads that occur during the tilting sequence do not create bending stresses in excess of the safety factor. However, if a panel suddenly drops and is caught by the slings, or hits the crane boom or some other obstruction, an increased load will be applied to the pickup inserts.

Panels are analyzed for stresses at 0 degrees and at various angles during the tilting sequence. They are analyzed at 0 degrees because of the added loads from suction, impact, bond, and because the spans are the longest. Panels with more than one horizontal row of pickup points are analyzed at angles of rotation due to the cable configuration changing the loads to the pickup points and therefore, changing the bending moments. The resultant stresses are compared to the allowable and if exceeded, additional reinforcing or strongbacks are added depending upon the contractor's preference.

After the tilt-up panels are analyzed vertically, they are examined horizontally. The procedure for horizontal analysis is similar to the vertical examination, except that a portion of the panel resting on the ground is not considered because of continuous support.

Erection Details

The engineering service (Erection Details) which is provided by Dayton Superior is a very important part of our total tilt-up package. The location and selection of the proper lifting insert, brace type and brace anchor location, as well as the calculation of additional reinforcing steel or strongback size and location is critical for a safe and efficient panel erection.

Dayton Superior uses computers to provide fast and accurate analysis of the stresses involved in tilting a panel into position. Erection detail booklets are furnished to the contractor showing pickup locations, wall brace insert locations, crane riggings and cable lengths, reinforcing or strongback details, and specific assumptions relating to concrete strength and wind loads used in the brace design. These details are furnished at a nominal charge and are as important to the success of the operation as are the contract drawings. In order to provide these erection details to the tilt-up contractor, Dayton Superior needs the following information:

- Name of our dealer where you will purchase accessories.
- Name and address of project.
- Name of contractor.
- Job phone number.
- Name of job superintendent.
- Crane operator.
- Project plans with panel drawings.
- Number of buildings.
- Approximate number of panels.
- Number of detail booklets required.
- Date erection details required.
- Are copies of calculations required?
- Is engineer's stamp required?
- Type of inserts for tilting, bracing and strongbacking.
- Rigging type preferred for tilting.
- Are braces required? If so, what is the specified maximum wind load (psf)?
- Are panels to be braced to inside or outside of the building?
- Are panels cast inside face up or outside face up?
- Type and unit weight of concrete.
- Compressive strength of concrete at lift.
- Type and details of surface treatment.
- Special instructions not covered by the above items.

Computer Service

- All panels with openings are entered in the computer for analysis.
- Inserts are then positioned relative to the center of gravity.
- Panel dimensions and insert locations are checked by the computer for exact insert loading and flexural stress analysis.
- The bending moments and stresses in a panel are constantly changing as the panel rotates from 0° (horizontal) to approximately 90° (vertical).
- Stresses are checked at various degrees of rotation with respect to the horizontal.
- The most critical stress during lifting will normally occur somewhere between 20° and 50° rotation. The reason for this range is the different geometric shapes of the panels and number of inserts required.
- The calculations for determining the stresses at varying angles of rotation are extremely complex due to the cable geometry and the method of structural analysis required, and can only be accomplished efficiently by utilizing the accuracy and speed of the computer.
- As the cable, attached to the lifting plate, changes its angle during rotation, the force components on the lifting plate will vary causing the **tension** load on the insert to vary.
- When one insert's **tension** load increases, another insert's **tension** load may decrease. This is what causes the bending moments and stresses to vary throughout rotation of the panel.
- For example: the tension load at "B" in Fig. 3 is 100% tension and the tension load at "C" is 85% tension, but when rotated to 30° in Fig. 4, the tension load at "B" has decreased to 80% and the tension load at "C" has increased to 100%.
- To provide uniformity in panel detailing, Dayton Superior provides computerized or computer aided drafting graphics in addition to the stress analysis.

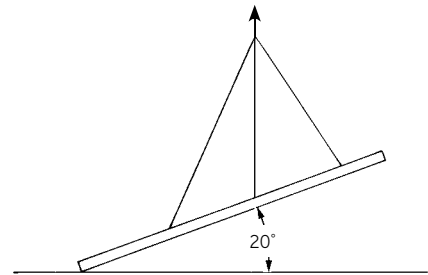


Fig. 1

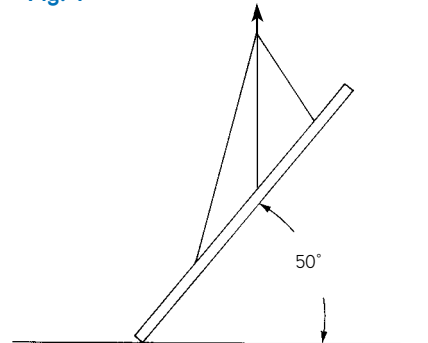


Fig. 2

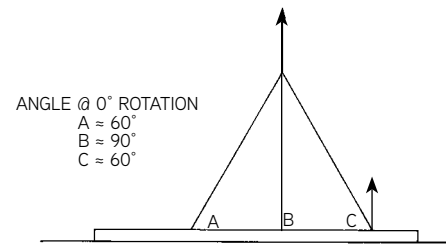


Fig. 3

ANGLE @ 0° ROTATION
 A = 60°
 B = 90°
 C = 60°

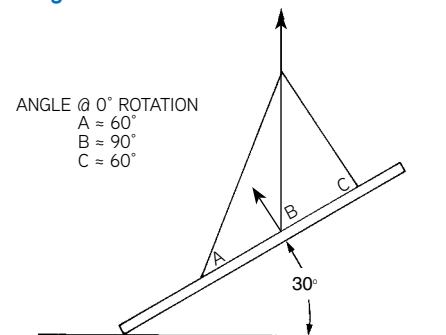


Fig. 4

ANGLE @ 0° ROTATION
 A = 60°
 B = 90°
 C = 60°

Stress Tables and Rigging Patterns

Note: The accompanying stress tables and rigging configurations are intended for estimating purposes only and are not to be used for designing purposes.

The stress tables are valid for solid, uniformly thick panels without exposed aggregate or formliners. For panel shapes that vary from these criteria, contact a Dayton Superior Technical Services Department for assistance. A flexure (bending) stress analysis will be required.

The following tables show the actual bending stresses in pounds per square inch (psi) according to panel thickness, height and rigging configuration and are based on dead load only. Additional safety factors must be applied for any anticipated impact or dynamic loads.

When choosing a desired rigging configuration, always make certain the panel total weight divided by the number of lifting inserts does not exceed the following:

1. Face lift insert safe working load.
2. Edge lift inserts tension safe working load.
3. 65% of the panel weight divided by the number of inserts does not exceed edge lift insert shear safe working load.

Calculate normal weight concrete at 150 pounds per cubic foot.

Panels may be safely tilted when the calculated bending stress is equal to, or lower than the allowable bending stress for the compressive strength at the time of lifting. When the calculated bending stress exceeds the allowable, the panel can be tilted only if the bending stress is reduced by:

1. Increasing the number of lifting inserts;
2. Using additional, properly placed reinforcing steel;
3. Using external stiffening devices, such as strongbacks or
4. Possibly changing the concrete mix to a stronger compressive strength.

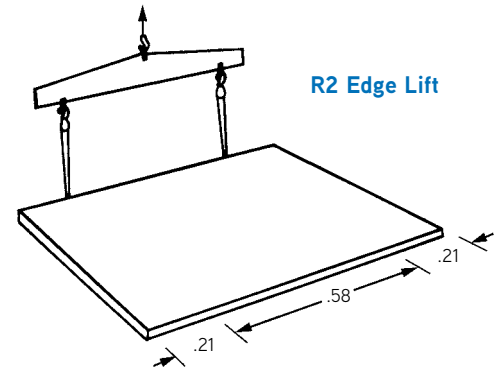
Panel Thickness	Maximum Panel Width	
	2 Wide Rigging	4 Wide Rigging
4"	21'-0"	34'-0"
5"	24'-0"	38'-0"
5-1/2"	25'-0"	40'-0"
6"	26'-0"	41'-0"
6-1/2"	27'-0"	43'-0"
7"	28'-0"	45'-0"
7-1/2"	29'-0"	46'-0"
8"	30'-0"	48'-0"
8-1/2"	31'-0"	49'-0"
9"	32'-0"	51'-0"
9-1/2"	33'-0"	52'-0"
10"	33'-0"	54'-0"
10-1/2"	34'-0"	55'-0"
11"	35'-0"	56'-0"
11-1/2"	36'-0"	57'-0"
12"	37'-0"	59'-0"

Table of Allowable Concrete Stresses (psi)							
f'c	2,000	2,300	2,500	2,700	3,000	3,500	4,000
Allowable Bending Stress	268	287	300	311	328	354	379

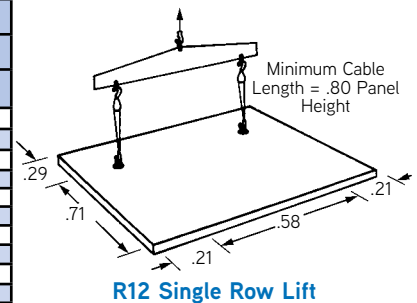
f'c = Normal weight concrete compressive strength at time of lift.

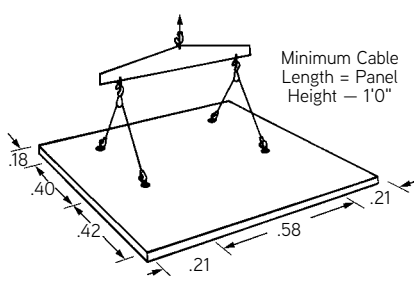
Note: See Safety Notes and Product Application in General and Technical Information section before using these charts for estimating lightweight concrete panels

Edge Lift Panel Stress (psi)														
Panel Thickness	Panel Height													
	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'	
4"	190	234	284	338	396									
5"	152	188	227	270	317	368	422							
5-1/2"	138	170	206	245	288	334	384							
6"	127	156	189	225	264	306	352	400						
6-1/2"	117	144	175	208	244	283	325	369	417					
7"	108	134	162	193	226	263	301	343	387					
7-1/2"	101	125	151	180	211	245	281	320	361	405				
8"	95	117	142	169	198	230	264	300	339	380	423			
8-1/2"	89	110	133	159	186	216	248	282	319	357	398			
9"	84	104	126	150	176	204	234	267	301	338	376	417		
9-1/2"	80	99	119	142	167	193	222	253	285	320	356	395		
10"	76	94	113	135	158	184	211	240	271	304	338	375	413	
10-1/2"	72	89	108	129	151	175	201	229	258	289	322	357	394	
11"	69	85	103	123	144	167	192	218	246	276	308	341	376	
11-1/2"	66	82	99	117	138	160	183	209	236	264	294	326	360	
12"	63	78	95	113	132	153	176	200	226	253	282	313	345	

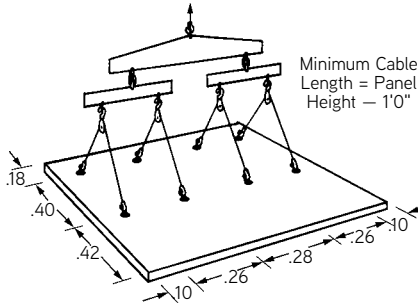


Single Row Lift Panel Stress (psi)																											
Panel Thickness	Panel Height																										
	13'	14'	15'	16'	17'	18'	19'	20'	21'	22'	23'	24'	25'	26'	27'	28'	29'	30'	31'	32'	33'	34'					
4"	139	161	185	210	237	266	296	328	362	397																	
5"	111	129	148	168	190	213	237	262	289	318	347	378	410														
5-1/2"	101	117	134	153	172	193	215	239	263	289	316	344	373	403													
6"	92	107	123	140	158	177	197	219	241	265	289	315	342	370	399												
6-1/2"	85	99	114	129	146	164	182	202	223	244	267	291	315	341	368	396											
7"	79	92	105	120	135	152	169	187	207	227	248	270	293	317	342	367	394	422									
7-1/2"	74	86	98	112	126	142	158	175	193	212	231	252	273	296	319	343	368	394	420								
8"	69	80	92	105	119	133	148	164	181	198	217	236	256	277	299	321	345	369	394	420							
8-1/2"	65	76	87	99	112	125	139	154	170	187	204	222	241	261	281	303	325	347	371	395	420						
9"	62	71	82	93	105	118	132	146	161	176	193	210	228	246	266	286	307	328	350	373	397	421					
9-1/2"	58	68	78	88	100	112	125	138	152	167	183	199	216	233	252	271	290	311	332	354	376	399					
10"	55	64	74	84	95	106	118	131	145	159	174	189	205	222	239	257	276	295	315	336	357	379					
10-1/2"	53	61	70	80	90	101	113	125	138	151	165	180	195	211	228	245	263	281	300	320	340	361					
11"	50	58	67	76	86	97	108	119	132	144	158	172	186	202	217	234	251	268	287	305	325	345					
11-1/2"	48	56	64	73	82	92	103	114	126	138	151	164	178	193	208	224	240	257	274	292	311	330					
12"	46	54	62	70	79	89	99	109	121	132	145	157	171	185	199	214	230	246	263	280	298	316					

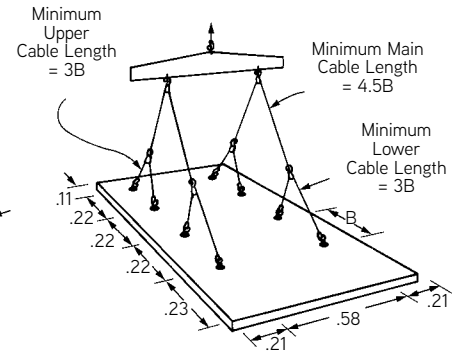




R22 Double Row Lift



R24 Double Row Lift



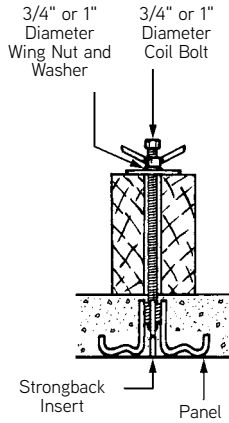
R42 Four Row Lift

R22 and R24 Double Row Lift Panel Stress (psi)																								
Panel Thickness	Panel Height																							
	20'	21'	22'	23'	24'	25'	26'	27'	28'	29'	30'	31'	32'	33'	34'	35'	36'	37'	38'	39'	40'	41'	42'	43'
4"	205	226	248	271	295	320	346	373	401															
5"	163	180	197	216	235	255	276	297	320	343	367	392	418											
5-1/2"	148	164	180	196	214	232	251	271	291	312	334	357	380	404										
6"	136	150	165	180	196	213	230	248	267	287	307	328	349	371	394	417								
6-1/2"	125	138	152	166	181	196	212	229	246	264	282	301	321	342	363	384	406							
7"	117	129	141	155	168	183	198	213	229	246	263	281	299	318	338	358	379	400	422					
7-1/2"	109	120	132	144	157	170	184	198	213	229	245	262	279	296	315	333	353	373	393	414				
8"	102	113	124	135	147	160	173	186	200	215	230	246	262	278	295	313	331	350	369	389	409			
8-1/2"	96	106	116	127	138	150	162	175	188	202	216	231	246	261	277	294	311	329	347	365	384	403	423	
9"	91	100	110	120	131	142	154	166	178	191	205	219	233	248	263	279	295	311	329	347	364	382	401	421
9-1/2"	86	95	104	114	124	134	145	157	169	181	194	207	220	234	249	263	279	294	310	329	344	361	379	398
10"	82	90	99	108	118	128	138	149	160	172	184	196	209	223	236	250	265	280	295	311	327	344	361	378
10-1/2"	78	86	94	103	112	122	132	142	153	164	176	187	200	212	225	239	253	267	282	295	312	328	344	361
11"	74	82	90	98	107	116	125	135	146	156	167	178	190	202	215	227	241	254	268	282	297	312	328	343
11-1/2"	71	78	86	94	102	111	120	129	139	149	160	171	182	193	205	217	230	243	256	270	284	298	313	328
12"	68	75	82	90	98	106	115	124	133	143	153	163	174	185	197	208	220	233	245	259	272	286	300	314

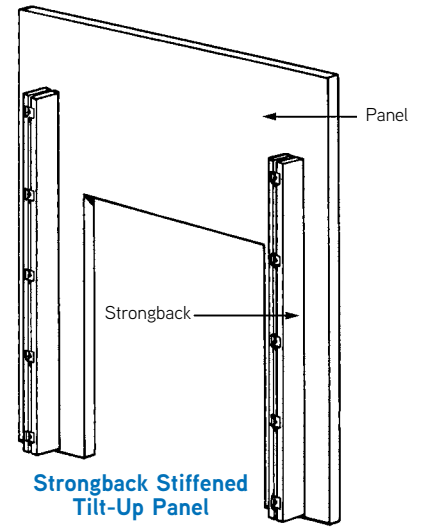
R42 and R44 Four Row Lift Panel Stress (psi)																									
Panel Thickness	Panel Height																								
	32'	33'	34'	35'	36'	37'	38'	39'	40'	41'	42'	43'	44'	45'	46'	47'	48'	49'	50'	51'	52'	53'	54'	55'	
4"	313	333	353	374	396	418																			
5"	250	266	282	299	316	334	353	371	391	410															
5-1/2"	227	241	256	272	287	303	320	337	355	373	291	410													
6"	208	221	235	249	263	278	293	309	325	341	358	376	393	411											
6-1/2"	192	204	217	230	243	257	271	285	300	315	331	347	363	380	397	414									
7"	178	189	201	213	225	238	251	264	278	292	307	321	337	352	368	384	400	417							
7-1/2"	166	176	187	198	210	222	234	246	259	272	286	299	314	328	343	358	373	389	405	421					
8"	156	166	176	186	197	208	220	231	243	256	268	281	294	308	322	336	350	365	380	396	411				
8-1/2"	146	155	165	175	185	195	206	217	228	240	252	264	276	289	302	315	329	343	357	371	386	401	416		
9"	139	148	157	166	176	186	196	206	217	228	239	251	263	275	287	300	312	326	339	353	367	381	395	410	
9-1/2"	131	140	148	157	166	176	185	195	205	216	226	237	249	260	272	284	296	308	321	334	347	361	374	388	
10"	125	133	141	149	158	167	176	186	195	205	215	226	236	247	258	269	281	293	305	317	330	343	356	369	
10-1/2"	119	126	134	142	150	159	168	176	186	195	205	214	225	235	245	256	267	279	290	302	314	326	338	351	
11"	113	121	128	136	144	152	160	169	177	186	195	205	215	224	234	245	255	266	277	288	300	311	323	335	
11-1/2"	109	115	123	130	137	145	153	161	170	178	187	196	205	215	224	234	244	255	265	276	287	298	309	321	
12"	104	111	117	124	132	139	147	155	163	171	179	188	197	206	215	224	234	244	254	264	275	285	296	307	

Strongbacks

When openings are required in a tilt-up panel, they often create extreme bending stresses in the remaining concrete sections. If additional reinforcing steel is not an option, strongbacks can be used effectively to stiffen the panel. Strongbacks may be fabricated from lumber, aluminum or steel and are usually reusable.

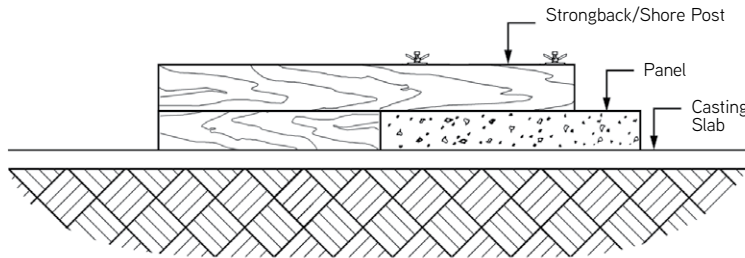


Section Through Strongback

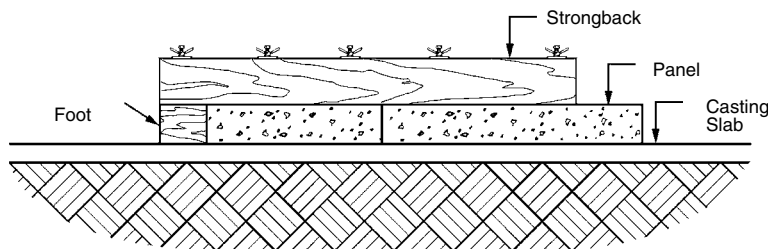


Strongback Stiffened Tilt-Up Panel

Panel Erection Information



Strongback/Shore Post

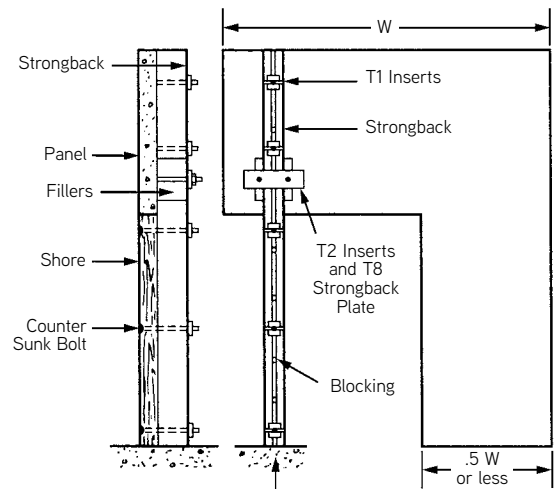


Strongback With Foot

Strongback-Shore

The strongback-shore system is used to reduce stresses during the lifting process and stabilize the panel during and after erection. Generally, this system should be utilized on panels where an offset opening is equal to or greater than 1/2 the panel width. The concrete leg section must be checked for stresses to determine if additional reinforcing steel or strongbacks are needed.

Strongback size should be of sufficient width and depth to carry erection loads and consist of material strong enough to withstand repeated use. The shore depth should be the same nominal size as the panel thickness, i.e., a 6" panel would require a 4x6 or 6x6 shore.



Contractor to Provide Landing Pad to Support Shore

Rigging and the Crane — General

The most important phase during the construction of a tilt-up building is the erection of the wall panels. It is extremely important for the designers and contractors to plan and re-plan this portion of the job. They should direct their efforts to ensure that this important phase of construction is performed safely and efficiently.

Since there must be a close, cooperative relationship between the panel contractor and the erection subcontractor, it is advisable to select an erection subcontractor during the early days of the project. The erection sub-contractor and crew should be well experienced in tilt-up, as panel tilting and handling is a very specialized skill.

Prior to Construction

Prior to the actual start of construction, an inspection of the site should be made by the contractor. The location of the jobsite may be such that special permits will be required to gain access to the site for heavy equipment such as the crane. As an example, permits are a common requirement for schools and church projects. These projects are usually built in residential areas where weight and size restrictions may exist.

It is advisable for the contractor to investigate restrictions on early daily start-up times. Many areas have noise abatement and dust control regulations. Also, the panel contractor and erection contractor should walk the site and determine a suitable location for the crane assembly and rigging make-up. Some local governments will not allow this activity on public streets.

It is also advisable that any problems with uneven terrain be noted at this time and dealt with prior to bringing the crane onto the jobsite.

The panel contractor and the erection contractor should always agree on a location for both the crane entrance onto the floor slab as well as the exit ramp off the floor slab. If necessary, plans should be made to thicken the floor slab at these ramp locations so the crane weight will not damage the edge of the slab.

Underground tunnels, trenches and sewer lines are a very common occurrence and can create problems. It is necessary to know the location of these underground hazards and to avoid those that may need strengthening in order to support the crane's weight. We have often found that the location of these underground hazards is not always noted on the architect/engineer's plans. Further investigation by the panel contractor should be made in an effort to discover these types of unknown hazards.

Overhead electric or telephone wires can be a common problem on both urban and rural job sites. It may be necessary to shut off the power in some overhead wires in order to safely operate the crane during panel erection. Most safety regulations dictate that cranes will not be allowed to work closer than ten feet to power lines.

The quality of the floor slab on a tilt-up project cannot be over emphasized due to the heavy weights that the slab will be expected to support early in its life. Equally as important as the slab, is the sub-base under the floor slab. When it comes to supporting the combined weight of the crane and tilted panel, the floor slab is no better than its sub-base. Even a thick, properly engineered floor slab with two curtains of reinforcing steel will not support the weight of the crane if the sub-base is unstable.

To insure an efficient construction procedure, careful consideration must be given to the casting location of the panels. The following two important criteria must be met if the contractor expects to have a successful project:

- Panels must be located for efficient CASTING.
- Panels must be located for efficient LIFTING.

The panel contractor should work with the erection subcontractor in developing the panel casting layout. The erector's advice should be sought so that the panels are cast in such a position that a properly sized crane can safely reach and erect them.

Crane selection should not be looked on as merely routine. General rules for sizing the crane state that the crane capacity should be a minimum of two to three times that of the heaviest panel including the weight of the rigging gear. However, in the final analysis not only the panel weight, but also the crane's position relative to the panel must be considered: The following questions must be answered before final determination of crane size can be established:

- How far must the crane reach to lift the panel?
- How far will the crane have to travel with the panel?
- How far will the crane have to reach to set the panel?

Crane Certification

The crane that is finally selected for the project should be properly certified. Many, if not all states have standards with which erection sub-contractors must comply. Prudent contractors make certain they have available at the jobsite documentation attesting to the crane's certification. The contractor should also obtain a certificate of liability insurance from the erection sub-contractor.

Prior to Erection — Site Inspection

After the panels are cast and curing, the panel contractor, erection sub-contractor, and the accessory supplier should again walk the site. The terrain upon which the crane will travel should be inspected and any further corrections noted. Corrective actions shall be taken prior to erection of the panels.

Entrance and exit ramps should be checked. The entrance ramp should be built up so the crane descends slightly down onto the slab instead of crawling up onto it. The exit ramp should be built in the same manner. On some buildings, architectural openings are large enough for the crane to exit. In any case, do not let the crane's weight bear at the extreme edge of the slab. This is of particular importance if the crane is walking out with the added weight of the closure panel.

Equipment and Crew

The panel contractor and the erection contractor must itemize the rigging and equipment that will be needed for a proper and safe lift. The instruction manual that is supplied by Dayton Superior will specify all the types of rigging configuration and cable lengths for the project. These details should be rigidly adhered to, since they are an integral part of the erection stress calculations.

DAYTON SUPERIOR DOES NOT SPECIFY THE DIAMETER OR SAFE WORKING LOAD OF THE CABLE as this is the responsibility of the erection contractor. The panel contractor should also make a list of required tools. The list should include, but not be limited to, a compressor, drills, wrenches, a bolt-on lift plate along with extra T13 post drilled anchors, ladders and miscellaneous hand tools. A minimum of two extra lifting hardware units should be on the job.

It is also prudent to anticipate material needs for last minute repairs. If a delay is caused for any reason, down time can add up rapidly.

The panel contractor should provide a clean working area with all obstacles removed. Members of the erection crew will be guiding a panel while it is being moved from the casting location to its position in the structure. Most of the time these crew members will be looking up at the rigging and inserts. They should not be tripping over loose debris and tools.

The erection contractor's minimum crew should consist of the crane operator, oiler (driver), rigger foreman, and two journeyman riggers. This crew should be augmented, as required, by carpenters and laborers from the panel contractor's work force, primarily to handle braces. In areas of the country where no erection contractors are available, the minimum crew should consist of crane operator, oiler, foreman and four to five laborers. An exception to this would be with stacked panels which require an additional two to three laborers. Consideration should also be given to having a welder standing by. A properly staffed and well coordinated erection crew is the key to successful lifting.

The crane operator must be a skilled journeyman, experienced in handling tilt-up panels. He must be able to control three motions of his crane: hoist, swing and boom hoist. It is quite normal to use all three of these functions simultaneously.

Panel Preparation

All standing water should be blown away from around the perimeter of the panel. Also, remove all water that might be pooled in panel openings. Standing water prevents air from entering under the panel and creates an additional load that must be overcome. These suction loads can be of such strength, that the additional load causes the lifting inserts to be overloaded.

Panel preparations should also include checking the inserts for proper location, as shown in the erection instructions. It also includes removing the void former from the insert. All inserts should be checked with a lift hardware to make certain that the hardware can be properly attached to the lifting insert. Strongbacks should also be properly installed at this time.

The required compression strength of the concrete must be attained. The strength of concrete, noted in the erection instructions, refers to the concrete compressive strength at the time of lifting and not the ultimate or 28 day strength. This should be checked by an independent test lab using beam or cylinder tests.

Blockouts over interior footings should not be broken out prior to the lift, particularly in rainy weather. Water under the slab could make the subgrade weak. Projecting ledgers and reinforcing steel must be brought to the attention of all concerned. All bracing that is attached to the panel prior to the lift must be inspected for proper length and type.

Day of Erection – Safety Meeting

A safety meeting with full crew should be held before any lifting starts and the accessory supplier should also be present for this meeting. Personnel should be told to never place themselves under the panel while it is being tilted or on the blind side of the panel when the crane is traveling with it. The crew should be told to never get between the crane and the panel. A conscientious erection contractor will always advise his crew that horseplay or unnecessary talking will not be allowed.

A standard part of the safety meeting, which is normally conducted by the rigger foreman, should contain comments about the need to remain alert. Each person's safety depends on the safe practices of others. The crew should be reminded that safety is everyone's responsibility and that hard hats are required. It is advisable for the erection contractor to create a safety check list and have the crew members sign it at the end of the safety meeting.

The rigger foreman should be clearly identified at the safety meeting. This individual will be the one the crane operator will be looking to for all signals. The rigger foreman must be experienced with handling panels and be totally familiar with the precise set of hand and arm signals. This will safely communicate his desires to the crane operator. Verbal instructions are all but impossible due to the noise level in the operator's cab.

A competent rigger foreman will create and maintain a confident atmosphere during the lift. He will always remain alert to guard against overconfidence, and will not allow the crew to become careless.

During the safety meeting the rigger foreman should demonstrate the proper use of the lifting hardware, bracing hardware and the proper way to hold a brace and how to use any necessary tools and equipment. If the crane is using rolling outriggers a warning to the crew to stay clear is in order.

The crew should be broken up into teams for handling bracing, rigging, and hardware attachment. Each individual's function and responsibility should be clearly defined. The panel contractor should furnish an individual whose responsibility it is to clean the floor slab casting location as soon as the crane has lifted a panel and cleared the area. Regardless of how good a contractor's housekeeping is prior to the lift, there is always a certain amount of debris left behind. This individual should also make certain that all leftover forming nails are pulled from the slab.

The rigging details furnished by Dayton Superior in the erection instructions are not merely simple guidelines from which the erector can stray. THE RIGGING DETAILS DEFINE THE PROPER RIGGING FOR EACH PANEL FOR THE ERECTOR. Spreader bar widths and cable angles are integral parts of the erection stress analysis.

Proper cable lengths are important to the success of the lift.

The use of cables that are shorter than the prescribed length will increase stresses in the panel and could cause the panel to crack. If an erector has a problem with rigging details or cable lengths, as they are shown in the erection instructions, he should not take it upon himself to change them. Instead, a call should be made to the technical service center from which the erection instructions originated. An alternate solution may be worked out depending on the individual situation.

Extra precautions should be taken when lifting panels with special shapes or special rigging. Erection instructions should be consulted for CAUTIONARY NOTES as to how a panel might act during lifting, and to again verify the rigging and the insert locations.

During the Lift – Precautions

Wind conditions must be considered prior to lifting a panel. A 40-ton panel will easily move in a slight breeze when hanging from a crane. All spectators should be kept well away from the lift and not allowed to interfere with the proceedings.

Panels should be inspected prior to lifting for any reinforcing steel and/or ledgers that may be projecting beyond the panel edges that will create interference when the panel is being plumbed next to a previously erected panel. This happens most often at corners.

After all attachments are made to the panel, and as the rigging is being raised to take the slack out of the cables, but prior to initial loading of the inserts, all rigging gear must be inspected for proper alignment and be free of snags. If non-swivel type sheaves are used, make certain the sheaves are properly aligned. As cables are being tensioned, they invariably tend to twist and possibly rotate the lifting hardware causing side loading on the hardware. The rigger foreman should be alert for this condition and if it does happen, **SHOULD HALT THE LIFT AND REALIGN THE HARDWARE.**

It is the rigger foreman's responsibility to be alert to all obstacles in the path of the crane and crew. He should be alert for panels that may be stuck to the casting surface. Under such conditions, loads transferred to the lifting inserts could be more than doubled causing possible insert failure. Carefully positioned, pry bars and wedges can often be successful in helping the crane release the panel from the casting surface. Any wedges that are applied to help release the panel should be positioned at the insert lines.

Braces are almost always attached to the panel prior to lifting. Caution must be taken to be certain the braces will not be trapped by the rigging when the panel is in the upright position.

Plumbing Panels – Precautions

Be alert when plumbing panels to their final upright position. Caution must be taken to make certain the panel being plumbed does not strike a previously erected panel. All personnel should be cleared of those critical areas around a panel when plumbing is being done. If the panel being plumbed is a closure panel, measurements should be taken prior to lifting to make certain the panel will fit.

Tilt-up panels should be as plumb as possible prior to attaching the brace to the floor attachment anchor. A temporary out-of-plumb condition **SHOULD NOT EXCEED 4"** measured at the top of the panel. It is generally more practical to "fine tune" the panel plumb-ness with the pipe braces after the lift is completed.

There are two commonly occurring conditions that dictate that the panels be braced perfectly plumb prior to releasing the crane:

1. If the panel is going to support an adjacent spandrel or lintel panel, the supporting panel should be in an accurate final position to prevent having to adjust it later when it is supporting another panel.
2. If the bracing design calls for a subsupport system of knee, lateral, and end or cross bracing, then the panel should be accurately plumbed prior to attaching the subsupport system. Panels requiring subsupport systems must not be plumbed later as the brace subsupport system, if not removed, must be at least loosened in order to adjust the main brace, thus placing the panel in a dangerous position.

Bracing – General

Do not release the crane load if, for any reason, the bracing does not appear adequate. Crane loads should always be released slowly, keeping an eye on the panel and bracing for any unusual activity. It is desirable that all bracing be complete before releasing the crane. That is, all knee, lateral, and end or cross bracing, if required, be in place. However, this is not always possible. You should always be able to install the knee bracing, however, the crane's position near the panel may prevent the lateral bracing from being attached.

Once the crane is clear of the area, the panel contractor must complete the lateral and end or cross bracing. He must complete this phase of the bracing while remaining no more than one panel behind the erection crew. All bracing should be completed on all erected panels at the end of the work day.

Standard Rigging Details

Rigging is an integral factor in Dayton Superior erection stress analysis. Rigging used on this project must conform to the rigging pattern specified and shown on the panel layout sheet for that individual panel.

Use spreader and equalizer beams of such length that rigging cables are at a 90 ± 5 degree angle with the equalizer beams, unless otherwise shown or noted on the panel layout sheet.

The contractor must refer to the special information sheet for the minimum cable length to be used for each type of rigging specified in these erection details. Using shorter cables than specified may overload inserts or crack panels.

WARNING

Use of shorter cables or rigging patterns other than specified can cause insert failure, cracked panels, property damage, serious injury or death.

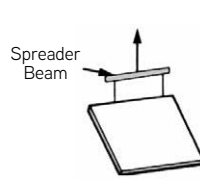
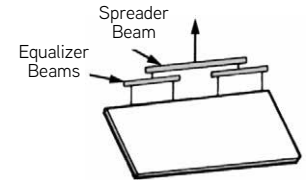
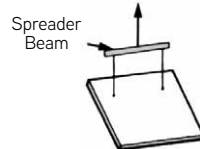
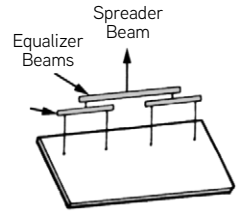
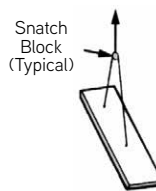
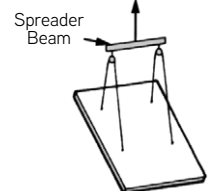
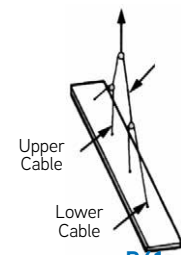
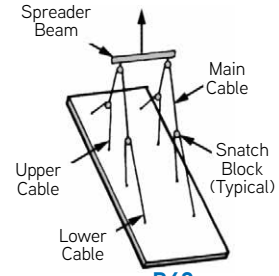
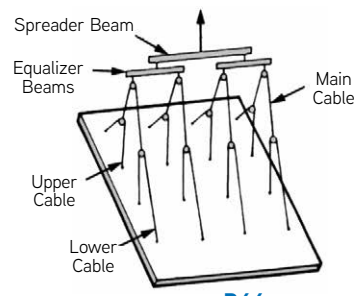
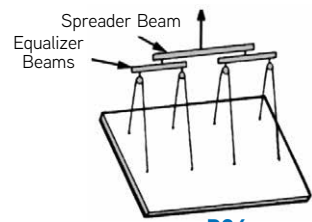
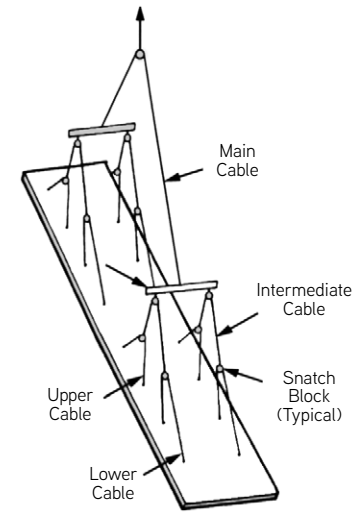
Cables must be of sufficient diameter to minimize stretch under load. Small diameter cables may have sufficient strength, but may stretch and cause the panel to bounce and result in increased insert loads.

WARNING

The factor of safety used in the lifting design for these tilt-up panels is based on the panel being handled one time. Lifting and/or handling a panel more than one time could lead to property damage, serious injury or death.

WARNING

Contact Dayton Superior Technical Service Center for proper rigging details before attempting to use two cranes dual-rigged to lift one panel. Improper dual-rigged cranes may overload inserts resulting in property damage, serious injury or death.


R02

R04

R12

R14

R21

R22

R41

R42

R44

R24

R82

Boom Positioning

To safely erect a tilt-up panel, the crane boom must be directly over the panel's center of lift. If the boom is not correctly positioned the inserts have different loads than calculated in the erection analysis and the stresses in the panel will be greater than anticipated. If insert loads or panel stresses become too large, an insert will pull out of the concrete or the panel will crack.

When the crane boom is set toward the bottom of the panel (under-booming) as the panel is erected, the panel will slide backwards. When the crane boom is set toward the top of the panel (over-booming) as the panel is erected, the panel will slide forward.

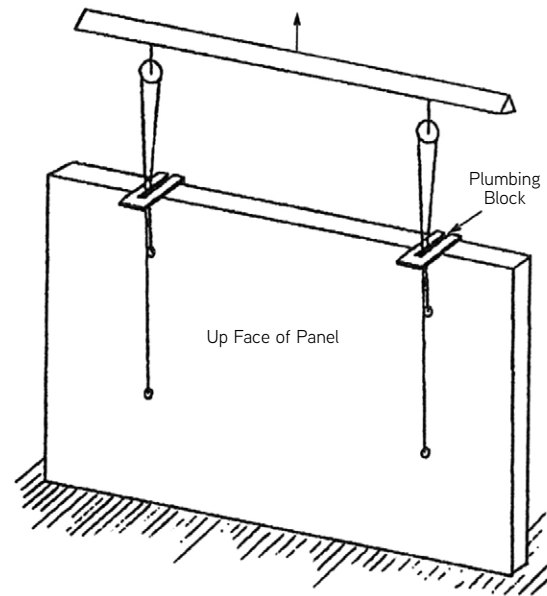
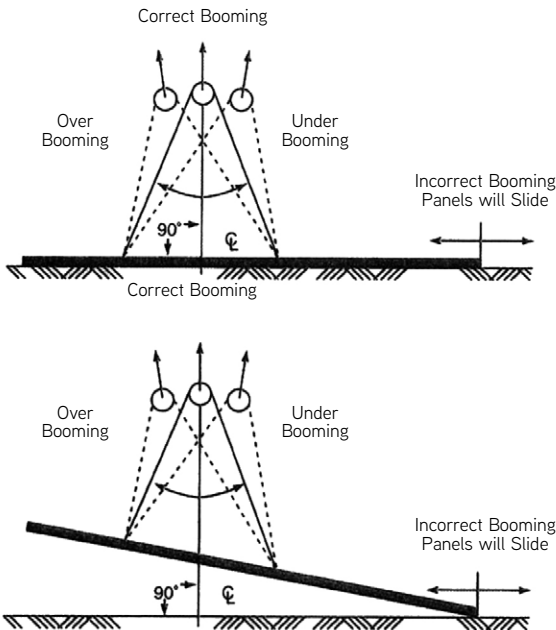
When a panel slides due to excessive under-booming or over-booming, it is possible for someone to be trapped between panels, between the panel and the crane, between panel braces, etc.

Plumbing Face-Lifted Panels

When a tilt-up panel is too tall to erect using edge lift inserts and the panel must hang as plumb as possible for setting, there are three standard methods available for use. One is the "plumbing block" method, the second is the "brace and re-rig" method and the third is the "transfer" method.

Plumbing Block Method

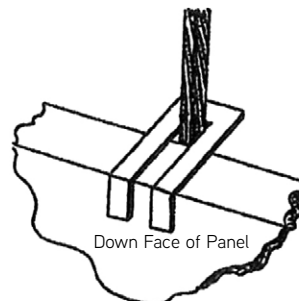
After erecting the panel to a vertical position, set the panel on the ground and tip the panel so that the panel's top edge rests against the rigging cables. Next, plumbing blocks supplied by others are placed around the cables and hooked over the top of the panel as shown below. The tendency of the cables to pull away from the panel will keep the plumbing blocks tight as the crane lifts the panel into position.



NOTE: Rigging may vary from that shown.

WARNING

Incorrect placement of the crane boom can cause over-stressing of the panel/inserts and possible sliding of the panel. Failure to correctly position the crane boom can cause property damage, serious injury or death.

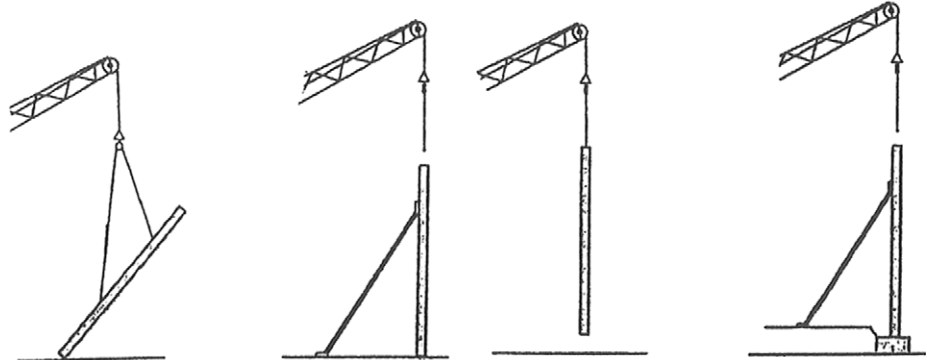


Plumbing blocks must be fabricated for each particular situation depending on the panel thickness and the number and diameter of cables. The plumbing blocks must fit securely over the thickness of the panel on the cables as shown.

Brace and Re-Rig Method

The “brace and re-rig” method is used when a crane does not have a second line that can safely carry the required panel weight. This method requires you to:

1. Erect the panel using the face lift inserts only.
2. Brace the panel as required.
3. Release the face lift hardware and rigging.
4. Reinstall the proper hardware and rigging onto the final set inserts.
5. With the rigging tight, remove the bracing.
6. Lift and set the panel into its final position.
7. Brace the panel as detailed.
8. Remove the final set lifting hardware and rigging.



1. Lift Panel With Face Lift Inserts
2. Brace Panel

3. Release Hardware
4. Re-Rig Panel

5. Remove Bracing
6. Lift and Set Panel
7. Set and Brace

8. Remove Hardware

NOTE: Rigging may vary from that shown.

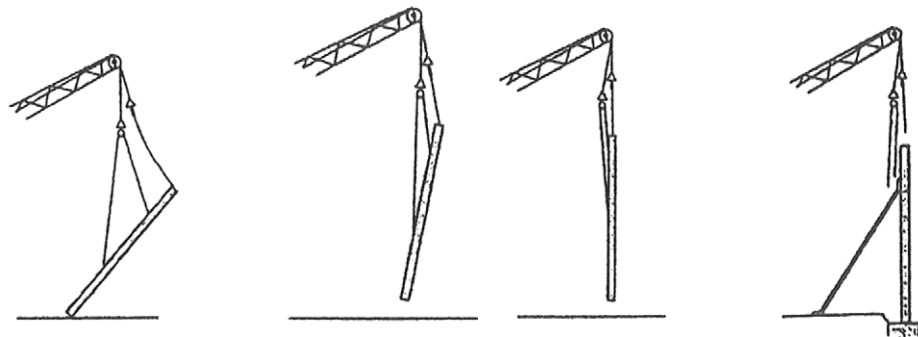
WARNING

Failure to properly brace panels before releasing lifting hardware may cause failures resulting in injury or death.

Transfer Method

The “transfer” method is generally used when the crane has a second line that can safely carry the total panel weight. Using the transfer method requires:

1. That the panels be lifted to the vertical position using the face lift inserts and rigging only.
2. Keeping the rigging attached to the final set inserts slack with the final set hardware properly aligned with the cables.
3. After the panel is vertical and completely in the air, transfer the total panel load to the crane line and rigging attached to the final set inserts.
4. The panel is then set into its final position.
5. Brace the panel as detailed.
6. Release both the face lift and final set lifting hardware and rigging.



1. Lift Panel Using Face Inserts
2. Edge Lift Rigging Remains Slack

3. Transferring Load To Edge Lift Inserts

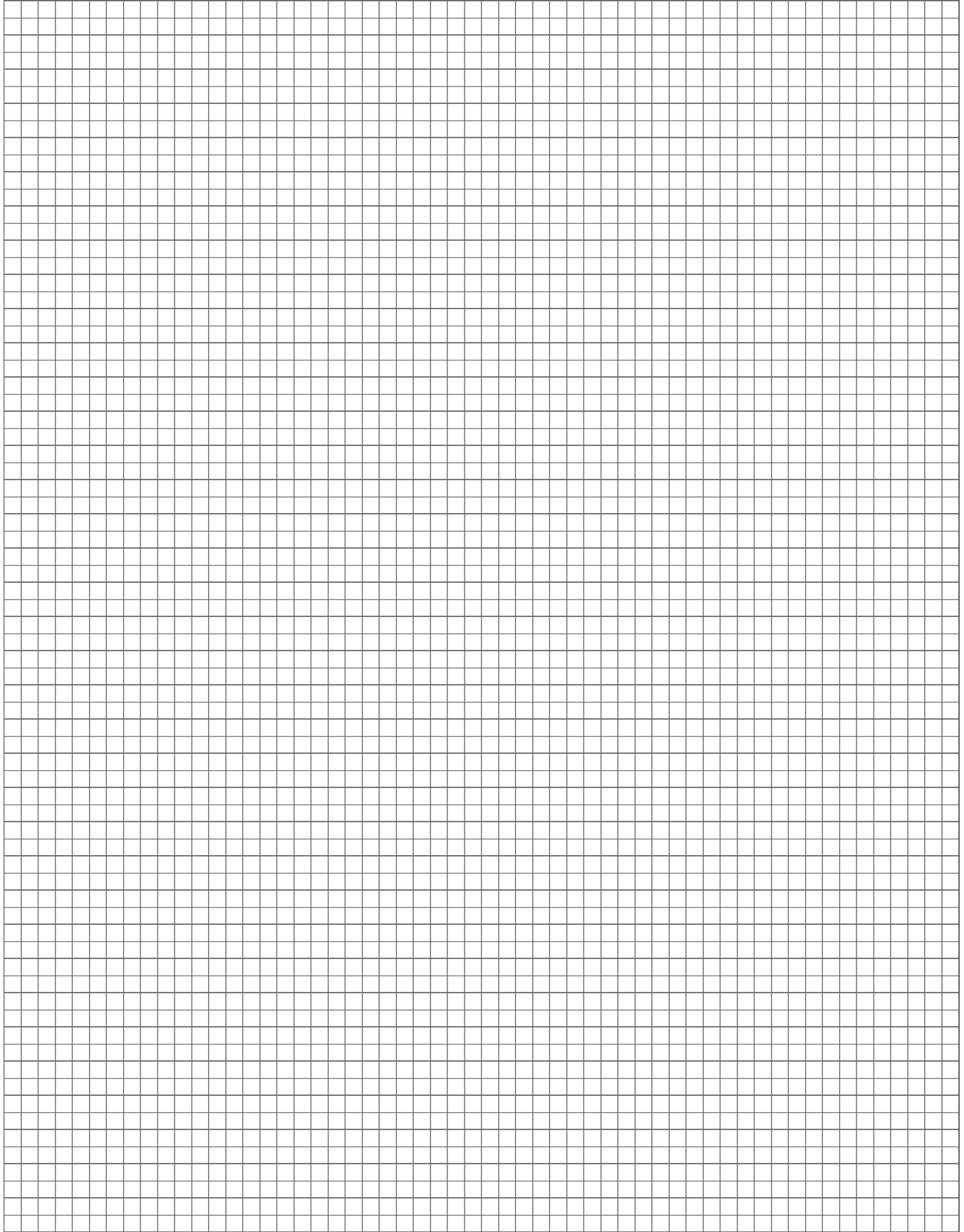
4. Load Transferred and Panel Set In Place
5. Brace As

6. Required Release Hardware

NOTE: Rigging may vary from that shown.

WARNING

Failure to properly brace panels before releasing lifting hardware may cause failures resulting in injury or death.



Dayton Superior manufactures several lifting systems for Tilt-Up Construction. These systems are made to meet the many designs and job requirements found in the market. The project requirements along with the contractor's preference dictate which system is utilized on a project. Listed below is a brief description of the various options available to the contractor.

T250 Tilt-Up Lifting System

This system features the T250 Lifting Insert capable of lifting 24,000 # SWL per insert for face lifting, and the T120 Superior Lifting Hardware for erection of the panels. The system is a ground release system. The insert consists of a dual forged foot anchor assembled in a four-leg base with a plastic void cover. The insert is a directional insert used parallel to the height of the panel.

Superior Lifting System

This system features the T110 Superior Lift Insert capable of lifting 24,000 # SWL per insert for face lifting and the T120 Superior Lifting Hardware for erection of the panels. The system is a ground release system typically used on larger, heavier panels with concrete thickness over 8". The insert is composed of a forged anchor with wire leg assembly for support and a plastic disposable void former. The insert is a directional insert used parallel to the height of the panel. For edge lifts, the Dayton P92P Erection Anchor with shear plate is utilized. This utilizes T120 Superior Lifting Hardware.

Ground Release Lifting System

This system features the T41 Ground Release Insert capable of lifting 15,000 # SWL per insert for face lifting and the T43L Ground Release Lifting Hardware for erection of the panels. This system is a ground release system typically used for panels up to 8" in thickness. The insert is a forged "dog bone" style insert with a plastic star base or wire base and a plastic disposable void former. The insert is a directional insert used parallel to the height of the panel. For edge lifts, the Dayton P52 Swift Lift[®] Anchor with shear bar is utilized. This anchor can utilize the same T43L hardware during the erection. This system is available in a 22,800 # SWL System. See T81 Heavy Ground Release Insert.

Gyro Tilt Plus System

This system features the T49 Gyro Tilt Plus Face Insert capable of lifting 15,000 # SWL per insert for face lifting and the T50 Gyro Tilt Plus Lifting Hardware for erection of the panels. This system is a ground release system typically used for panels up to 8" in thickness. The insert is a forged "dog bone" style insert with a wire leg assembly or plastic star base and a plastic disposable void former. This insert is a non-directional insert allowing complete rotation of the lifting hardware. For edge lifts, this system also uses the T49E Anchor (no base) with shear bar and the T50 Gyro Hardware during erection. This system is available in a 22,800 # SWL System. See T52 Heavy Gyro Insert.

Coil Lifting System

This is the basic system employed during the original development years of tilt construction. This system uses the Dayton Superior T1 Pick-Up Insert along with B14 Coil Bolts and a variety of lifting hardware. The T1 Insert is available in 3/4" to 1-1/2" diameters, capable of lifting 14,000 # SWL per insert. This system is utilized today with smaller buildings and unique limited repetition panels. The T12 and T26 Lifting Hardware are used for erection of the panels.

T110 Superior Lift System

The Dayton Superior T110 Superior Lift Insert consists of a forged foot anchor, 4-leg wire base and plastic void former. The insert is positioned with the void direction toward the top of the panel and then is tied in place to the rebar cage. The T120 Superior Lifting Hardware allows quick attachment to the insert and remote ground release after panel has been erected and braced. The T110 Superior Lift Inserts are shipped assembled, ready to go and are sized 1/8" less than the panel thickness.



T110 Superior Lift System

Structural Panel Thickness	Face Tension 2:1 SF	Face Shear 2:1 SF	Anchor Length
5"	11,600 lbs	12,400 Lbs	3.625"
5.5"	13,000 Lbs	13,400 Lbs	4.125"
6"	14,300 Lbs	14,400 Lbs	4.625"
6.5"	15,700 Lbs	15,300 Lbs	5.125"
7"	17,000 Lbs	16,200 Lbs	5.625"
7.25"	17,700 Lbs	16,700 Lbs	5.875"
7.5"	18,400 Lbs	17,100 Lbs	6.125"
8"	20,200 Lbs	18,100 Lbs	6.625"
8.5"	21,600 Lbs	19,200 Lbs	7.125"
9"	23,000 Lbs	20,400 Lbs	7.625"
9.25"	23,700 Lbs	20,900 Lbs	7.875"
9.5"	24,000 Lbs	21,500 Lbs	7.875"
10"	24,000 Lbs	22,900 Lbs	7.875"
10.5"	24,000 Lbs	22,950 Lbs	7.875"
11"	24,000 Lbs	23,000 Lbs	7.875"
11.25"	24,000 Lbs	23,400 Lbs	7.875"
11.5"	24,000 Lbs	23,800 Lbs	7.875"
12"	24,000 Lbs	24,000 Lbs	7.875"

** Safe working load provides approximate safety factor shown with minimum 2500 psi normal weight concrete.

To Order:

Specify: (1) Quantity, (2) Name, (3) Panel Thickness, (4) bottom face aggregate or formliner thickness

Example:

150, T110 Superior Lift Inserts, 9" Panel with 1/2" formliner panel

P99P Fleet Patch

The Dayton Superior P99P Fleet Patch is a durable plastic patch designed to quickly cover T110 Fleet-Lift setting plug recesses. The P99P patch is fabricated from an additive stabilized polypropylene to maintain the patch's slightly convex shape. The convex shape helps to keep a constant gripping pressure after installation. The patch is supplied in a concrete gray color with a matte finish that allows subsequent painting, if desired.

Fleet Patch Advantages:

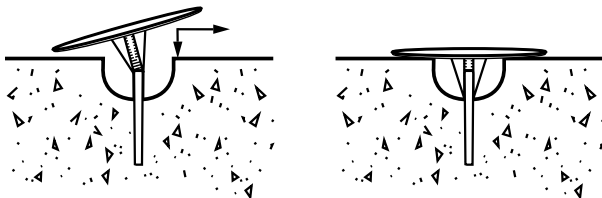
- Special shape-holding composition
- Fast, one-piece "push-on" installation
- Paintable concrete gray matte finish
- Full eight (8) inch diameter
- Weather and chemical resistant
- Self adjusting grippers

The P99P Fleet Patch is a high quality, one piece plastic patch that is easy to install and maintain. It will provide a quick and economical solution to covering Fleet-Lift anchor recesses.

Typical P99P Fleet Patch Installation:

- 1) Start the patch grippers on the top edge of the anchor
- 2) Push the patch onto the anchor and flush with the concrete

Note: The P99P Fleet Patch will not prevent corrosion or rusting of an embedded anchor that is subject to wet conditions. Spraying the anchor with a corrosion resistant compound and applying a bead of silicone around the underside of the patch will help prevent moisture penetration.



P99P Fleet Patch

Fleet Patch

Sales Category	Product Code	Weight for 100
P99P	FL612	24 lbs.

To Order:

Specify: (1) quantity, (2) name, (3) product code.

Example:

200, P99P Fleet Patch, FL612.

T250 Tilt-Up Anchor

The Dayton Superior T250 consists of a dual forged foot anchor assembled in a four-leg base with a plastic void cover. The insert is positioned with the void direction toward the top of the panel and then tied in place to the rebar mat. The T250 inserts are shipped assembled, ready to install and sized 1/8" less than the panel thickness. The T120 Lifting Hardware allows for quick attachment to the insert and remote ground release after the panel has been erected and braced.

Product Code	Structural Panel Thickness	Safe Working Load - Tension	Safe Working Load - Shear
144887	5.5"	9,400 Lbs	16,750 Lbs
144888	6"	12,200 Lbs	19,000 Lbs
144889	7.25"	20,100 Lbs	24,000 Lbs
144890	8"	20,100 Lbs	24,000 Lbs
144891	8.5"	20,100 Lbs	24,000 Lbs
144892	9.25"	24,000 Lbs	24,000 Lbs

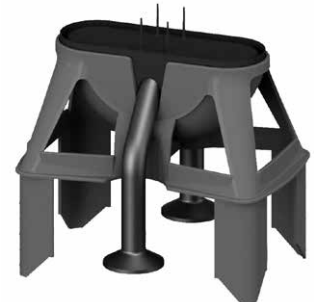
Standard insert heights are shown in the chart. Minimum edge distance is 15"

To Order:

Specify:(1) Quantity, (2) Name, (3) Panel Thickness, (4) Product Code

Example:

150, T250 Tilt-Up Anchors, 7-1/4" 144889



T250 Tilt-Up Anchor

T120 Superior Lift Hardware

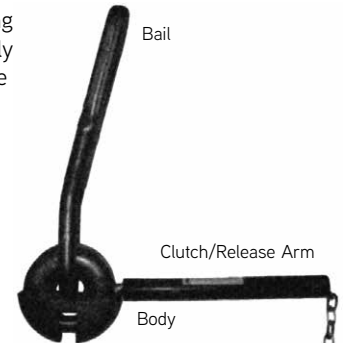
The Dayton Superior T120 Superior Lift Hardware is designed to easily attach to the insert by engaging the curved clutch handle into the opening in the anchor. The bail of the hardware is designed to readily align itself to the pull of the rigging. Once engaged and under load, it can not be disengaged by remote ground release until the load has been removed in lowering the rigging. The T120 is used for face or edge lift system conditions.

To Order:

Specify:(1) Quantity, (2) Name

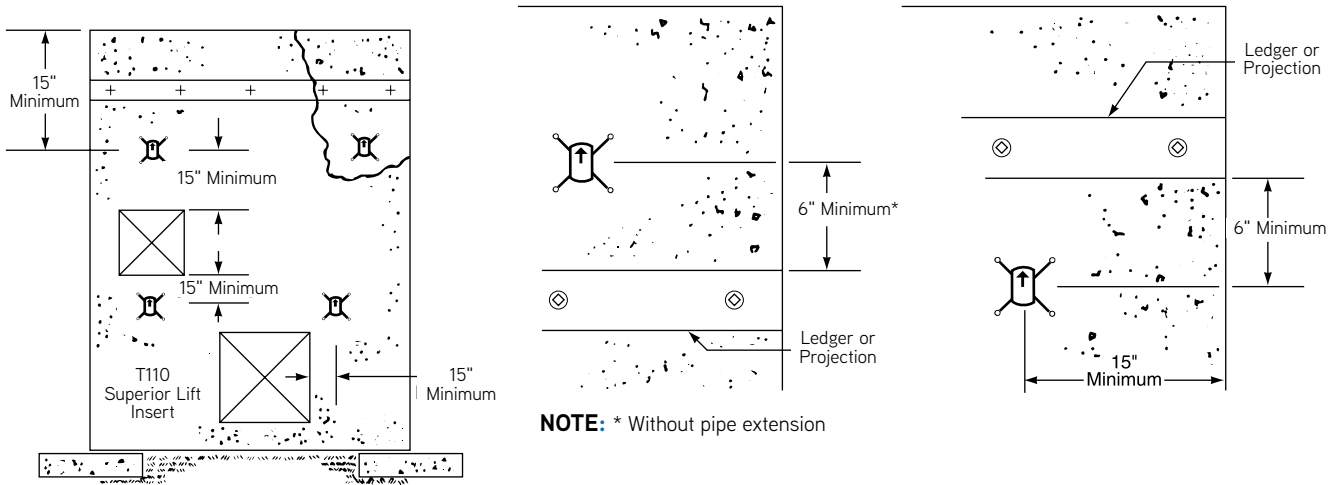
Example:

8, T120 Superior Lift Hardware



T120 Superior Lift Hardware

Minimum Insert Distances



Lifting Systems

Warning! All T110 Superior Lift Inserts must be properly located in relation to the center of gravity of the panel. See notes below.

Safety Notes:

Safe use of the Superior Lift System requires the inserts to be positioned so that the arrows on the direction label point to the top and bottom of the panel (parallel to the sides of the panel).

The inserts must be properly located in relation to edges, corners, openings and ledgers, and at distances allowing the development of a full concrete shear cone. Minimum distances are shown in the sketches above. Placing an insert closer to an edge than the minimums shown may reduce the effective concrete shear cone and reduce the insert's safe working load.

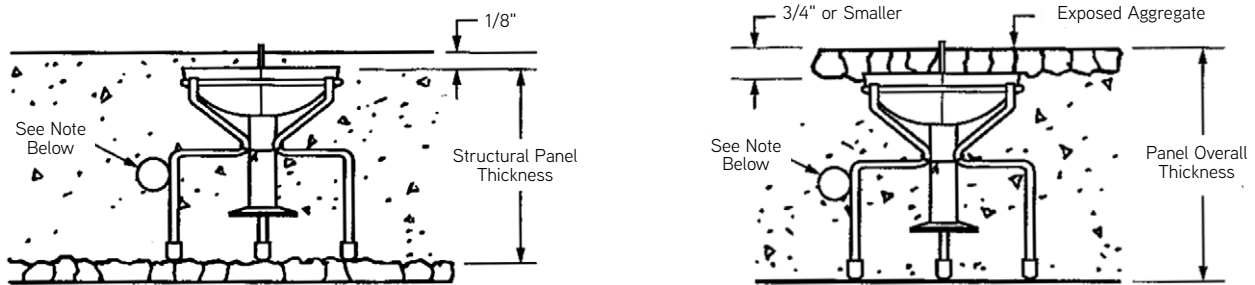
Lifting inserts must be properly wired in place so that the vertical axis of the insert is perpendicular to the panel surface. Care must be taken to avoid displacement of the inserts during concrete placement and screeding operations.

Do not weld to the Superior Lift Anchor as welding causes embrittlement and can result in premature failure.

Exposed Aggregate Panel Inserts

Tilt-up panels with exposed aggregate or formliner thickness are often cast face down. In these panels, the aggregate or formliner thickness and the structural thickness are required to determine correct insert height.

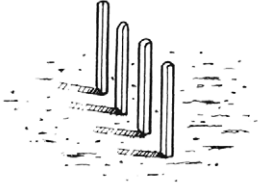







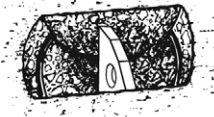
For panels exposed aggregate face up, the overall thickness of the panel determines insert height.



NOTE: If attaching insert to rebar mat, it must be attached on vertical portion of the wire base leg as shown. DO NOT attach rebar to the horizontal portion of the wire base leg.

NOTE: It is not required to attach the insert to rebar.

How to Remove the T110 Plastic Recess Plug

 <p>1. The T110 Insert's location in the panel is easily found by locating the antennae which will project through the surface of the concrete.</p>	 <p>2. Using an ordinary claw hammer, tap lightly around the antennae, breaking through the thin skin of concrete to expose the insert. Avoid striking the concrete too hard so as not to break through the plastic recess plug.</p>	 <p>3. Drive the claws of the hammer down about 3/8" between the end of the recess plug and the concrete.</p>
 <p>4. Pry up on the end of the recess plug until one half of it pops up to a point where it is about one third of the way out of the concrete. For the time being, leave it as it is and proceed with step #5.</p>	 <p>5. Repeat steps #3 and #4 to loosen the opposite half of the recess plug.</p>	 <p>6. Grasp both halves of the recess plug between the thumb and finger and squeeze.</p>
 <p>7. Both halves of the recess plug should now be easily removed, exposing the insert.</p>	 <p>8. If one half of the recess plug should be hard to remove, drive the claws of the hammer as deep as possible between the recess plug and the top of the insert, as shown above. Push forward on the hammer with one quick motion. This will remove the recess plug.</p>	 <p>9. Use a blower to remove all debris from around the insert and the recess plug. The insert is now ready to receive the lifting hardware.</p> <p>Note: For proper hardware release do not "round" out void holes.</p>

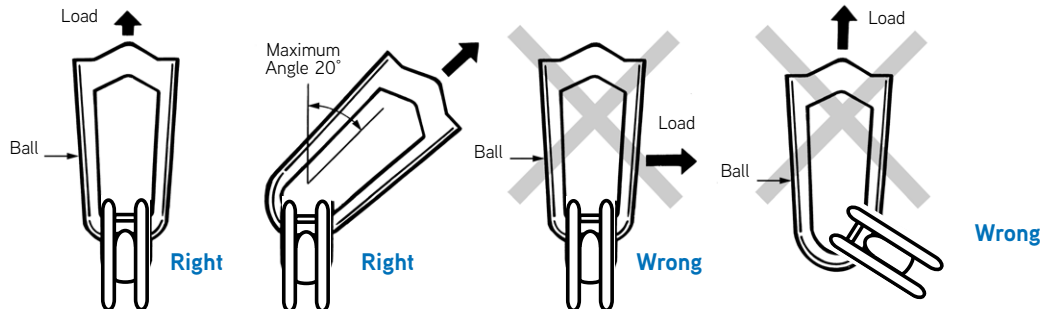
Lifting Systems

Proper Hardware Usage

Prior to lifting any tilt-up panel, apply an initial load to the crane lines, making certain that the hardware is properly attached to the head of the T110 Insert and that the bail of the lifting hardware is aligned with the crane line.

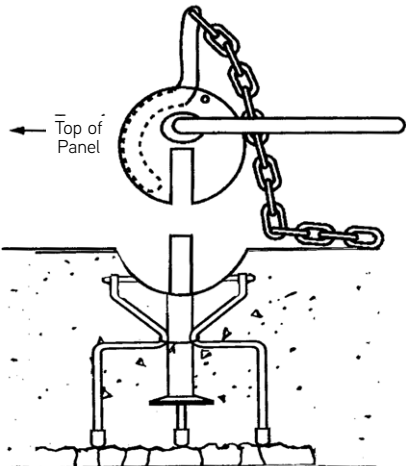
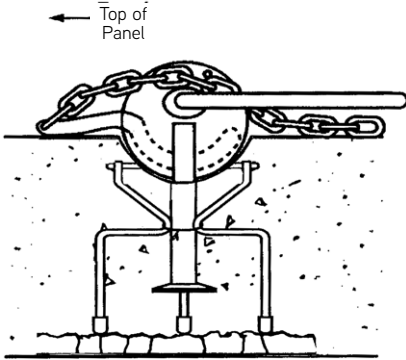
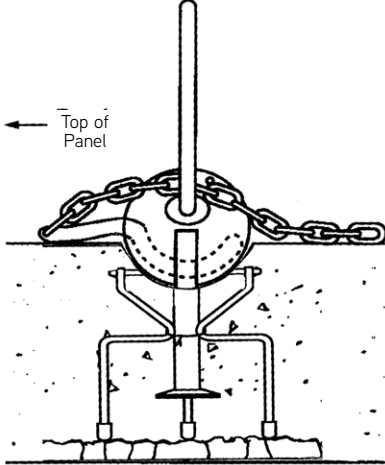
Warning! Do not apply a sideward load to the bail of the lifting hardware.

Warning! Do not modify, weld or alter in any way T120 Hardware units. Such actions could lead to premature failure of the hardware.

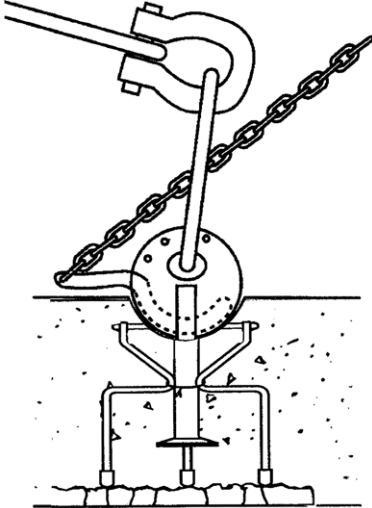
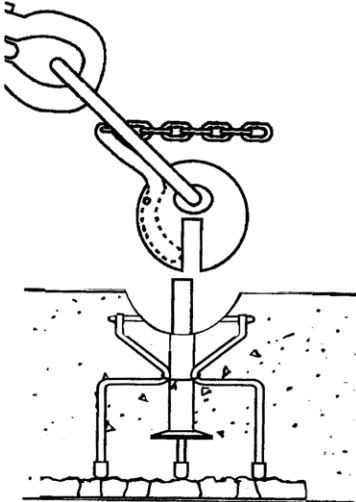


T120 Superior Lift Hardware Installation Sequence

Lifting Systems

 <p>1. T120 Hardware in open position centered over the T110 Insert.</p>	 <p>2. The Hardware nestled in the Insert Recess and the Bolt/Release Arm engaged. The Bolt/Release Arm must contact the panel surface as shown in the sketch. Chip away excess concrete, if necessary, to nest the Bolt/Release Arm on the concrete surface. Contact a Dayton Superior Technical Service Center if unable to nest the Bolt/Release Arm on the face of the panel.</p>	 <p>3. The installation is complete. Erection may proceed.</p>
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T120 Superior Lift Lifting Hardware Release Sequence

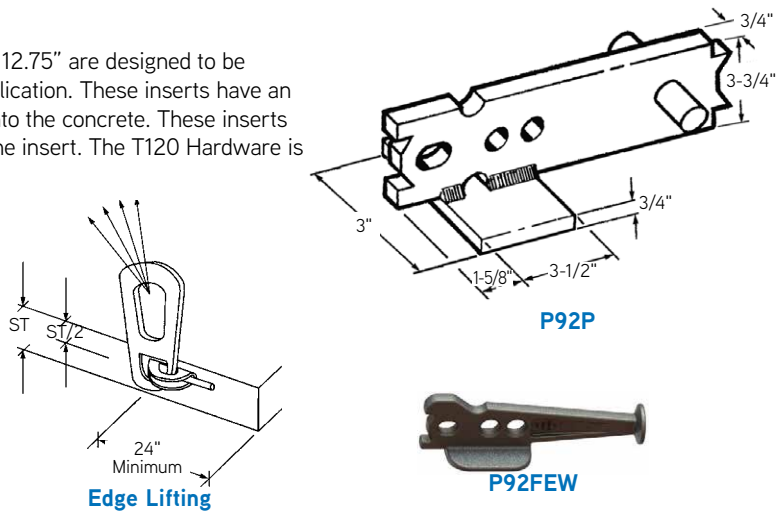
 <p>1. After the panel erection is complete and the panel has been properly braced/tied-off, the crane line should be relaxed slightly to permit the release of the lifting hardware.</p>	 <p>2. To Release the hardware, apply a quick, even downward force to the release line. The hardware stays attached to the crane line and is moved to the next panel.</p>
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T110E Edge Lift Application

The P92P 8T x 13.25" Edge Lift Insert and P92FEW 10T x 12.75" are designed to be used with the T110 Superior Lift System in an edge lift application. These inserts have an integral shear plate for maximum transfer of shear loads into the concrete. These inserts use the P99D 8T-10T Disposable Recess Plug for setting the insert. The T120 Hardware is used for erection with these inserts.

To Order:
Specify: (1) quantity, (2) name

Example:
20, P92P 8T FL149 Erection Anchor w/
SP20, P99D 8T FL068S Disposable Recess



P92P Stamped Anchor

Structural Panel Thickness	SWL 2:1 Safety Factor			SWL 2.5:1 Safety Factor		
	Shear (lbs)	Tension with Anchor Only (lbs)	Tension with #6 Tension Bar (lbs)	Shear (lbs)	Tension with Anchor Only (lbs)	Tension with #6 Tension Bar (lbs)
6"	6,760	9,432	24,000	5,408	7,546	24,000
7"	7,180	11,612	24,000	5,744	9,290	24,000
8"	7,560	13,142	24,000	6,048	10,514	24,000
9"	8,000	14,030	24,000	6,400	11,224	24,000
10"	8,300	14,875	24,000	6,640	11,900	24,000
11"	8,800	16,903	24,000	7,040	13,522	24,000
12"	9,200	19,100	24,000	7,360	15,280	24,000

Safe working load provides approximate safety factor shown in chart with minimum 2500 psi normal weight concrete

P92FEW Forged Anchor

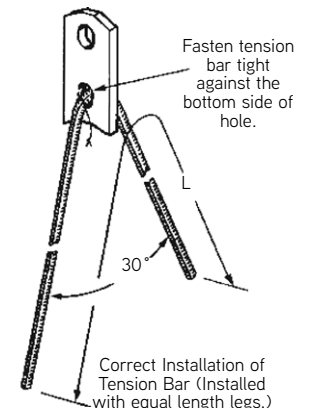
Structural Panel Thickness	SWL 2:1 Safety Factor			SWL 2.5:1 Safety Factor		
	Shear (lbs)	Tension with Anchor Only (lbs)	Tension with #7 Tension Bar (lbs)	Shear (lbs)	Tension with Anchor Only (lbs)	Tension with #7 Tension Bar (lbs)
7.5"	7,775	24,000	24,000	6,220	23,664	24,000
8"	8,113	24,000	24,000	6,491	24,000	24,000
9"	9,212	24,000	24,000	7,370	24,000	24,000
10"	10,311	24,000	24,000	8,249	24,000	24,000
11"	11,494	24,000	24,000	9,195	24,000	24,000
12"	12,846	24,000	24,000	10,277	24,000	24,000

*SWL provides approximate safety factor shown in chart with minimum 2,500 psi normal weight concrete

P98T Fleet-Lift Tension Bar

The Dayton Superior P98T Fleet-Lift Tension Bar is used with various Fleet-Lift Anchors to provide a simple, inexpensive method of distributing tension forces (lifting) deep into a precast member.

Anchor Tonnage	Tension Bar (Grade 60)	Length of P98T Tension Bar
6-ton or 8-ton	#6	66"
10 Ton	#7	96"



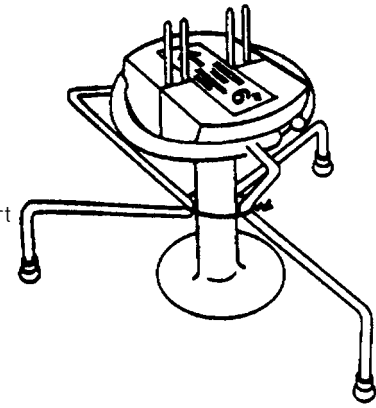
Lifting Systems

T41 Ground Release^{II} Insert

The Ground Release^{II} System is a unique method of tilting concrete tilt-up wall panels into position and allows the hardware to be easily released from the ground. Ladders are normally not required during the hardware release process which greatly increases worker safety and productivity.

Features of the T41 Ground Release^{II} Insert Are

- **Flexible Plastic Antenna** folds over when screed passes, but springs back to indicate insert location.
- **Plastic Recess Plug** creates a void for attaching the Ground Release^{II} Lifting Hardware to the insert head. The expendable plastic recess plug is easily removed from hardened concrete.
- **Directional Label** indicates correct panel thickness and direction of plastic recess plug in relation to top and bottom of panel.
- **Ground Release^{II} Anchor.** This hot forged anchor permits rapid hardware attachment and allows smooth rotation of the hardware during the releasing operation.
- **Wire Frame** is standard used with T41 inserts. This provides a stable base that is easy to insert into rebar cage. A Plastic Support Base is available in situations where the insert is set on insulation or where there is concern of potential rust problems.
- **Ground Release^{II} Inserts** are shipped assembled, ready to use and are sized 1/8" less than panel thickness. SWL provides a safety factor of approximately 2 to 1 in 2,500 psi normal weight concrete.



T41 Ground Release^{II} Insert

NOTE: Special inserts are available sized for panel thicknesses other than those listed in the chart above. When these special inserts are supplied, they will have the Ground Release^{II} Anchor suspended from a plastic tipped wire

T41 Single Ground Release ^{II} Insert Selection Chart							
Structural Panel Thickness	5"	5-1/2"	6"	6-1/2"	7"	7-1/2"	8"
Ground Release ^{II} Anchor Length	3-3/4"	4-1/4"	4 3/4"	5-1/4"	5-3/4"	5-3/4"	5-3/4"
Insert Safe Working Load (lbs.)	8,000	10,000	12,000	13,500	15,000	15,000	15,000

To Order:
Specify: (1) quantity, (2) type, (3) panel thickness, (4) bottomface exposed aggregate or foam formliner thickness

Example:
150 pcs., T41 **Ground Release^{II}** insert for 6" panel and 3/4" bottom face exposed aggregate.

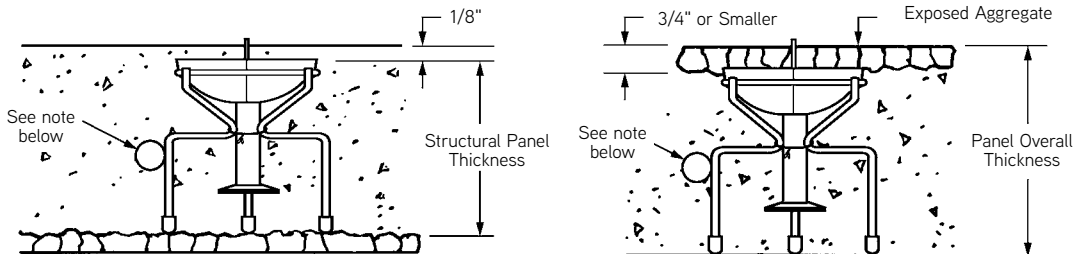
support chair instead of being supported by a plastic base.

Danger! Do not use for edge lifting of panels, as insert is not designed for such use. Do not use with top surface seeded exposed aggregate 3/4" or larger as aggregate will pop out during erection resulting in a reduced insert SWL.

See "Safety Notes and Product Applications" in General and Technical Information for reduction factors that must be applied to insert's SWL when using lightweight concrete.

Exposed Aggregate Panel Inserts

NOTES: For panels cast with exposed aggregate face down or those using a formliner, the panel's structural thickness determines the insert height. In these cases, the exposed aggregate or formliner thickness as well as the panel's structural thickness are required to determine the proper insert height.

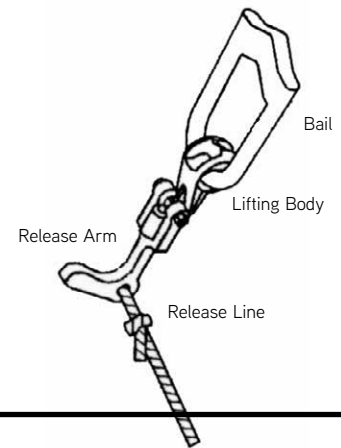


For panels cast with exposed aggregate face up, the panel's overall thickness determines the insert height for that panel. See the above sketch.

T43L Ground Release^{II} Lifting Hardware

T43L Ground Release^{II} Lifting Hardware unit offers the tilt-up contractor the latest and easiest to use tilt-up lifting hardware unit on the market today! This new lifting hardware unit is a simplified design and when combined with our T41 Ground Release^{II} Insert provides you with a superior system for the quick and efficient erection of tilt-up concrete wall panels.

- Bail will accept all conventional crane attachments. Unit moves easily as it follows line of action of crane cable.
- Lifting Body attaches to head of insert. Whenever diagonal loads are applied to the bail, the result is a combination of a compressive load applied to the concrete and a tension load applied to the insert.
- Release Line is a 1/2" hollow braided Polyethylene Cord of sufficient length to reach the ground.
- SWL is 15,000 lbs. with an approximate factor of safety of 5 to 1.

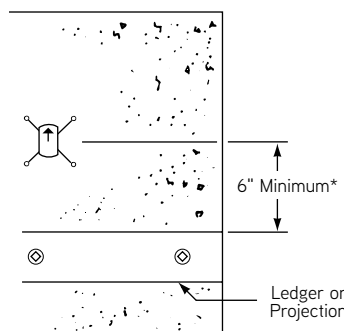
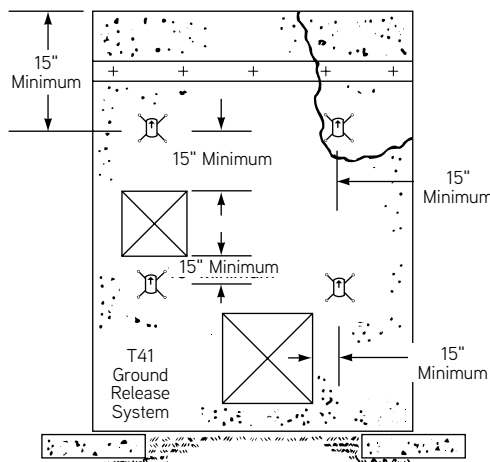


Minimum Insert Distances

Safety Notes:

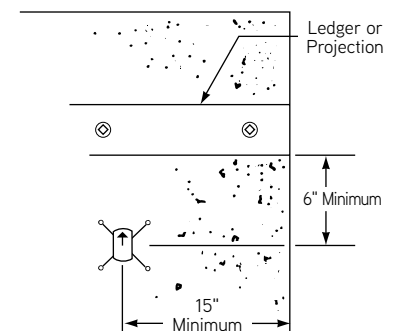
Safe use of the Ground Release^{II} System requires the inserts to be positioned so that the arrows on the direction label point to the top and bottom of the panel (parallel to the sides of the panel).

The inserts must be properly located in relation to edges, corners, openings and ledgers, and at distances allowing the development



NOTE: * Without pipe extension

Warning! Inserts must be properly located in relation to the center of gravity of the panel. This work should be performed under the direction of a registered professional engineer.



of a full concrete shear cone. Minimum distances are shown in the sketches above. Placing an insert closer to an edge than the minimums shown may reduce the effective concrete shear cone and reduce the insert's safe working load.

Lifting inserts must be properly wired in place so that the vertical axis of the insert is perpendicular to the panel surface. Care must be taken to avoid displacement of the inserts during concrete placement and screeding operations.

Do not weld to a lifting insert. Welding causes embrittlement and can result in an insert failure. See related safety information concerning welding on inside back cover.

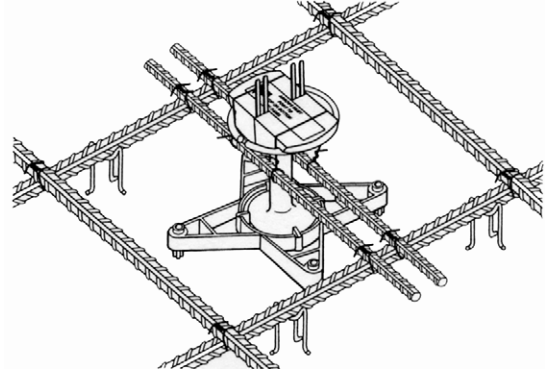
How to use the Ground Release^{II} System – T43L Hardware

Do Not Use This System On Top Surface, Seeded, Exposed Aggregate 3/4" or Larger.

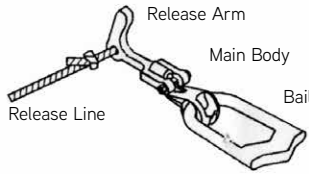
Precheck all insert holes with hardware prior to erection date, following instruction steps 2, 3 and 4, so that during tilting, proper hardware action is assured. See next page for proper procedure for removal of plastic recess plug.

1. Install the insert so the directional arrow on the plastic recess plug points to the top or bottom of the panel. Wire tie the insert into position using a short length of additional reinforcing steel (rebar) placed tight against each side of the insert. Next, near each end of the plastic void former, secure a tie wire to one of the additional rebars, running the wire over the top of the plastic void former and back down, securing it to the additional rebar on the other side of the insert. Be sure to run the tie wire between the metal ring and the plastic void former as shown in the sketch to the right.

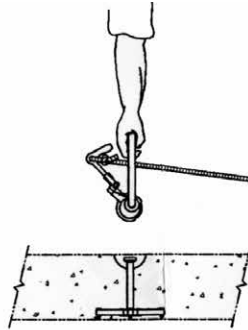
Note: The short length of rebar recommended is an aid to prevent the insert from moving during concrete placement. When this rebar is added for insert stability, it should be placed against the vertical portion of the insert and at least 1" away from the insert's foot. This extra rebar is not required to develop the insert's safe working load.



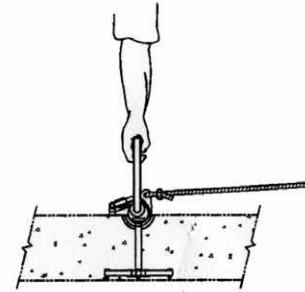
T43L Installation Sequence



2. The various parts of the T43-L Ground Release^{II} Lifting Hardware are shown above.

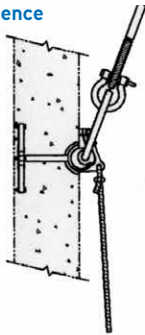


3. To install the lifting hardware onto the insert, hold the hardware by the bail, release arm, and lower it onto the head of the insert. Check to make certain that the release arm points to the top of the panel.

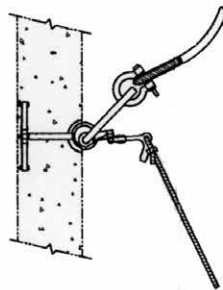


4. Lower the release arm parallel to the face of the panel. Lay the release line along side of the lifting hardware so that the line goes to the bottom of the panel. With the crane lines attached, the panel is now ready for lifting.

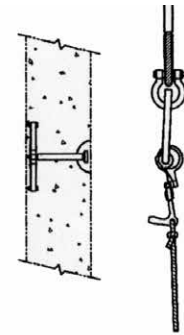
T43L Release Sequence



5. As the panel is lifted, friction from the load on the insert prevents the lifting hardware from prematurely releasing. Brace and secure the panel into position.



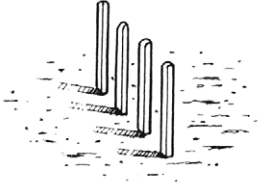

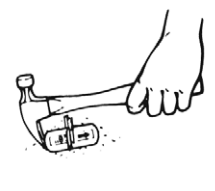




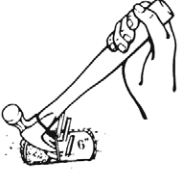
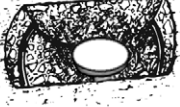
6. The crane line should be slackened slightly to permit the release of the lifting hardware. To release the lifting hardware, apply a single downward force to the release line.



7. The lifting hardware remains in the open position, ready to be lowered to the ground and attached to the next panel.

Danger! The crane line and bail of the lifting hardware must be turned in the direction of the cable forces before the lifting operation begins. The crane line must not be allowed to apply a sideward force on the bail, as this condition is dangerous and could lead to premature failure of the hardware or insert.

How to Remove the T41 Ground Release^{II} Plastic Recess Plug

 <p>1. The Ground Release^{II} Insert's location in the panel is easily found by locating the antennae which will project through the surface of the concrete.</p>	 <p>2. Using an ordinary claw hammer, tap lightly around the antennae, breaking through the thin skin of concrete to expose the insert. Avoid striking the concrete too hard so as not to break through the plastic recess plug.</p>	 <p>3. Drive the claws of the hammer down about 3/8" between the end of the recess plug and the concrete.</p>
 <p>4. Pry up on the end of the recess plug until one half of it pops up to a point where it is about one third of the way out of the concrete. For the time being, leave it as is and proceed with step #5.</p>	 <p>5. Repeat steps #3 and #4 to loosen the opposite half of the recess plug.</p>	 <p>6. Grasp both halves of the recess plug between the thumb and finger and squeeze.</p>
 <p>7. Both halves of the recess plug should now be easily removed, exposing the insert.</p>	 <p>8. If one half of the recess plug should be hard to remove, drive the claws of the hammer as deeply as possible between the recess plug and the top of the insert, as shown above. Push forward on the hammer with one quick motion. This will remove the recess plug.</p>	 <p>9. Use a blower to remove all debris from around the insert and the recess plug. The insert is now ready to receive the lifting hardware.</p> <p>Note: For proper hardware release do not "round" out void holes.</p>

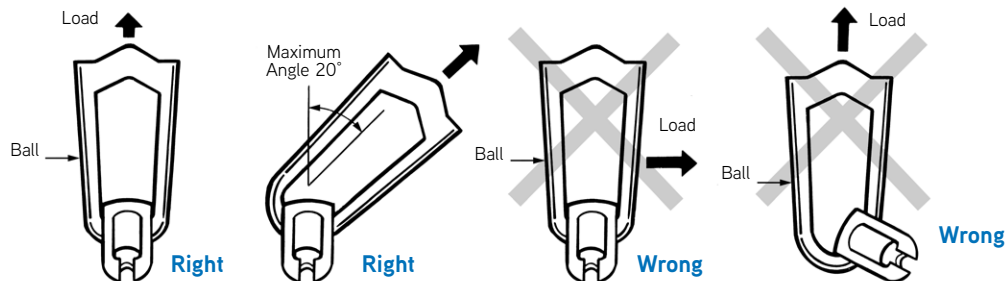
Lifting Systems

Proper Hardware Usage

Prior to lifting any tilt-up panel, apply an initial load to the crane lines, making certain that the hardware is properly attached to the head of the T41 Ground Release^{II} Insert and that the bail of the lifting hardware is aligned with the crane line.

Warning! Do not apply a sideward load to the bail of the lifting hardware.

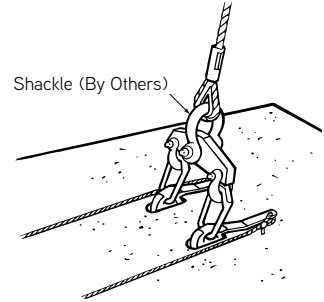
Warning! Do not modify, weld or alter in any way T120 Hardware units. Such actions could lead to premature failure of the hardware.



T42 Double Ground Release^{II} System

The Dayton Superior T42 Double Ground Release^I System consists of two T41 Ground Release^{II} Inserts, two T43L Ground Release^{II} Hardware units and a T46 Ground Release^{II} Spreader Beam with twin 8-1/2 ton shackles.

The two inserts are spaced on 12" centers to mate with the tandem hardware attached to the spreader beam. After lifting and positioning the panel, the hardware is released from the ground in the same manner as the basic system.



Shackle (By Others)
Available exclusively through Certified Dayton Tilt-Up Dealers.

Double Ground Release ^{II} Insert Selection Chart							
Structural Panel Thickness	5"	5-1/2"	6"	6-1/2"	7"	7-1/2"	8"
Ground Release ^{II} Anchor Length	3-3/4"	4-1/4"	4-3/4"	5-1/4"	5-3/4"	5-3/4"	5-3/4"
Insert Safe Working Load (lbs.)	13,000	15,000	17,000	19,000	22,000	24,000	26,000

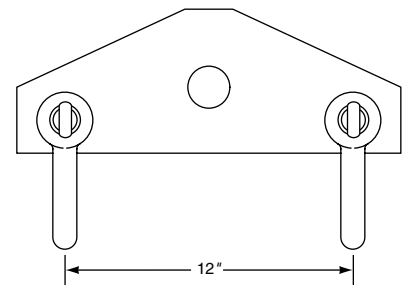
Note: The two inserts must be spaced on 12" centers to develop the safe working loads displayed in the Chart. SWL provides a safety factor of approximately 2 to 1 in 2,500 psi normal weight concrete.

See "Safe Working Load Reduction Factors for Lightweight Concrete" in General and Technical Information section for reduction factors that must be applied to insert's SWL when using lightweight concrete.

Lifting Systems

T46 Ground Release^{II} Spreader Beam with Twin Shackles

The Dayton Superior T46 Ground Release^{II} Spreader Beam is supplied with two 8-1/2 ton shackles to attach the beam to two ground release inserts. Use of the T46 spreader beam will simplify rigging change requirements on large or extremely heavy panels. The T46 has a safe working load of 30,000 pounds with an approximate safety factor of 5 to 1.



T46 Ground Release^{II} Spreader Beam with Twin Shackles

Available exclusively through Certified Dayton Tilt-Up Dealers.

T46HD Ground Release^{II} Spreader Beam with Twin

To Order:

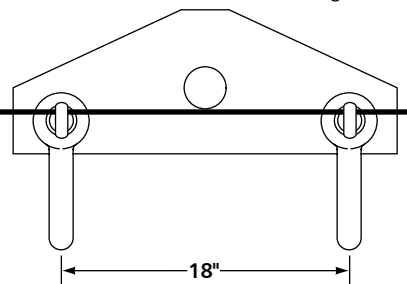
Specify: (1) quantity, (2) name.

Example:

2, T46 Ground Release^{II} Spreader Beams.

Shackles

The Dayton Superior T46HD Ground Release^{II} Spreader Beam is supplied with two 8-1/2 ton shackles to attach the beam to two ground release inserts. Use of the T46HD spreader beam will simplify rigging change requirements on large or extremely heavy panels. The T46HD has a safe working load of 32,000 pounds with an approximate safety factor of 5 to 1.



T46HD Ground Release^{II} Spreader Beam with Twin Shackles

Available exclusively through Certified Dayton Tilt-Up Dealers.

T45 Ground Release^{II} Patch Cap

The Dayton Superior T45 Ground Release^{II} Patch Cap is manufactured from ABS

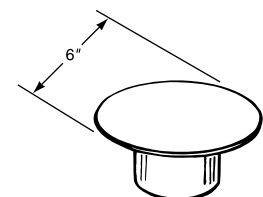
To Order:

Specify: (1) quantity, (2) name.

Example:

2, T46HD Ground Release^{II} Spreader Beams.

paintable plastic and provides a cosmetic alternative for patching insert holes. The T45 patch cap is available in concrete gray color only. It is easy to install by pushing it into the void. Friction holds the cap in place and the beveled flange assures a tight, flush fit. No grouting is required.



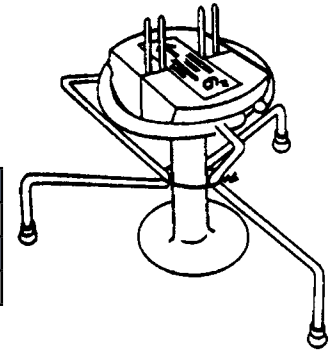
T45 Ground Release^{II} Patch Cap

Available exclusively through Certified Dayton Tilt-Up Dealers.

T81 Heavy Duty Ground Release^{II} Insert

The Dayton Superior T81 Heavy Duty Ground Release^{II} Insert is similar to the T41 insert but is designed to utilize a 1" diameter anchor. The insert is furnished with the anchor, wire base and plastic void former assembled and ready to use. The T81 insert is sized 1/8" less than the panel thickness and is equipped with antennae for quick locating.

T81 Heavy Duty Ground Release ^{II} Insert Selection Chart								
Structural Panel Thickness	8"	8-1/2"	9"	9-1/2"	10"	10-1/2"	11"	11-1/2"
Ground Release ^{II} Anchor Length	6-3/4"	7-1/8"	7-1/8"	7-1/8"	7-1/8"	7-1/8"	7-1/8"	10"
Insert Safe Working Load (lbs.)	15,500	18,200	18,200	19,100	20,000	20,900	21,800	22,800



T81 Heavy Duty Ground Release Insert

Available exclusively through Certified Dayton Tilt-Up Dealers. S.W.L. provides a safety factor of approximately 2 to 1 in 2,500 psi normal weight concrete

To Order:

Specify: (1) quantity, (2) name, (3) panel thickness, (4) bottom face exposed aggregate or foam formliner thickness, if required.

Example:

150, T81 Heavy Duty Ground Release^{II} inserts for 10" panel with 3/4" exposed aggregate.

T83 Heavy Duty Ground Release^{II} Hardware

The Dayton Superior T83 Heavy Duty Ground Release^{II} Hardware is used with the T81 insert to lift and handle large tilt-up panels. The high strength, efficient system offers quickness and safety.

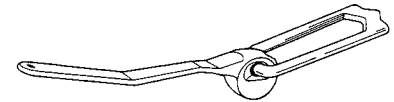
Note: It is a good practice to have an extra hardware unit on the job site in case there is a need to replace one in use.

To Order:

Specify: (1) quantity, (2) name.

Example:

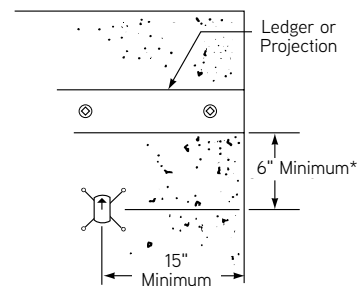
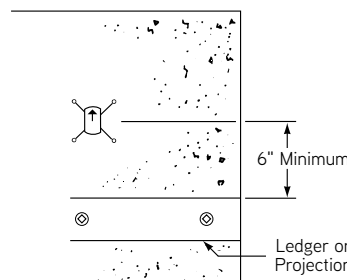
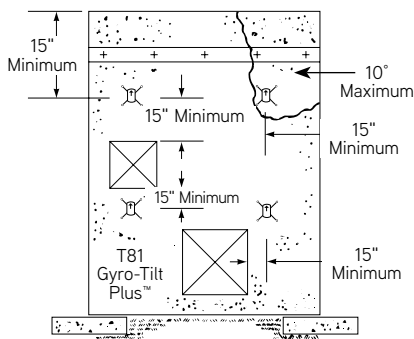
9, T83 Heavy Duty Ground Release^{II} Hardware units.



T83 Heavy Duty Ground Release^{II} Hardware

Available exclusively through Certified Dayton Tilt-Up Dealers.

Minimum Insert Distances



NOTE: * Without pipe extension

Warning! Inserts must be properly located in relation to the center of gravity of the panel. This work should be performed under the direction of a registered professional engineer.

Safety Notes:

Safe use of the Ground Release^{II} System requires the inserts to be positioned so that the arrows on the direction label point to the top and bottom of the panel (parallel to the sides of the panel).

The inserts must be properly located in relation to edges, corners, openings and ledgers, and at distances allowing the development of a full concrete shear cone. Minimum distances are shown in the sketches above. Placing an insert closer to an edge than the minimums shown may reduce the effective concrete shear cone and reduce the insert's safe working load. Lifting inserts must be properly wired in place so that the vertical axis of the insert is perpendicular to the panel surface. Care must be taken to avoid displacement of the inserts during concrete placement and screeding operations.

Do not weld to a lifting insert. Welding causes embrittlement and can result in an insert failure. See related safety information concerning welding on inside back cover.

How to use the Ground Release^{II} System – T83 Hardware

Do Not Use For Edge Lifting

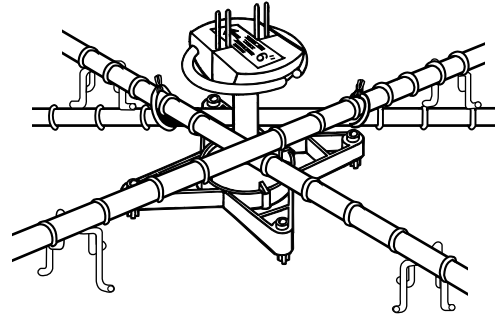
Do Not Use This System On Top Surface, Seeded, Exposed Aggregate 3/4" or Larger.

Precheck all insert holes with hardware prior to erection date, following instruction steps 2, 3 and 4, so that during tilting, proper hardware action is assured. See next page for proper procedure for removal of plastic recess plug.

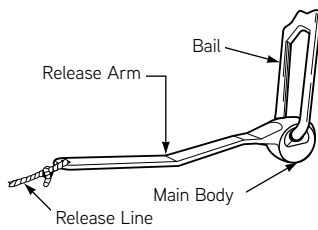
Lifting Systems

1. Install the insert so the directional arrow on the plastic recess plug points to the top or bottom of the panel. Wire tie the insert into position using a short length of additional reinforcing steel (rebar) placed tight against each side of the insert. Next, near each end of the plastic void former, secure a tie wire to one of the additional rebars, running the wire over the top of the plastic void former and back down, securing it to the additional rebar on the other side of the insert. Be sure to run the tie wire between the metal ring and the plastic void former as shown in the sketch to the right.

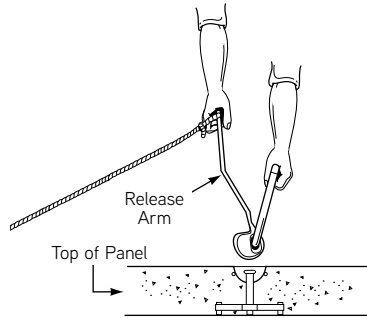
Note: The short length of rebar recommended is an aid to prevent the insert from moving during concrete placement. When this rebar is added for insert stability, it should be placed against the vertical portion of the insert and at least 1" away from the insert's foot. This extra rebar is not required to develop the insert's safe working load.



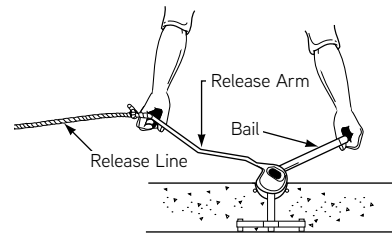
T83L Installation Sequence



2. The various parts of the T83 Ground Release^{II} Lifting Hardware are shown above.

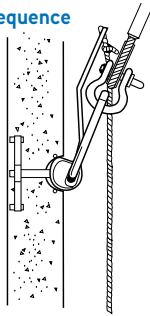


3. To install the lifting hardware onto the insert, hold the hardware by the bail, release arm, and lower it onto the head of the insert. Check to make certain that the release arm points to the top of the panel.

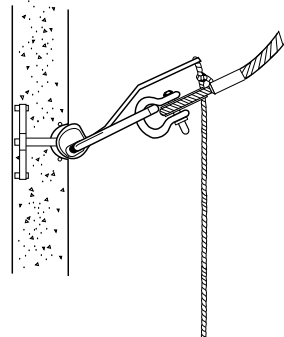


4. Lower the release arm parallel to the face of the panel. Lay the release line along side of the lifting hardware so that the line goes to the bottom of the panel. With the crane lines attached, the panel is now ready for lifting.

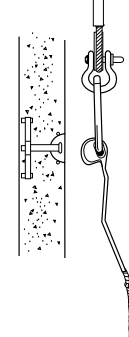
T83L Release Sequence



5. As the panel is lifted, the release arm is trapped between the panel and the crane line, which insures that the lifting hardware cannot be prematurely released. Brace and secure the panel into position.



6. The crane line should be slackened slightly to permit the release of the lifting hardware. To release the lifting hardware, apply a single downward force to the release line.



7. The lifting hardware remains in the open position, ready to be lowered to the ground and attached to the next panel.

Caution! The crane line and bail of the lifting hardware must be turned in the direction of the cable forces before the lifting operation begins. The crane line must not be allowed to apply a sideward force on the bail, as this condition is dangerous and could lead to premature failure of the hardware or insert.

P52 Swift Lift[®] Anchor - Edge Lift Anchor

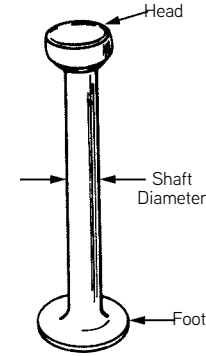
The Dayton Superior P52 Swift Lift Anchor is a hot forged insert available in 9/16" and 3/4" shaft sizes. The spherical head engages with the P51 hardware to lift and handle precast panels. The standard lengths available for the 9/16" unit are 6-3/4" and 11". The standard lengths available for the 3/4" unit are 9-1/2" and 19". Other lengths are available on special order.

To Order:

Specify: (1) quantity, (2) name, (3) shaft diameter, (4) length.

Example:

200, P52 Swift Lift Anchors, 9/16" dia. x 11" long.



P52 Swift Lift Anchor

Caution: The Swift Lift anchor is designed to be used in conjunction with the P54 plug and P59 shear bar combination. Failure to use this combination may result in concrete spalling or premature failure.

P54 Swift Lift[®] Recess Plug

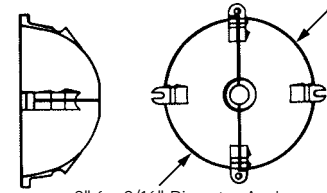
The Dayton Superior P54 Swift Lift Recess Plug is fabricated from high density polyethylene plastic in two sizes to accommodate the P52 anchor, above. The two-piece design snaps together to securely hold the anchor. Built-in tabs are provided on the plug to hold the P59 Swift Lift Shear Bar, shown below.

To Order:

Specify: (1) quantity, (2) name, (3) shaft diameter.

Example:

200, P54 Swift Lift Recess Plugs for 9/16" shaft diameter.



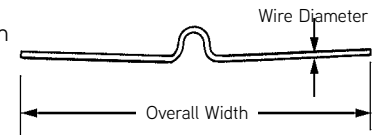
3" for 9/16" Diameter Anchors
3-3/4" for 3/4" Diameter Anchors

P54 Swift Lift Recess Plug

Caution! The Swift Lift recess plug is designed to be used in conjunction with the P52 insert and P59 shear bar combination. Failure to use this combination may result in concrete spalling or premature failure.

P59 Swift Lift[®] Shear Bar

The Dayton Superior P59 Swift Lift Shear Bar is designed for use with the P54 recess plug shown above.



P59 Swift Lift Shear Bar

For Use With Anchors Having	Wire Diameter	Overall Width
9/16" Shafts	.375"	24"
3/4" Shafts	.440"	30"

To Order:

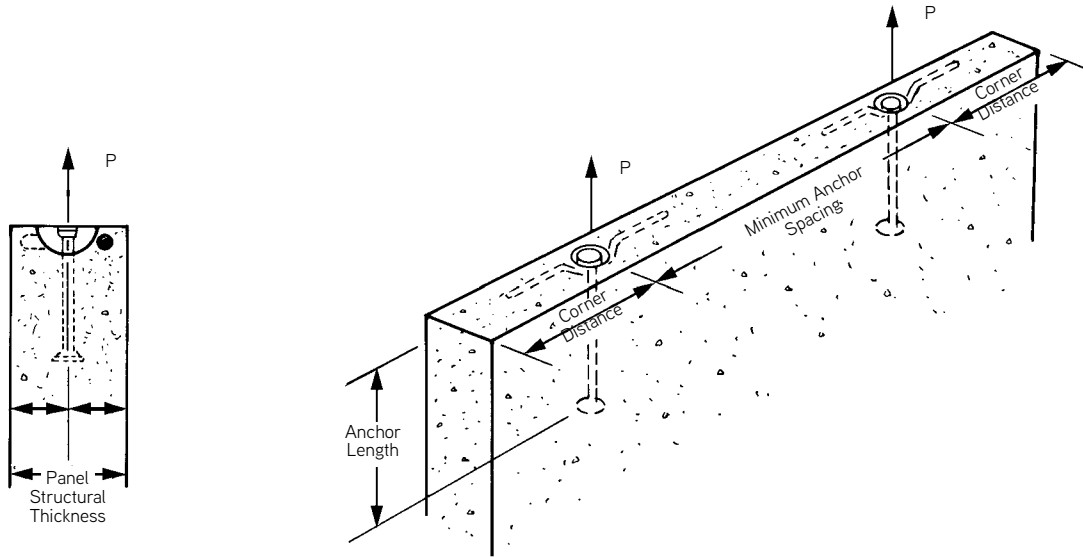
Specify: (1) quantity, (2) name, (3) size.

Example:

200, P59 Swift Lift Shear Bars, 3/4" diameter.

P52 Swift Lift Anchor Tension SWLs

The Swift Lift System is a quick connect-disconnect system that allows tilt-up panels to be edge lifted with speed, safety and economy.



Lifting Systems

The system is a non-welded system and avoids threaded connections, that are time-consuming, subject to thread wear and damage and the further risk of not being fully engaged, with consequent reduction of the safe working load. The reusable SL Lifting Eye is free of these disadvantages and by virtue of its quality and heavy duty construction will give years of use.

The efficiency of the system has been proven by years of successful use as well as exhaustive laboratory tests. The components are subjected to regular batch testing during manufacture.

The SL System is an ideal method to use when large tilt-up panels must hang plumb for setting.

Shaft Dia. x Anchor Length	Panel Structural Thickness	Tension Safe Working Load per Anchor (lbs)		
		Corner Distance		Minimum Anchor Spacing
		20"	30"	
9/16" Dia. x 6-3/4" Long	4"	3,500	3,500	4'-0"
	5"	4,000	4,000	4'-0"
	6"	4,000	4,000	4'-0"
	7"	4,000	4,000	4'-0"
	8"	4,000	4,000	4'-0"
9/16" Dia. x 11" Long	4"	4,000	4,000	5'-6"
	5"	4,000	4,000	5'-6"
	6"	4,000	4,000	5'-6"
	7"	4,000	4,000	5'-6"
	8"	4,000	4,000	5'-6"

SWL's provide an approximate 2 to 1 factor of safety in 2,500 psi normal weight concrete.

Caution! See "Safe Working Load Reduction factors for Lightweight Concrete" in General and Technical Information section for lightweight concrete SWL reduction factors.

Shaft Dia. x Anchor Length	Panel Structural Thickness	Tension Safe Working Load per Anchor (lbs)		
		Corner Distance		Minimum Anchor Spacing
		24"	30"	
3/4" Dia. x 9-1/2" Long	4"	4,700	5,000	5'-0"
	5"	5,900	6,200	5'-0"
	6"	7,000	7,500	5'-0"
	7"	8,000	8,000	5'-0"
	8"	8,000	8,000	5'-0"
3/4" Dia. x 14" Long	4"	7,200	7,800	7'-3"
	5"	8,000	8,000	7'-3"
	6"	8,000	8,000	7'-3"
	7"	8,000	8,000	7'-3"
	8"	8,000	8,000	7'-3"

SWL's provide an approximate 2 to 1 factor of safety in 2,500 psi normal weight concrete.

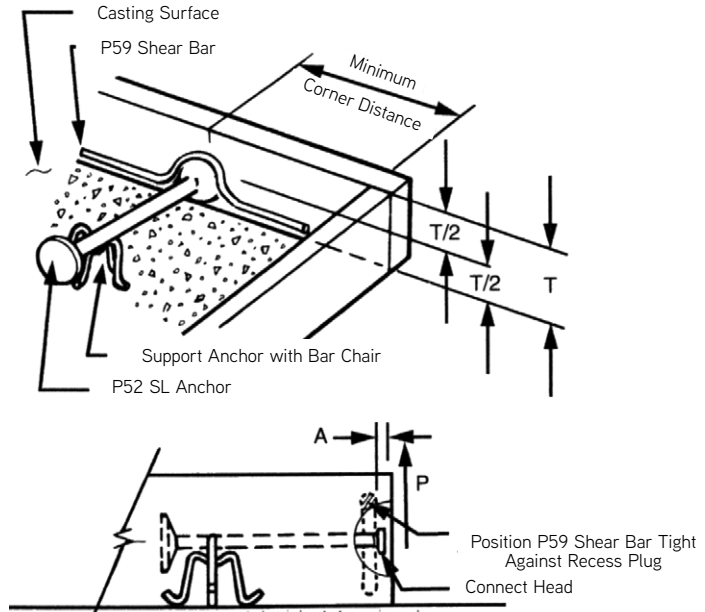
Caution! See "Safe Working Load Reduction factors for Lightweight Concrete" in General and Technical Information section for lightweight concrete SWL reduction factors.

Swift Lift[®] Anchor Shear (Edge Lifting) SWLs

The Swift Lift System is very useful for raising tilt-up panels from the horizontal casting position to a vertical position. When the P52 SL Anchor is used under this shear loading condition, special shear bars must be positioned tightly against the recess plug as shown in the illustrations below to prevent the concrete from spalling. The P59 Shear Bars must be used to develop the safe shear working loads shown.

To develop the shear capacity of the P52 SL Anchor the minimum spacing between two anchors is two times the corner distance. When raising panels to a vertical position, always check both shear SWL and tension SWL.

Anchor Shaft Diameter x Anchor Length	Panel Structure Thickness	Minimum Corner Distance	Shear Safe Working Load Per Anchor (lbs.)
9/16" Dia. x 6-3/4" or Longer	5"	20"	3,500
	5-1/2"	20"	4,000
	6"	20"	4,000
	7"	20"	4,000
3/4" Dia. x 9-1/2" or Longer	5-1/2"	24"	4,200
	6"	24"	4,400
	7"	24"	5,200
	8"	24"	5,600



SWL provides a factor of safety of approximately 2 to 1 in 2,500 psi concrete. The above Shear Safe Working Loads are based on the use of P51 SL Lifting Eye only! DO NOT ATTEMPT to use any other type of lifting hardware when edge lifting of tilt-up wall panels using P52 Swift Lift Anchors.

Caution! See "Safe Working Load Reduction factors for Lightweight Concrete" in General and Technical Information section for lightweight concrete SWL reduction factors.

Danger! Dayton Superior does not recommend the use of P52 SL Anchors without shear bars for edge lifting tilt-up panels. Spalling of the concrete above the anchor will result and the anchor could pull out of the concrete at lower than anticipated loads.

Rigging

Dayton recommends type of rigging the Swift Lift lift tilt-up panels. 4-point rigging

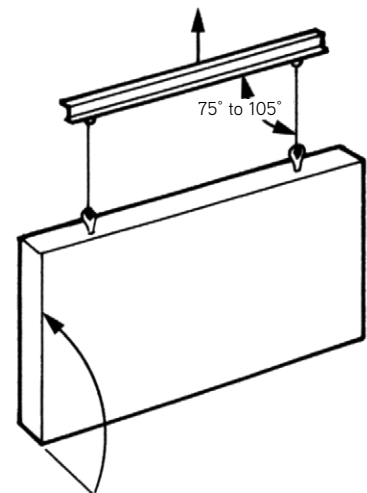
P59 Shear Bar Setback	
Anchor Shaft Diameter	A
9/16"	1/2"
3/4"	3/4"

Suggested Method

Superior the use of this when using System to edge

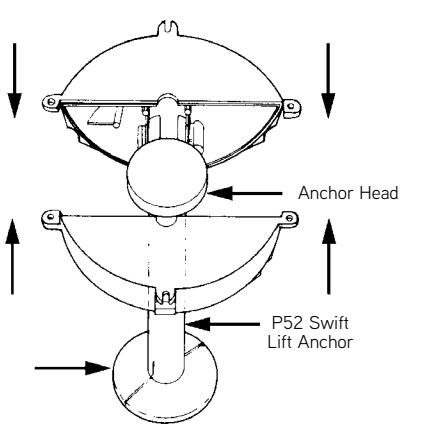
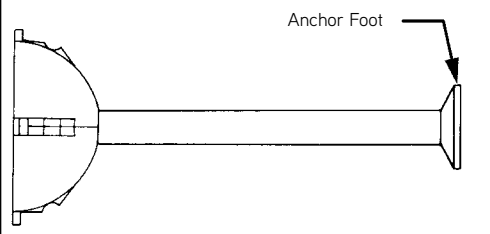
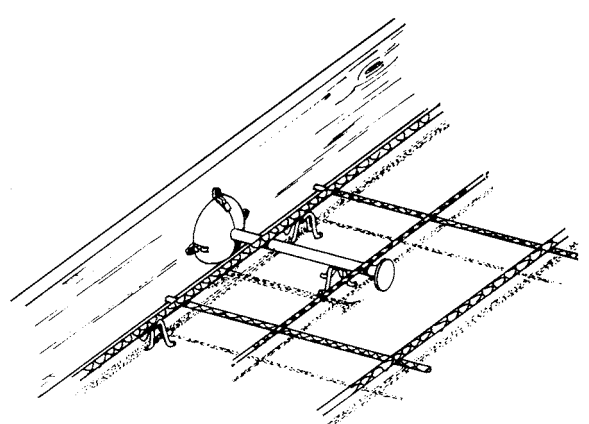
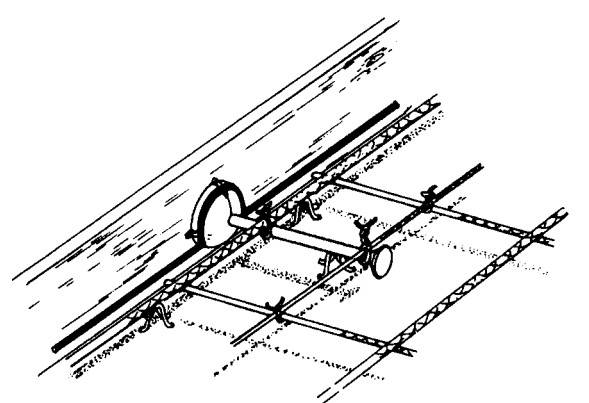
would be similar to the 2-point rigging shown.

Warning! The use of angular rigging will apply loads greater than those anticipated and should be avoided.



How To Install the Swift Lift Anchor

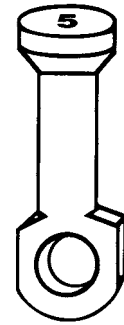
Lifting Systems

 <p>1. Assemble the P54 Recess Plug by placing the head of the P52 Swift Lift Anchor inside any two halves of the recess plug. Then snap the two halves together. It is very difficult to assemble the unit with the foot of the anchor inside the P54 Recess Plug and still get the two halves to close together correctly. If the two halves of the P54 Recess Plug do not fit closely together, it could be because the anchor is in upside down. In such a case, reverse the anchor and try again.</p>	 <p>2. A correctly assembled P54 Recess Plug and anchor.</p>
 <p>3. Attach the assembled P54 Recess Plug and anchor to the formwork in its predetermined location with the recess plug seam in the vertical position. Use common (not double headed) nails in the upper three tabs of the recess plug. The plug and anchor assembly can also be attached to the formwork by using a 2 ton stud and wingnut if desired. Provide bar supports around the anchor as shown to prevent displacement during the casting process.</p>	 <p>4. Slip the preformed shear bar onto the P54 Recess Plug as shown. The receiving tabs of the P54 Recess Plug will correctly position the shear bar. Usually, additional support wiring is not needed to hold the shear bar in place. However, prudent users will provide an additional wire tie or two to make certain the shear bar will not dislodge during concrete placement. Wire tie the P52 Swift Lift Anchor to reinforcing steel as shown.</p>

P53 Swift Lift[®] Eye Anchor - Edge Lifting

The Dayton Superior Swift Lift Eye Anchor (P53) is similar to the P52 anchor but has an eye at the foot to accept P60 Tension Bars. The P53 anchor is used primarily in thin sections, thin panels of lightweight concrete or shapes that must be handled at concrete compressive strengths below 2,000 psi. P53 anchors are available in 1, 2, 4, 8 and 20 T capacities and each has its load rating embossed on the head.

Note: P60 Tension Bar must be used with this anchor to achieve loads.



P53 Swift Lift Eye Anchor

Lifting Systems

To Order:

Specify: (1) quantity, (2) name, (3) system size, (4) length.

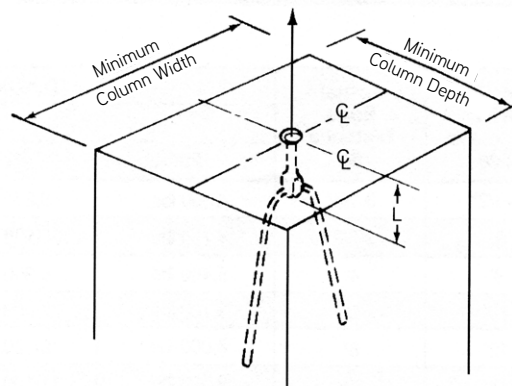
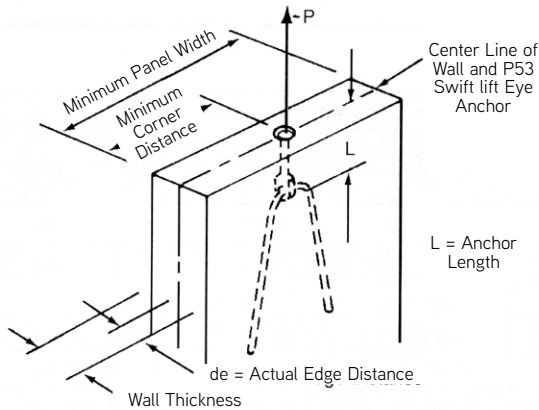
Example:

200, P53 Swift Lift Eye Anchors, 4 ton, 4-3/4" long

P53 Swift Lift Eye Anchor for Lifting and Handling

The P53 Swift Lift Eye Anchor is designed for use with the P60 Tension Bar placed through the eye of the anchor. This combination of Swift Lift Eye Anchor and P60 Tension Bar allows the anchor's full rated tensile load to be developed in thin, narrow wall applications. The anchor should be located at the center line of the wall. When two or more anchors are required, the minimum spacing between anchors must be equal to the minimum panel width.

The combination of P53 Swift Lift Eye Anchor and P60 Tension Bar is an excellent system to use for lifting, handling and setting precast columns.



P53 Swift Lift Eye Anchor Selection Chart

Anchor Rated Load (Tons)	Anchor Length L	Minimum Thickness or Depth 2 de	Actual Edge Distance de	Minimum Corner Distance	Minimum Panel Width	Tensile Safe Working Load per Anchor 2,000 PSI *
1	2-1/2"	3"	1-1/2"	8"	16"	2,000 lbs.
2	3-1/2"	3"	1-1/2"	4"	8"	4,000 lbs.
4	4-3/4"	3-3/4"	1-7/8"	5"	10"	8,000 lbs.
8	7-1/16"	4-3/4"	2-3/8"	7"	14"	16,000 lbs.
20	9-7/8"	6-3/8"	6-3/4"	8-1/2"	17"	40,000 lbs.

*Safe Working Load provides a factor of safety of approximately 2 to 1 in 2,000 psi normal weight concrete. The P53 Eye Anchor must be used in conjunction with the P60 Tension Bar in order to develop its published rated working loads.

Note: Contact Dayton Superior Technical Assistance for safe working loads when the P53 Eye Anchor is used with straight lengths of rebar.

P60 Swift Lift[®] Tension Bar

The Dayton Superior Swift Lift Tension Bar (P60) is designed to be used with the P53 Eye Anchor in order for the eye anchor to develop its published rated working loads. See P60 sizes and dimensions below.

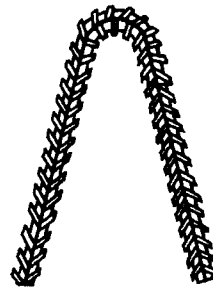
To Order:

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

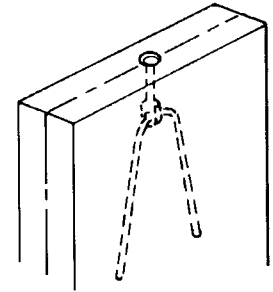
Example:

200, P60 Swift Lift Tension Bar, 8 ton anchor.

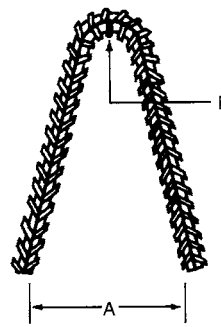
Note: Wire style is for use with 1.3 ton P53 Eye Anchors only.



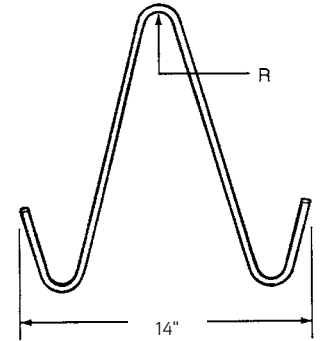
P60 Swift Lift Tension Bar



P60 Swift Lift Tension Bar Dimensions					
Anchor Rated Load (Tons)	Grade 60 Rebar Size	Rebar Overall Length	A		R
			Std.	Max.	
1	.306" Wire	40"	14"	-----	3/4"
2	#3	24"	5"	7-1/2"	1-1/8"
4	#5	24"	6-1/4"	10"	1-7/8"
8	#6	48"	9-1/2"	15"	2-1/4"
20	#9	156"	12-1/2"	20"	3"



P60 Rebar Style

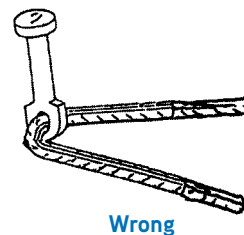
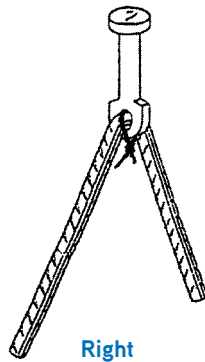


P60 Wire Style

P60 Swift Lift Tension Bar Installation

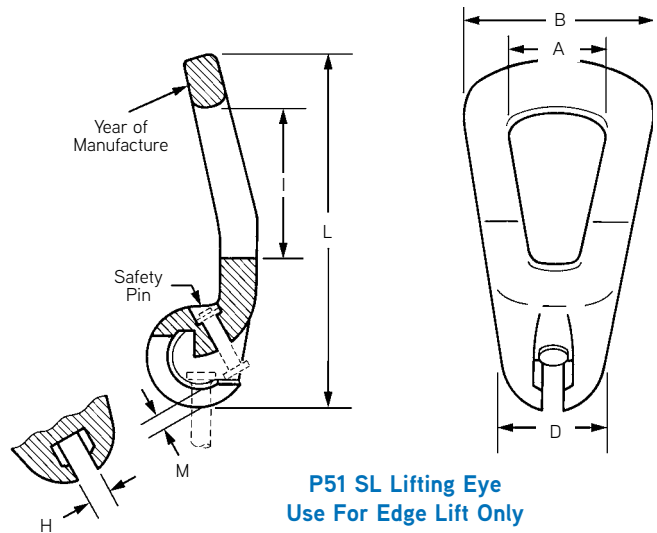
The proper installation of a tension bar is as follows:

1. Place the tension bar through the eye of the anchor in such a manner that the tension bar contacts the bottom of the eye.
 2. Make certain the legs of the tension bar are equal on either side of the anchor.
 3. Wire the tension bar into position so that the tension bar stays in contact with the bottom of the eye. (See sketch below.)
- DO NOT attempt to use field-bent bars as a replacement for the Dayton Superior P60 Tension Bar. Field bending may result in an improperly shaped tension bar, an incorrect radius and/or a cracked bar. A problem, such as this, can cause the field-bent tension bar to fail prematurely.



P51SL Lifting Eye – Edge Lifting in Shear Condition

The Dayton Superior P51SL Lifting Eye is a high quality steel casting. The P51 lifting eye fits into the recess formed by the recess plug and engages the spherical head of the P52 Swift Lift Anchor. The connection of the eye to the anchor can only be accomplished with the ball of the lifter facing the surface of the concrete. Accidental disengagement is prevented by a gravity actuated safety pin. The P51SL Lifting Eye is available in two sizes that are recommended for tilt-up edge lift applications. The 2 Ton unit that mates with the 9/16" diameter Swift Lift anchor and the 4 Ton unit that utilizes the 3/4" diameter anchor.



Lifting Systems

To Order:
Specify: (1) quantity, (2) name, (3) size.

Example:
5, P51 SL Lifting Eyes, 4 Ton units

How to Use the P51SL Lifting Eye:

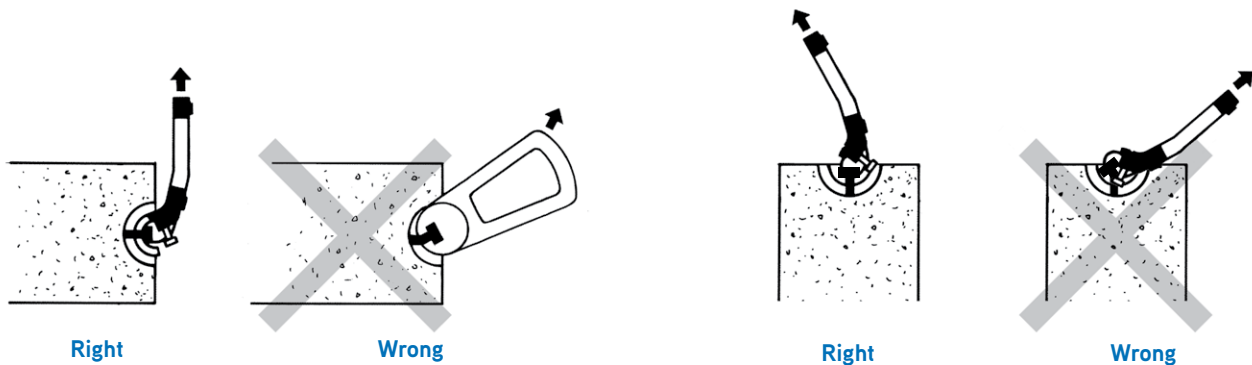
- Engage the lifting eye and the anchor.
 - Rotate the lifting eye into the lifting position and attach the crane hook. See sketch above. When the lifting eye is rotated to the working position, the safety pin will drop into position to prevent accidental release of the lifter.
- Do not use the P51SL Lifting Eye for face lift insert applications.

Inspection: The general condition and degree of wear of the P51 lifting eye should be checked on a regular basis, at least every three months. Areas of careful exam are shown as dimensions "H" and "M" in the sketch above. The maximum width of "H" and the minimum thickness of "M" are shown in the chart below. If either of these limits is exceeded, the unit must be removed from service and discarded. Also, check the safety pin to ensure that it is in good condition and moves freely. If the pin is worn or does not move freely, it must be replaced. Replacement pins are available.

Maintenance: The only maintenance on the P51 SL Lifting Eye is the replacement of the safety pin. No other repairs, alterations or welding are permitted.

Limiting Dimensions on P51SL Lifting Eye			General Information Dimensions of P51SL Lifting Eye				
Anchor Shaft Diameter	H Maximum Width	M Minimum Thickness	A	B	D	I	L
9/16"	.709"	.235"	2.64"	4.52"	2.36"	3.74"	8.43"
3/4"	.984"	.315"	3.00"	5.06"	2.83"	4.96"	10.35"

Caution! Do not attempt to lift with the P51 SL Lifting Eye if the unit has rotated from the correct working position (facing the concrete). Lifting with the hardware rotated will overload the anchor and may result in a premature failure.



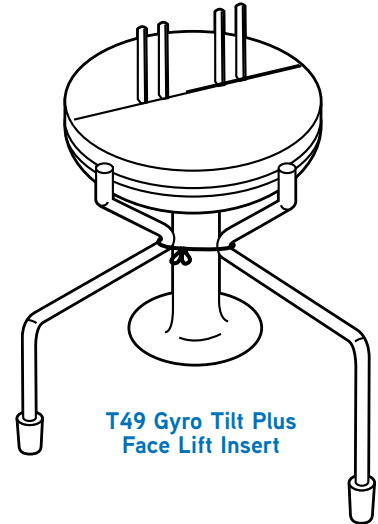
Gyro Tilt Plus™ System*

The Gyro Tilt Plus System is designed to quickly and efficiently lift and handle tilt-up panels and to be easily released from the ground. Ladders are seldom required when utilizing this system.

*U.S. Patent No. 4,703,595; 4,368,914 and 4,769,960.T49

Gyro Tilt Plus Face Lift Insert

The Dayton Superior T49 Gyro Tilt Plus Face Lift Insert is a 3/4" diameter insert manufactured from high quality steel. The hot forged head is engaged by the system hardware. The insert assembly is complete with plastic void and plastic protected wire base. The insert assembly is easily positioned and tied to the rebar mat and requires no special orientation.



To Order:

Specify: (1) quantity, (2) name, (3) panel thickness, (4) bottom face exposed aggregate or formliner thickness.

Example:

150, T49 Gyro Tilt Plus™ Face Lift Inserts, 6" panel with 3/4" bottom face exposed aggregate

Available exclusively through Certified Dayton Tilt-Up Dealers.

T49 Gyro Tilt Plus Face Lift Insert Selection Chart

Structural Panel Thickness	5"	5-1/2"	6"	6-1/2"	7"	7-1/4"	7-1/2"	8"
Gyro Tilt Plus Anchor Length	3-3/4"	4-1/4"	4-3/4"	5-1/4"	5-3/4"	5-3/4"	5-3/4"	5-3/4"
Insert Safe Working Load (lbs.)	8,000	10,000	12,000	13,500	15,000	15,000	15,000	15,000

Caution! SWL provides a safety factor of approximately 2 to 1 in 2,500 psi normal weight concrete.

Note: Special inserts are available sized for panel thicknesses other than those listed in the chart above.

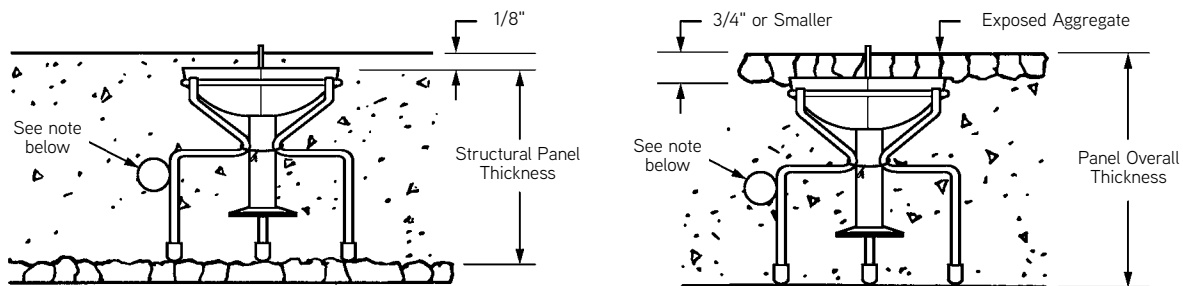
Caution! Do not use for edge lifting of panels, insert is not designed for such use. Do not use with top surface seeded exposed aggregate 3/4" or larger, aggregate will pop out during erection, resulting in a reduced insert SWL.

Note: See "Safe Working Load Reduction factors for Lightweight Concrete" in General and Technical Informatin section for reduction factors that must be applied to insert's SWL when using lightweight concrete.

Exposed Aggregate Panel Inserts

Tilt-up panels with exposed aggregate or formliner thickness are often cast face down. In these panels, the aggregate or formliner thickness, as well as the structural thickness are required to determine correct insert height.

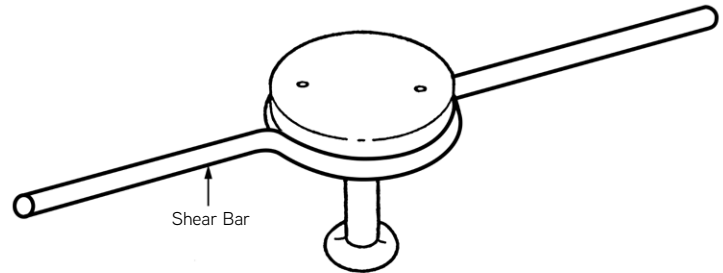
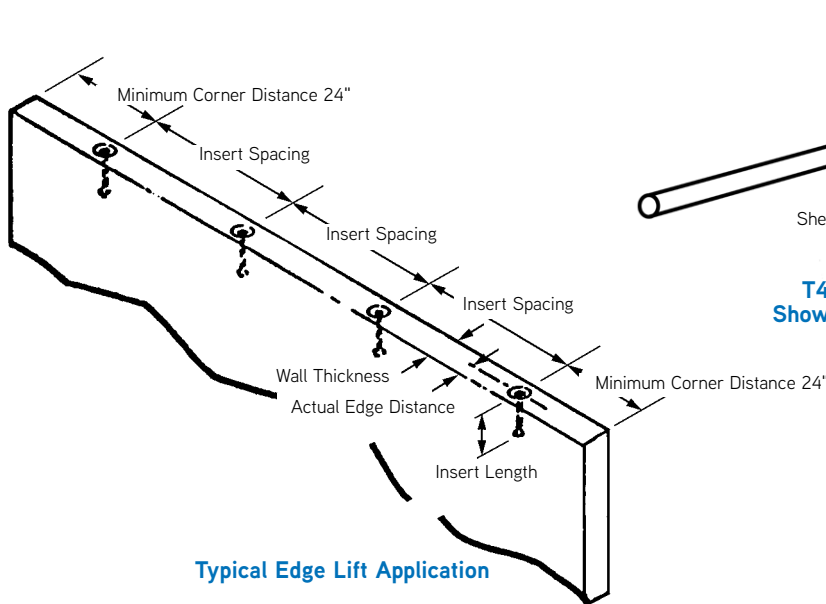
For panels cast with exposed aggregate face up, the overall thickness of the panel determines insert height.



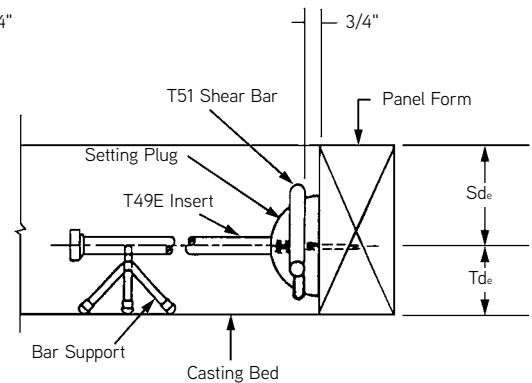
Note: Attach insert to rebar mat on vertical portion of the wire base leg as shown. DO NOT attach rebar to the horizontal portion of the wire base leg.

T49E Gyro Tilt Plus Edge Lift Insert

The Dayton Superior T49E Gyro Tilt Plus Edge Lift Insert is the same basic insert as the face lift insert, but is furnished without the wire base. This allows the plastic void to be nailed directly to the panel form. Standard T49E insert is 3/4" x 9-1/2", other lengths are available on request.



**T49E Gyro Tilt Plus Edge Lift Insert
Shown with mandatory shear bar in place**



S_{de} = Minimum edge distance in the direction of applied shear load.

T_{de} = Minimum edge distance for tension loading.

Lifting Systems

Available exclusively through Certified Dayton Tilt-Up Dealers.

To Order:

Specify: (1) quantity, (2) name, (3) insert length.

Example:

100, T49-E Gyro Tilt Plus Edge Lift Insert, 9-1/2" long.

T49 Gyro Tilt Plus Edge Lift Insert – Safe Working Loads (lbs.)						
Spacing Between Anchors	Panel Thk	4-1/2"	5"	6"	7"	8"
	S_{de}	2-1/4"	2-1/2"	3"	3-1/2"	4"
20"	Shear*	4,000	4,500	4,920	5,340	6,400
	Tension	4,000	5,000	6,000	6,800	8,000
30"	Shear*	4,000	4,500	4,920	5,340	6,400
	Tension	5,200	6,600	8,100	9,200	10,600
40"	Shear*	4,000	4,500	4,920	5,340	6,400
	Tension	6,200	7,800	9,700	11,100	12,500
50"	Shear*	4,000	4,500	4,920	5,340	6,400
	Tension	7,050	8,800	10,800	12,700	14,000
60"	Shear*	4,000	4,500	4,920	5,340	6,400
	Tension	7,800	9,300	11,300	13,400	15,100

Safe Working Loads reflect approx. 2:1 safety factor in normal weight 2,500 psi concrete.

See "Safe Working Load Reduction Factors for Lightweight Concrete" in the General and Technical Information section for lightweight concrete reduction factors.

Note: Edge lift applications require the use of the Gyro Tilt Plus T51 Shear Bar to develop the shear loads displayed in the chart.

*Shear loads are based on mandatory use of shear bar.

T50 Gyro Tilt Plus Hardware

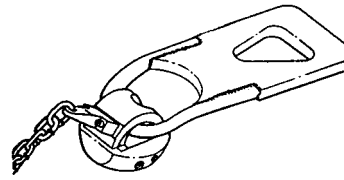
The Dayton Superior T50 Gyro Tilt Plus Hardware is designed to accomplish the task of lifting and handling tilt-up panels quickly and efficiently. High safe working load, ease of operation and positive ground release provide tilt-up effectiveness.

To Order:

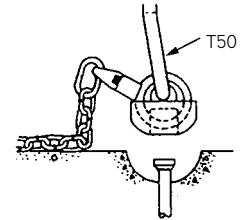
Specify: (1) quantity, (2) name.

Example:

8, T50 Gyro Tilt Plus Hardware.



T50 Gyro Tilt Plus Hardware



Typical Installation

Available exclusively through Certified Dayton Tilt-Up Dealers.

T51 Gyro Tilt Plus Shear Bar

The Dayton Superior T51 Gyro Tilt Plus Shear Bar tilt-up panel by spreading the shear loads over a wider Gyro Tilt Plus edge lift applications.

To Order:

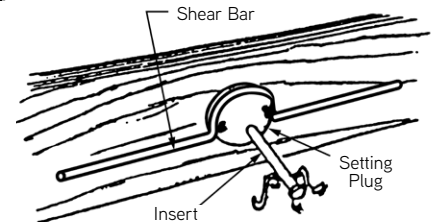
Specify: (1) quantity, (2) name.

Example:

200, T51 Gyro Tilt Plus Shear Bars.



T51 Gyro Tilt Plus Shear Bar



Edge Lift Insert Installation

Available exclusively through Certified Dayton Tilt-Up Dealers.

T52 Heavy Duty Gyro Tilt Plus Insert

The Dayton Superior T52 Heavy Duty Gyro Tilt Plus Insert is similar to the design of the proven T49 insert. The T52 insert load capacity is made possible by the 1" diameter hot forged anchor. The insert assembly is furnished complete with plastic void and plastic protected wire base. The assembly is easily positioned and wired to the rebar mat and requires no special orientation.

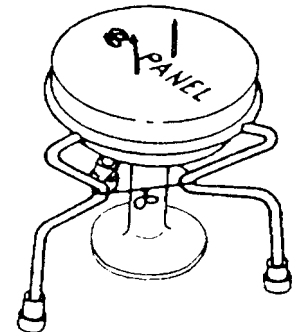
To Order:

Specify: (1) quantity, (2) name, (3) panel thickness.

Example:

200, T52 Heavy Duty Gyro Tilt Plus Face Lift Inserts for 10" panel thickness.

Available exclusively through Certified Dayton Tilt-Up Dealers.



T52 Heavy Duty Gyro Tilt Plus Insert

T52 Heavy Duty Gyro Tilt Plus Insert Selection Chart

Structural panel Thickness	8"	8-1/2"	9"	9-1/2"	10"	10-1/2"	11"	11-1/2"
Anchor Length	6-3/4"	6-3/4"	7-1/8"	7-1/8"	7-1/8"	7-1/8"	7-1/8"	10"
Insert Safe Working Load (lbs)	15,500	16,400	18,200	19,100	20,000	20,900	21,800	22,800

T53 Heavy Duty Gyro Tilt Plus Hardware

The Dayton Superior T53 Heavy Duty Gyro Tilt Plus Hardware is a strong, easy to use unit used in conjunction with the T52 insert to lift, handle and place heavy concrete tilt-up panels.

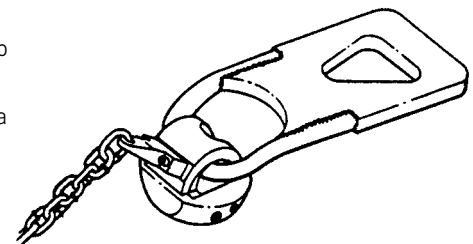
Note: It is a good practice to have an extra hardware unit on the job site in case there is a need to replace one in use.

To Order:

Specify: (1) quantity, (2) name.

Example:

8, Heavy Duty Gyro Tilt Plus Hardware units.



T53 Heavy Duty Gyro Tilt Plus Hardware

Available exclusively through Certified Dayton Tilt-Up Dealers.

How to use the Gyro Tilt Plus System

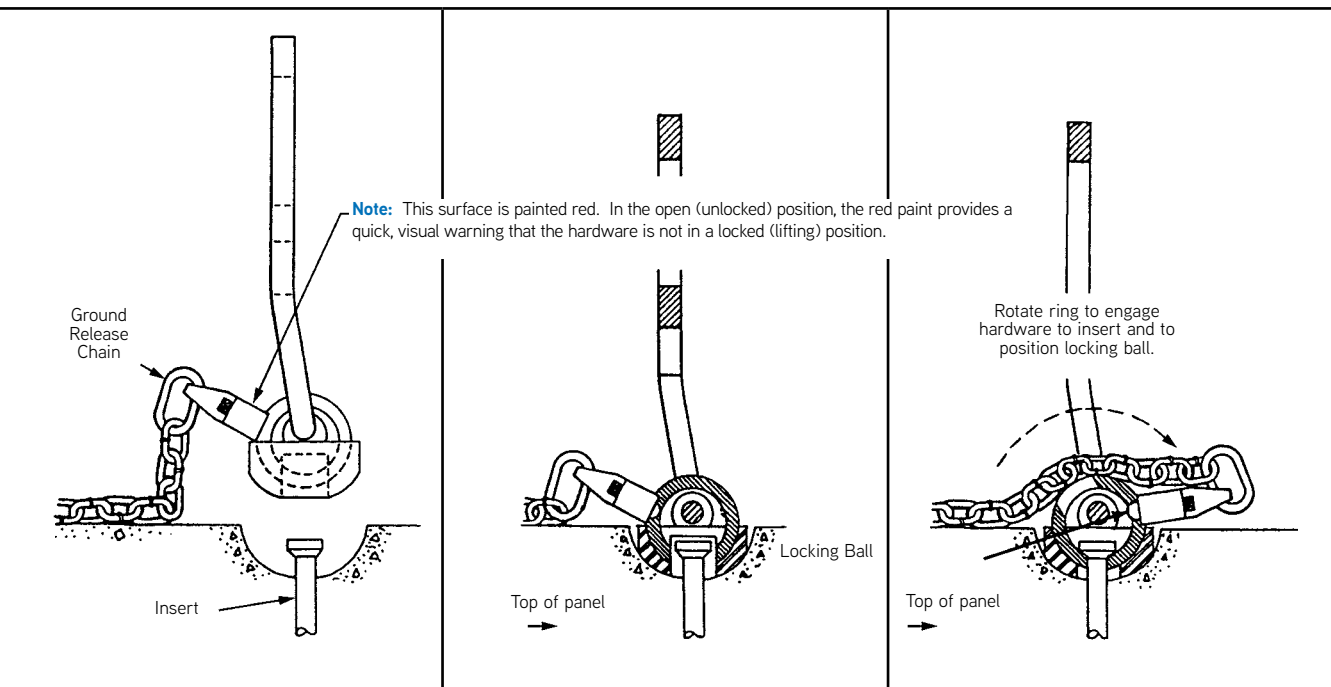
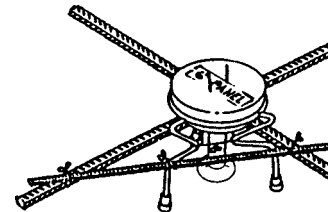
Do Not Use Face Lift Insert For Edge Lifting

Do Not Use This System On Top Surface, Seeded, Exposed Aggregate 3/4" or Larger.

Precheck all insert holes with hardware prior to erection date, following instruction steps below, so that during tilting, proper hardware action is assured. See next page for proper procedure for removal of plastic recess plug.

Inserts Installation — T49 Gyro Tilt Plus Inserts are simply wired to the rebar mat at designated points. No special orientation is required, but reasonable care should be taken to assure that the insert is the correct height for the panel and remains perpendicular to the panel face during concrete placement.

Note: The short length of rebar recommended is an aid to prevent the insert from moving during concrete placement. When this rebar is added for insert stability, it should be placed against the vertical portion of the insert and at least 1" away from the insert's foot. This extra rebar is not required to develop the insert's safe working load.



Hardware Installation — After proper concrete cure, the T50 Gyro Tilt Plus Hardware is attached to the crane rigging and moved to the panel to be lifted. The plastic void cap is removed from the insert assembly and the void checked for foreign matter. The hardware is placed in the void in the "open" position that allows the hardware to nest over the head of the insert. Moving the hardware ring to the "closed" position captures the head of the insert and allows the lifting sequence to begin. Visual inspection will confirm proper hardware installation.

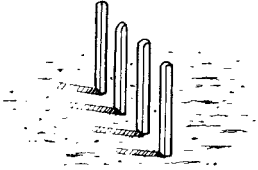
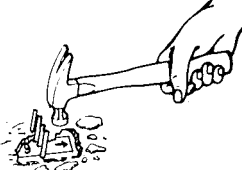
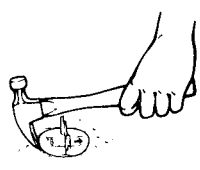
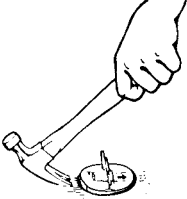
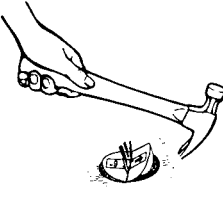


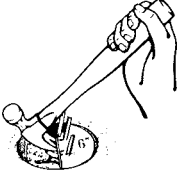
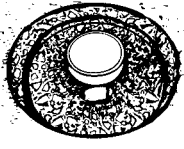
Stripping — After the panel has been lifted, placed and properly braced, the Gyro Tilt Plus Hardware is released by slackening the crane line and a simple, solid pull on the ground release lanyard. With the hardware released, the crane may move to the next panel and repeat the sequence.

Warning! The crane line and bail of the lifting hardware must be turned in the direction of the cable forces before the lifting operation begins. The crane line must not be allowed to apply a sideward force on the bail, as this condition is dangerous and could lead to premature failure of the hardware or insert.

Lifting Systems

How to Remove the Gyro Tilt Plus Plastic Recess Plug

Lifting Systems

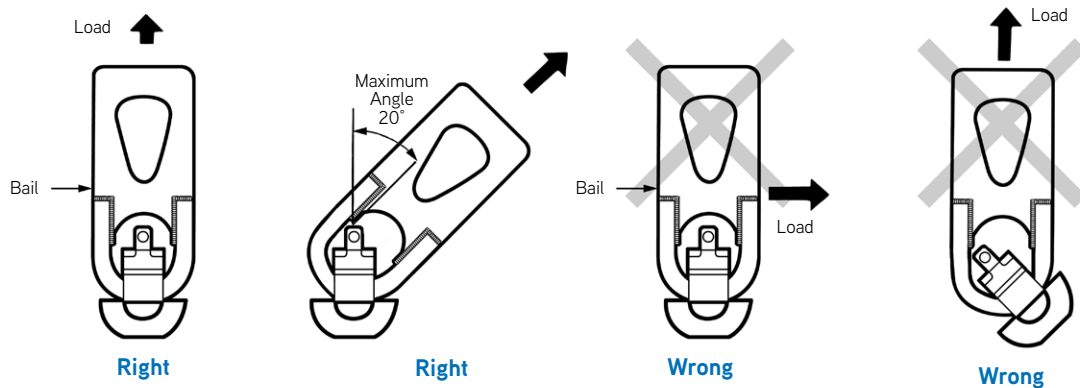
 <p>1. The Gyro Tilt Plus Insert's location in the panel is easily found by locating the antennae which will project through the surface of the concrete.</p>	 <p>2. Using an ordinary claw hammer, tap lightly around the antennae, breaking through the thin skin of concrete to expose the insert. Avoid striking the concrete too hard so as not to break through the plastic recess plug.</p>	 <p>3. Drive the claws of the hammer down about 3/8" between the end of the recess plug and the concrete.</p>
 <p>4. Pry up on the end of the recess plug until one half of it "pops up" to a point where it is about one third of the way out of the concrete. For the time being, leave it as is and proceed with step #5.</p>	 <p>5. Repeat steps #3 and #4 to loosen the opposite half of the recess plug.</p>	 <p>6. Grasp both halves of the recess plug between the thumb and finger and squeeze.</p>
 <p>7. Both halves of the recess plug should now be easily removed, exposing the insert.</p>	 <p>8. If one half of the recess plug is hard to remove, drive the claws of the hammer as deeply as possible between the recess plug and the top of the insert. Push forward on the hammer with one quick motion to remove the recess plug.</p>	 <p>9. Use a blower to remove all debris from around the insert and the recess plug. The insert is now ready to receive the lifting hardware.</p>

Proper Hardware Usage

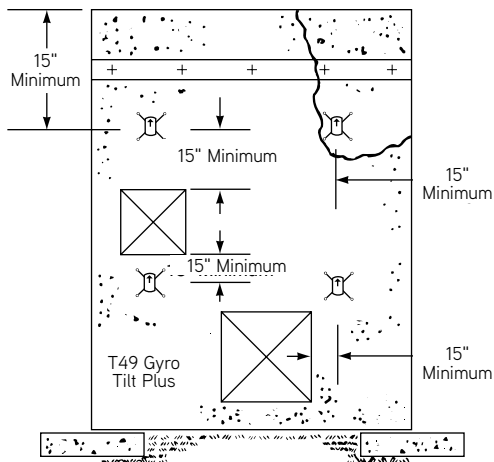
Prior to lifting any tilt-up panel, apply an initial load to the crane lines, making certain that the hardware is properly attached to the head of the T49 Gyro Tilt Plus Insert and that the bail of the lifting hardware is aligned with the crane line.

Warning! Do not apply a sideward load to the bail of the lifting hardware.

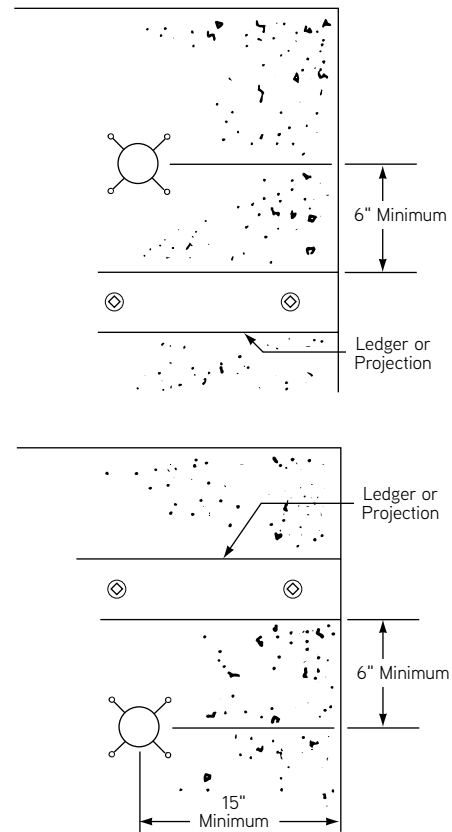
Warning! Do not modify, weld or alter in any way Gyro Tilt Plus Hardware units. Such actions could lead to premature failure of the hardware.



Minimum Insert Distances



Warning! All Gyro Tilt Plus Inserts must be properly located in relation to the center of gravity of the panel. See Safety Notes below.



Safety Notes:

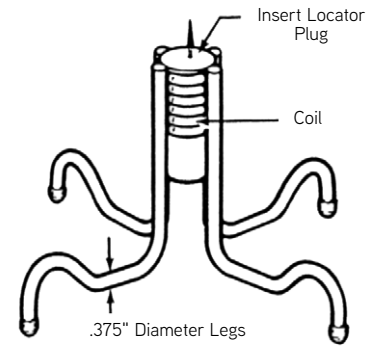
The inserts must be properly located in relation to edges, corners, openings and ledgers, and at distances allowing the development of a full concrete shear cone. Minimum distances are shown in the sketches above. Placing an insert closer to an edge than the minimums shown may reduce the effective concrete shear cone and reduce the insert's safe working load.

Lifting inserts must be properly wired in place so that the vertical axis of the insert is perpendicular to the panel surface. Care must be taken to avoid displacement of the inserts during concrete placement and screeding operations.

Do not weld to a lifting insert. Welding causes embrittlement and can result in an insert failure. See related safety information concerning welding on inside back cover.

T1 Single Pick-Up Insert

- Available with plastic tipped feet or stainless steel tips
- Available with insert locator plug installed
- Uses standard coil threaded bolts
- Uses T12 or T26 lifting plate
- Insert provides 3/8" setback from panel face
- Recommended minimum edge distance is 15"
- For proper bolt length see "How to Determine Bolt Lengths" in this section
- Only the 1-1/4" and 1-1/2" diameter inserts are recommended for use as pick-up inserts. The 1" diameter inserts are used for attachment of strong backs to a panel while the 3/4" diameter is used as a brace anchor.



Coil Bolt Diameter	Panel Thickness and Safe Working Load per Insert (lbs.)					
	4"	5"	5-1/2"	6"	7"	8"
3/4"	4,140	6,280	7,460	8,700	11,360	14,260
1"	4,140	6,280	7,460	8,700	11,360	14,260
1-1/4"	4,140	6,280	7,460	8,700	11,360	14,260
1-1/2"	4,140	6,280	7,460	8,700	11,360	14,260

Notes:

1. SWL provides a safety factor of approximately 2 to 1 in 2,500 psi Normal Weight Concrete
2. Corner or edge distances less than 1.5 times the embedment depth will proportionally reduce these ACI 318, App. D concrete limited capacities.

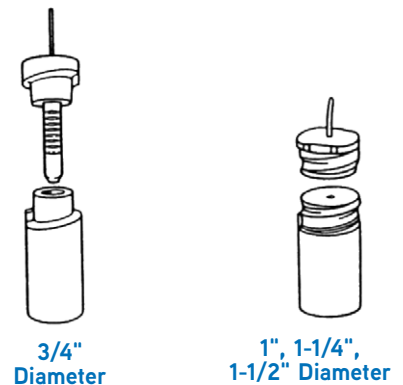
DANGER! DO NOT use as an edge lifting insert, as insert is not designed for such use. See "Safe Working Load Reduction Factors for Lightweight Concrete" in the General and Technical Information section.

To Order:
Specify: (1) quantity, (2) type, (3) diameter of bolt to be used, (4) panel a thickness and insert heights, (5) with or without Insert Locator Plug, (6) plastic coated feet or stainless steel tips.

Example:
300 pcs., T1 Single Pick-Up Insert, 1-1/2" diameter for 7-1/2" slab, 7-1/8" insert height with insert Locator Plugs, and plastic coated feet.

T21 Insert Locator Plugs

- The T21 plastic setting plugs may be ordered installed in free standing inserts such as the T1 and be ready for concrete placement to save time.
- Bottom portion of plug has a large barrel shape which allows B14 coil bolt to penetrate into the void.
- Made of flexible but durable plastic and top portion is removed from coil insert by prying out with screwdriver.
- The locator tip projects above the surface of the concrete; it bends without breaking off during screeding and returns to its original position once the screed has passed over.
- The distinctive bright color of the plug makes it easy to locate inserts in the slab.
- The coil bolt used to attach lifting, bracing or other hardware will crush the bottom half of the plug as it is screwed into the insert and normal penetration beyond the end of the coil will be achieved with ease.



To Order:
Specify: (1) quantity, (2) type, (3) diameter.

Example:
100 sets T21 Insert Locator Plugs, 1-1/4" diameter.

T2 Double Pick-Up Insert

- Available to fit 1" or 1-1/2" diameter coil bolts.
- Available with plastic tipped feet or stainless steel tipped feet.
- Available with insert locator plugs installed.
- Designed for use with T8 lifting angle.
- Insert is setback 3/8" from panel face.
- For proper bolt length, see "How To Determine Bolt Length" in this section.

Panel Thickness and Safe Working Load per Insert (lbs.)						
Coil Diameter	4"	5"	5-1/2"	6"	7"	8"
1"	5,400	8,100	9,400	10,800	13,500	16,000
1-1/2"	---	---	---	12,600	15,000	18,000

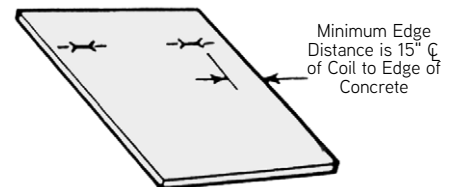
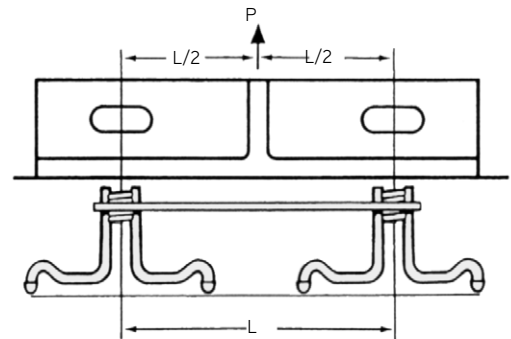
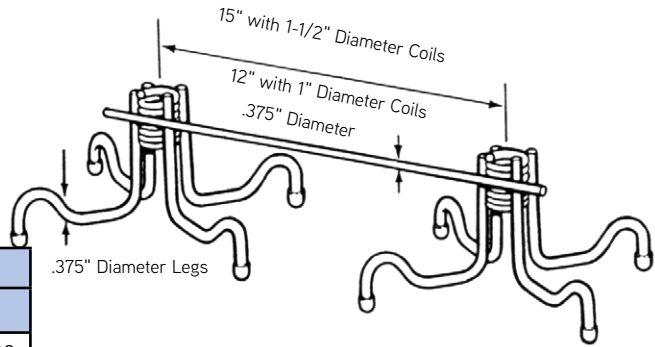
Safe working load provides a safety factor of approximately 2 to 1 in 2,500 psi concrete.

DANGER! DO NOT use as an edge lifting insert, as insert is not designed for such use.

See "Safe Working Load Reduction factors for Lightweight Concrete" in General and Technical Information section for lightweight concrete SWL reduction factors.

Insert Placement

Danger! All T2 Inserts must be positioned with the two coils in a horizontal line. If placed perpendicular, the shear loading (when the panel is raised to a vertical position) may be concentrated on one bolt only and severe strain will occur at the cable clevis and the lifting angle gusset.



To Order:

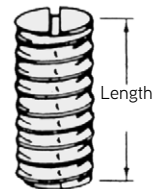
- Specify: (1) quantity, (2) type, (3) diameter of bolt to be used, (4) panel thickness and insert heights, (5) with or without Insert Locator Plug, (6) plastic coated feet or stainless steel tips.

Example:

250 pcs, T2 Double Pick-Up Insert, 1" diameter for 5-1/2" slab 5-1/8" insert height with insert Locator Plugs and plastic coated feet.

T7S, T7ST Slotted Setting Plugs

- Made of steel
- Used with standard coil threaded inserts to provide void for B14 coil bolts
- Top is cut off square so screed can pass over, also slotted to accept screwdriver
- Threads and slot should be coated with non-staining lubricant to prevent bonding
- Loosen studs within 8-24 hours for easier removal when ready to lift
- Steel — standard sizes are 3/4", 1", 1-1/2" and 1-1/4" diameter x 4" length. Special lengths available.
- Plastic — standard sizes are 3/4", 1", and 1-1/4" diameter x 3" length



To Order:

Specify: (1) quantity, (2) type, (3) diameter.

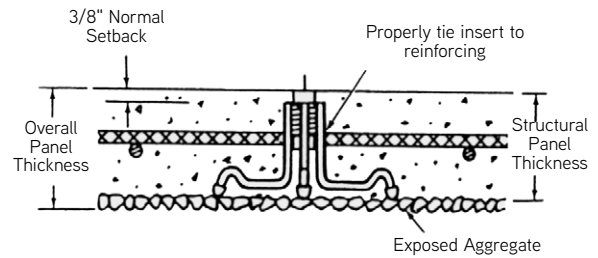
Example:

100 sets T7S Slotted Setting Plugs, 1-1/4" diameter.

Exposed Aggregate Details

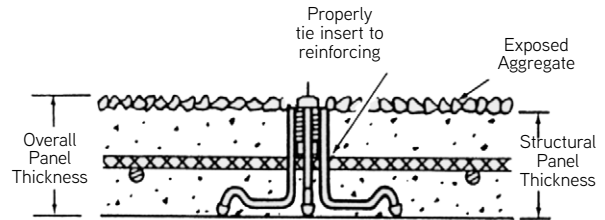
Exposed Aggregate Face Down

For exposed aggregate panels cast **face down**, the height of the coil insert should be $\frac{3}{8}$ " less than the structural panel thickness. If inserts are ordered for overall panel thickness, they will be too high when placed on aggregate.



Exposed Aggregate Face Up

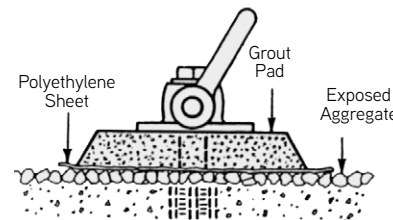
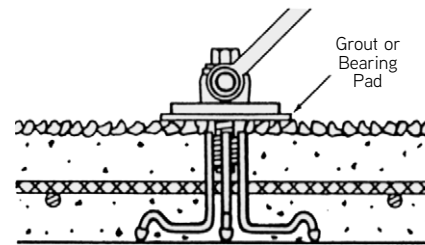
For exposed aggregate panels cast **face up**, the height of the coil insert should be the same as the structural panel thickness and not protrude up into the exposed aggregate.



Lifting Exposed Aggregate Face Up

When lifting exposed aggregate panels cast **face up**, if aggregate is carefully tamped and leveled during aggregate placing, it may not be necessary to place a grout or bearing pad under lifting plate. If aggregate surface is uneven, a plywood bearing pad is recommended under the lifting plate.

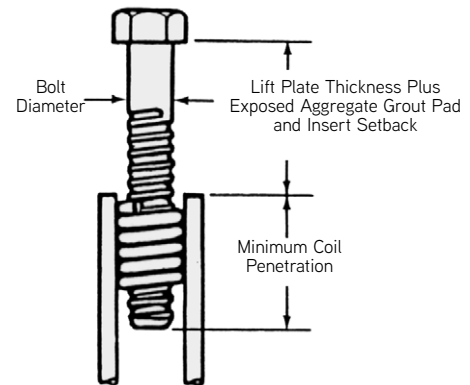
When used with large exposed aggregate face up panels, a grout pad is required to provide a bearing surface for the plate. Longer length bolts will be required for these panels. See "Coils" through "B14 Coil Bolts and Minimum Coil Penetration Information" in this section, and the illustration below for determining overall length of required bolts.



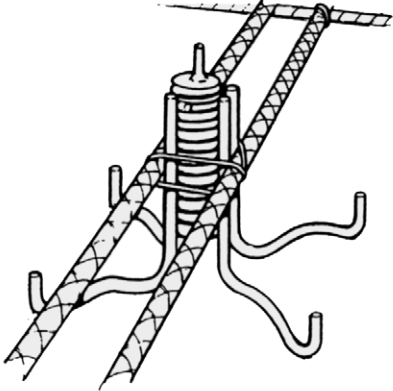
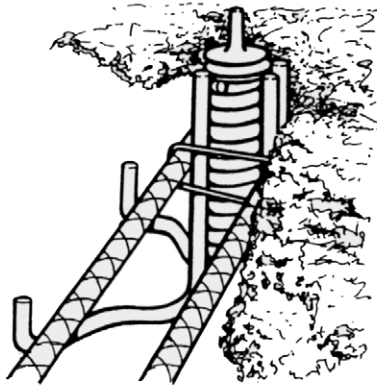
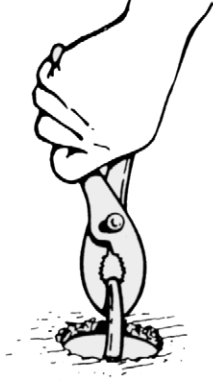




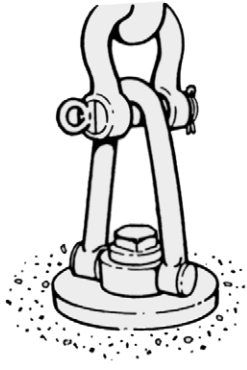
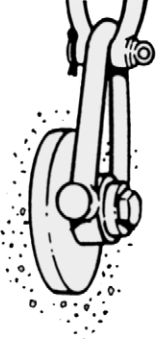
Safety Information

Coil Bolt Diameter	Minimum Coil Penetration
3/4"	2-1/4"
1"	2-1/2"
1-1/4"	2-1/2"
1-1/2"	3"

Danger! Incorrect penetration of coil bolts through the coil may result in premature failure.



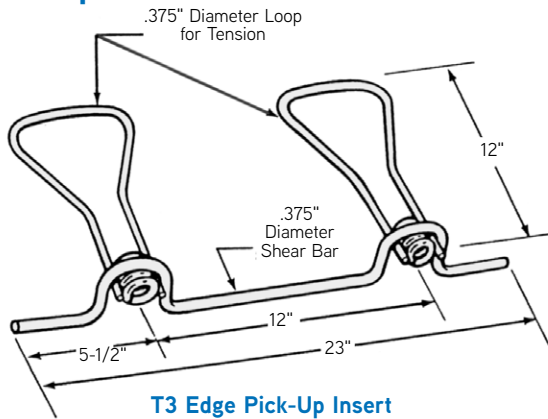
How to use Coil Face Inserts

 <p>1. Position insert in place and wire securely to rebar. Make sure coil is perpendicular to panel face.</p>	 <p>2. Place concrete, vibrate carefully in region of insert, and use screeding techniques which prevent crowns in slab. Excessive slab thickness increase setback dimensions and require the use of longer bolts.</p>	 <p>3. After plastic plug has been located, chip concrete cover off and with a pair of pliers pull the plug out of the coil.</p> <p>4. Remove T21 Plastic plug by prying it out with a screwdriver</p>
 <p>5. Hole should be small and concise, and if not used immediately, should be plugged to prevent debris and water from entering.</p>	 <p>6. Clean hole with compressed air, then place lift plate directly over insert hole.</p>	 <p>7. Slip bolt through hole in lift plate and start bolt into coil by hand.</p>
 <p>8. Turn bolt clockwise with a wrench until bolt is secured tight against lift plate.</p>	 <p>9. Attach crane line (use double clevises or swivels to take out twists in crane line) to lifting bail. Apply initial tension to crane lines and make sure bail is aligned in direction of applied load.</p>	 <p>10. To remove lift plate after panel is erected turn bolt counter clockwise with a wrench until bolt is free.</p>

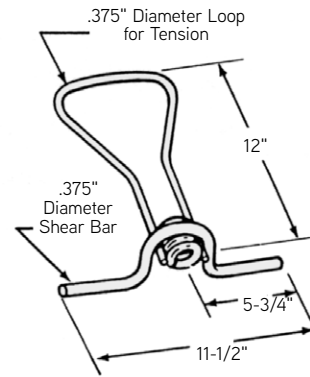
Lifting Systems

Danger! Crane line loads and bail of double-swivel lift plate must be turned in direction of crane forces before lifting operation begins. Crane line loads must not be allowed to apply sideways loads to bail as this condition is dangerous and could lead to premature failure of hardware.

Edge Pick-up



T3 Edge Pick-Up Insert



T3A Edge Pick-Up Insert

Safe Working Load Per Insert Thickness (lbs.)

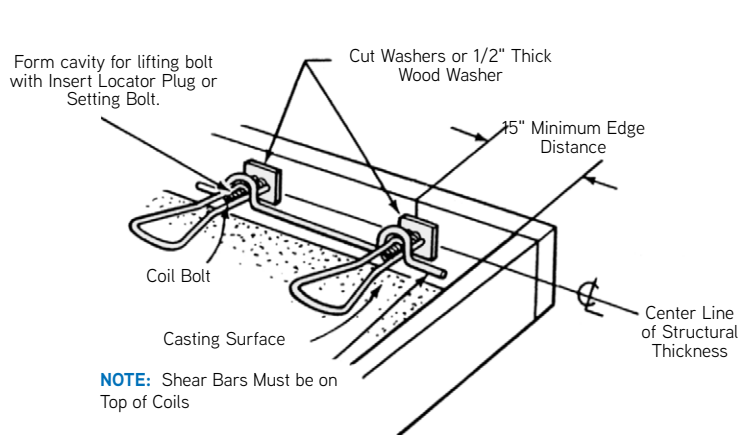
Insert Type	Coil Bolt Dia.	Concrete Strength	Load Condition	4\" Panel	5\" Panel	5-1/2\" Panel	6\" Panel	6-1/2\" Panel	7\" Panel	7-1/2\" Panel	8\" Panel
T3A	3/4\" Single	2,500	Tension	—	—	—	—	—	—	—	—
			Shear	—	—	—	—	—	—	—	—
T3A	1\" Single	2,500	Tension	—	6,000	6,600	7,200	7,800	8,400	9,000	9,000
			Shear	—	2,700	2,500	2,800	2,850	2,900	3,000	3,100
T3	3/4\" Double	2,500	Tension	5,000	—	—	—	—	—	—	—
			Shear	3,000	—	—	—	—	—	—	—
T3	1\" Double	2,500	Tension	—	8,000	8,800	9,600	10,400	11,200	12,000	12,800
			Shear	—	4,200	4,500	4,800	5,100	5,400	5,700	6,000

Approximate safety factor 2 to 1 in normal weight concrete. SWL's are based on the insert set back 1/2" from face of concrete.

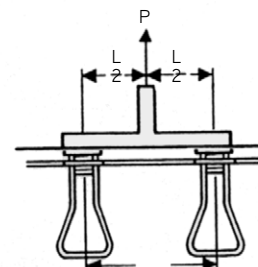
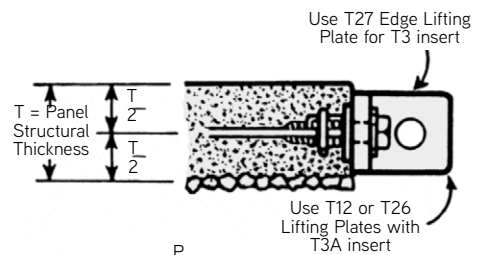
Warning! See "Safe Working Load Reduction factors for Lightweight Concrete" in General and Technical Information section for lightweight concrete SWL reduction factors.

Proper Placement of "Edge" T3 or T3A Inserts

When using EDGE inserts, a 1/2" thick wood washer or cut washers must be used against the ends of the loops when bolting the insert in place prior to placing concrete. This is necessary so that when the lifting plate is drawn down tightly it will bear against the concrete and not against the loop ends. This procedure is necessary to develop the loads shown in the table. EDGE inserts must be located in the center of the panel structural thickness.



NOTE: Shear Bars Must be on Top of Coils



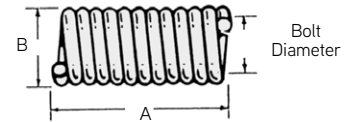
To Achieve SWL, Lifting Plate must be centered on T3 insert

Total System and Safe Working Loads

The user must be aware of the capacity of the total lifting system since the determination of the safe working load involves concrete strength and safe working loads of the insert, bolt and lifting hardware. All must be evaluated with the lowest safe load component determining the safe working load of the system. This handbook has such values listed in tabular form for all components including the minimum concrete compressive strengths that must exist at time of use. Therefore, do not assume that an insert's safe working load is that of the system, since the SWL's of the bolt or lifting hardware may be less than that of the insert. Examine the values of all components.

Coils

- Standard length coils are available for 3/4", 1", 1-1/4" and 1-1/2" diameter bolts.
- Longer length coils for 1-1/4" or 1-1/2" diameter bolts are used in T1, T24 Single Pick-up Inserts.



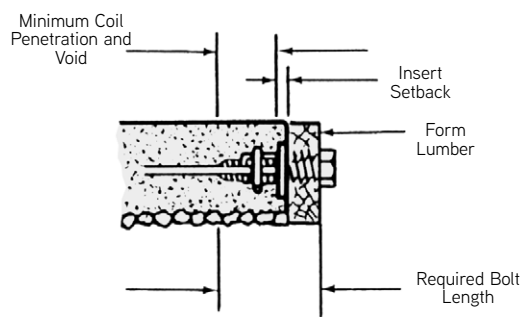
Coil Dimensions

Bolt Diameter	A	B	Wire Diameter	Threads Per Inch
1/2"	1-1/8"	25/32"	.162"	6
3/4"	1-9/16"	1-3/32"	.218"	4-1/2
1"	2"	1-7/16"	.281"	3-1/2
1-1/4"	2"	1-11/16"	.281"	3-1/2
1-1/4"	3-3/16"	1-11/16"	.281"	3-1/2
1-1/2"	2-5/16"	1-15/16"	.281"	3-1/2
1-1/2"	3-7/16"	1-15/16"	.281"	3-1/2

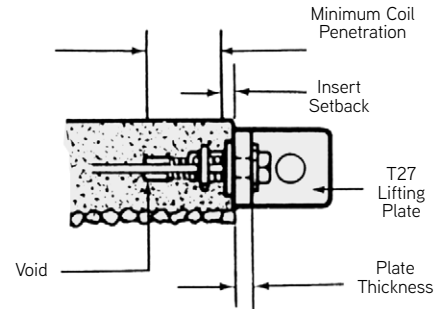
Warning! Do not use coils without strut or leg wires welded to them as they will not develop sufficient load carrying capabilities.

How to Determine Bolt Length

Note! Always check to make certain that you have the proper clearance void to prevent the Lifting Bolt from bottoming out. You must be able to tighten the bolt down tight to prevent the lifting hardware from slipping and applying unexpected loads to the insert.



Setting Bolt



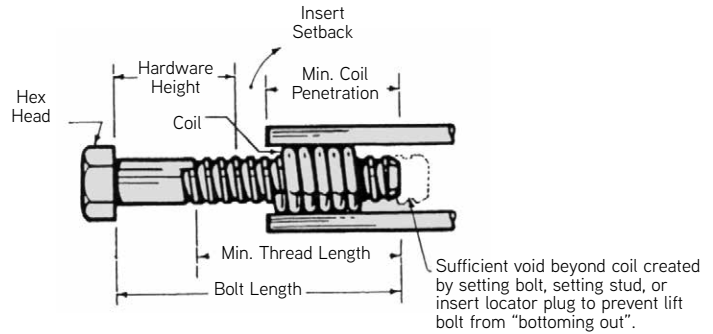
Lifting Bolt

Setting Bolt for Edge Inserts		Lifting Bolt for Edge Inserts	
Form Lumber	1-1/2"	T27 Plate Thickness	1"
Insert Setback	1/2"	Insert Setback	1/2"
Minimum Coil Penetration	2-1/2"	Minimum Coil Penetration	2-1/2"
Minimum Void	1/2"	Total Bolt Length	4"
Total Bolt Length	5"		

Note! Face insert lifting bolt lengths are calculated in a similar manner to that shown above.

B14 Coil Bolts and Minimum Coil Penetration Information

- B14 Coil Bolts have fast-acting, self-cleaning threads and are available in 3/4", 1", 1-1/4" and 1-1/2" diameter bolts.
- Bolts are furnished with integrally formed heads.
- May be reused —but will wear and must be regularly inspected.
- Must be kept clean and lubricated.
- When determining overall length of lifting bolt, see example on previous page — you must consider:
 1. Height of hardware
 2. Insert Setback
 3. Minimum coil penetration
- Minimum coil penetration shown in the charts below applies to all coil products.



To Order:

Specify:(1) Quantity, (2) Type, (3) Diameter of Bolt, (4) Length of Bolt, (5) Type.

Example:

300 pcs., B14 Coil Bolts, 1" diameter, 5" long with welded on B25 Coil Nut Head.

B14 Coil Bolts High Strength with Integrally Formed Hex Heads							
3/4" Diameter Forged Hex Nut Safe Working Load		1" Diameter Forged Hex Nut Safe Working Load		1-1/4" Diameter Forged Hex Nut Safe Working Load		1-1/2" Diameter Forged Hex Nut Safe Working Load	
Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear
8,000 lbs.	5,300 lbs.	14,500 lbs.	9,600 lbs.	20,300 lbs.	13,500 lbs.	29,500 lbs.	19,600 lbs.
Minimum Coil Penetration 2-1/4"		Minimum Coil Penetration 2-1/2"		Minimum Coil Penetration 2-1/2"		Minimum Coil Penetration 3"	
Bolt Length	Minimum Thread Length	Bolt Length	Minimum Thread Length	Bolt Length	Minimum Thread Length	Bolt Length	Minimum Thread Length
3"	2-3/4"	3"	2-3/4"	3"	2-3/4"	—	—
4"	3-3/4"	4"	3-3/4"	4"	3-3/4"	4"	3-3/4"
5"	4-3/4"	5"	4-3/4"	5"	4-3/4"	5"	4-3/4"
6"	5-3/4"	6"	5-3/4"	6"	5-3/4"	6"	5-3/4"
Over 6"	5-3/4"	Over 6"	5-3/4"	Over 6"	5-3/4"	Over 6"	5-3/4"

Approximate safety factor 5 to 1, for tilt-up hardware.

Safety Notes

- All plates must have full bearing on flat, smooth surfaces
- Lifting angle and plates must not be used with out a bolt fastener of sufficient strength to develop the required loads.
- Lifting angle and plates are to be used only with the bolt diameter for which they were designed. For example, use a 3/4" bolt with a 3/4" Swivel Lifting Plate, do not use a 3/4" bolt with a 1", 1-1/4" or 1-1/2" T12 Swivel Lifting Plate
- All plates must be securely fastened to the slabs.
- For exposed aggregate panels, a grout pad is required to provide for the bearing plate
- Coil bolt penetration must agree with minimums.

Danger! Crane line loads and bails of swivel and double swivel lifting plates must be turned in direction of crane forces before lifting operations begin. Crane line loads must not be allowed to apply sideward loads to bails of Swivel Lifting Plates or Clevis Attachment Plates of Lifting Angle or Lifting Plate, as this condition is dangerous and could lead to failure of hardware.

T8 Lifting Angle

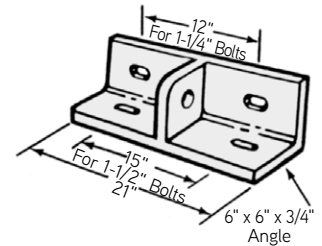
- Designed for use with T2 Double Pick-Up Inserts.
- Shorter bolts are required than those used with swivel lifting plates, normally 4" lengths.
- May be used for face lifting inserts and also edge lifting inserts when panel thickness exceeds 6".
- Cut washers are required under head of all bolts.
- Made from structural steel angle 6" x 6" x 3/4" x 21" long with 1/2" dia. hole for clevis attachment.
- Safe working load is 18,000 lbs.

To Order:

T8 or T27: (1) Quantity, (2) Type, (3) Size

Example:

8 pcs., T8 Lifting Angles.



T8

T12 Swivel Lift Plate

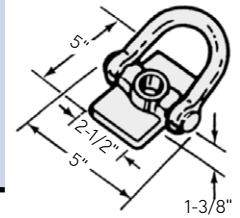
- Designed for use with single pick-up inserts.
- Can be used for face lifting or edge lifting
- Available for use with 3/4" or 1" diameter bolts.
- Complete unit made of forged steel.
- Safe working loads: 3/4" diameter is 7,200 lbs. and 1" diameter is 10,000 lbs.

To Order:

T12 or T26: (1) Quantity, (2) Type, (3) Size

Example:

24 pcs., T26 Double Swivel Lifting Plate for 1-1/4" bolts.



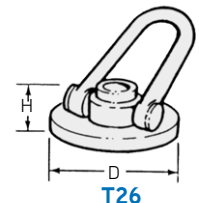
T12

Type	Bolt Size	Loop Height	Bearing Plate
T12	3/4" Diameter	3.688"	1/2 x 2-1/2 x 5"
	1" Diameter	3.688"	1/2 x 2-1/2 x 5"
	1" Diameter	6.75"	1/2 x 2-1/2 x 5"

SWL provides a factor of safety of approximately 5 to 1.

T26 Double Swivel Lifting Plate

- Designed for use with 1", 1-1/4" and 1-1/2" diameter coil bolts.
- Rotates 360 degrees in horizontal plane and 180 degrees in vertical plane.
- Round bearing plate provides maximum safety when used with any coil bolt lifting system.
- Heavy forged bail is made of high-strength material.
- Double swivel action allows bail to rotate in direction of applied load.
- Safe working load is 9,000 lbs. for 1" diameter.
- Safe working load is 13,500 for 1-1/4" and 1-1/2" diameter.



T26

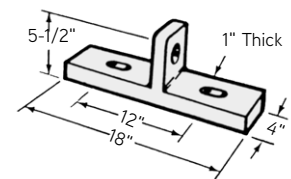
Type	Bolt Size	H	D
T26	1" Diameter	2-11/16"	5"
T26	1-1/4" or 1-1/2" Diameter	2-3/4"	7"

SWL provides a factor of safety of approximately 5 to 1.

T27 Edge Lifting Plate

- Designed for use with T3 or T11 pick-up inserts.
- Made from structural steel plate 1" x 4" x 18" long.
- Cut washers are required under head of all bolts.
- For use with 3/4" or 1" dia.inserts.
- For panels 6" thick or more, use T8.
- Safe working load is 8,800 lbs.

Warning! Never use T27 with face inserts.



T27

Continuous Coil Threaded Rod

- Available in 3/4", 1", 1-1/4" and 1-1/2" diameters.
- Available in high tensile strengths.
- May be cut with carborundum blades without damaging the threads.
- Do not use cutting torch to cut coil rod to length.
- Used with B13 or B25 Coil Nuts for making special Coil Bolts.
- B12 requires two B13 or one B25 Coil Nut in order to develop safe working loads.
- B12 standard length is 12'-0" — available in any length up to 20'-0" on special order.

Coil Rod Diameter	B12 High Tensile Designation	Safe Working Load	
		Tension	Shear
3/4"	24M	7,200	4,800
1"	50M	15,000	10,000
1-1/4"	75M	22,500	15,000
1-1/2"	90M	27,000	18,000

To Order:
Specify: (1) quantity, (2) type, (3) diameter, (4) length.

Example:
500 pcs. 24M, B12 High Tensile, 1" dia. for 8-1/2" long.



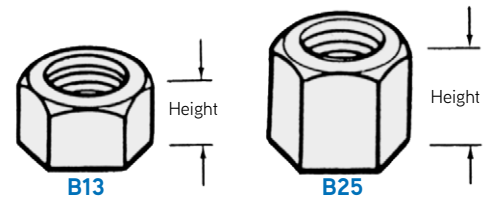
Approximate safety factor of 5 to 1 for tilt-up hardware.

Lifting Systems

B13 Coil Nut and B25 Heavy Nut

- B13 Coil Nut is made with 3/4", 1", 1-1/4" or 1-1/2" Diameter Coil Threads
- B25 Heavy Coil Nut is made with 3/4" or 1" Diameter Coil Threads

B13 and B25 Coil Nut Selection Chart					
Coil Nut Type	Dia.	Approx. Height	"A" Width Across Flats	Safe Working Load Tension (lbs.)	
				Using One B13 Nut	Using Two B13 Nuts or One B25 Heavy Nut
B13	3/4"	5/8"	1-1/8"	3,600	7,200
B25	3/4"	1-3/16"	1-1/8"	—	7,200
B13	1"	1"	1-5/8"	7,200	15,000
B25	1"	2"	1-3/8"	—	15,000
B13	1-1/4"	1-1/4"	2"	10,800	22,500
B13	1-1/2"	1-1/2"	2-3/8"	16,200	27,000



To Order:
Specify: (1) quantity, (2) type, (3) bolt dia.

Example:
200 pcs. B13 Coil Nut, 3/4" diameter.

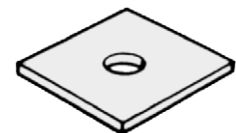
SWL provides a factor of safety of approximately 5 to 1, for tilt-up hardware.

B11 Flat Washer

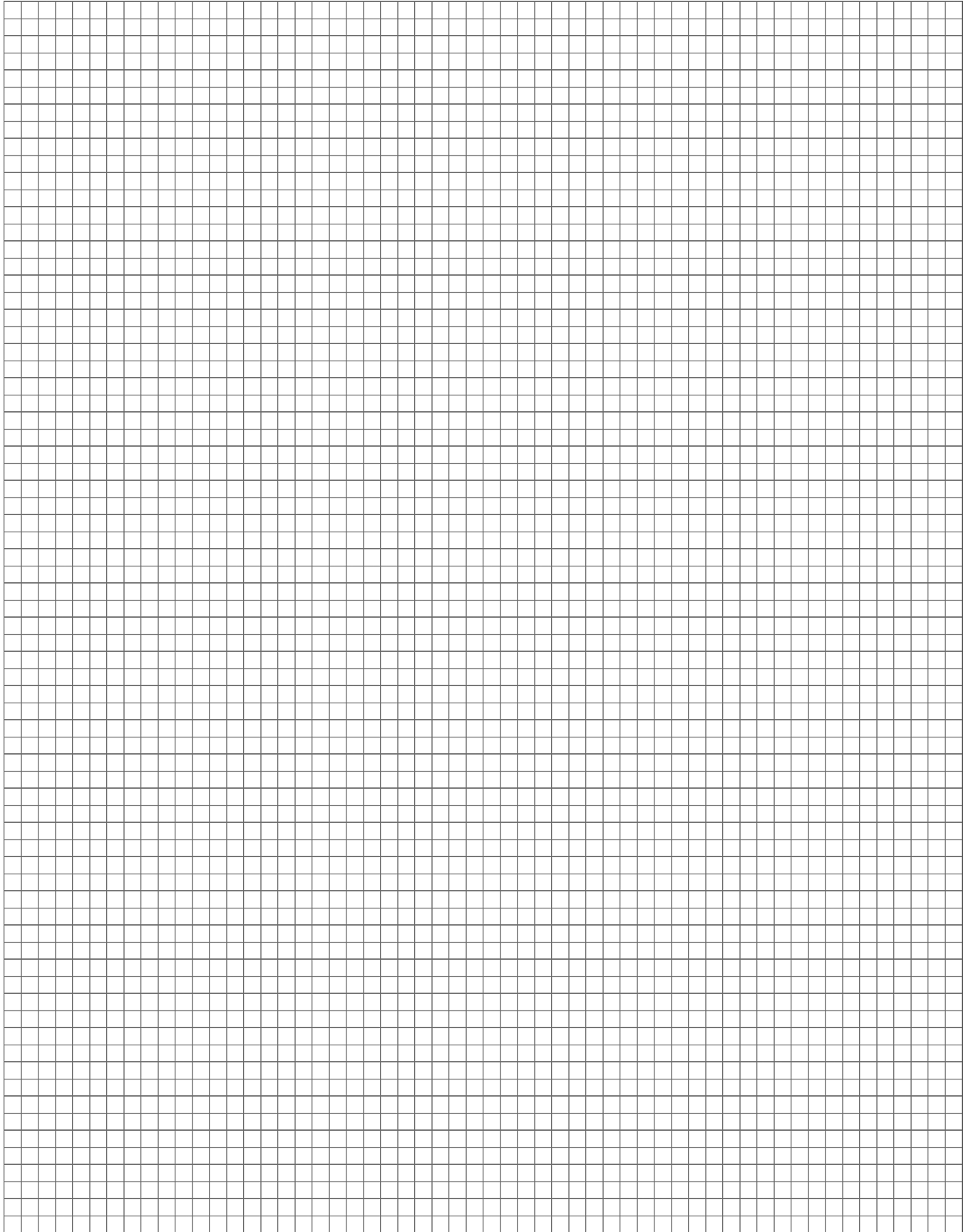
- For use with all types and sizes of bolts and coil rod.
- Made from carbon steel.
- Sizes shown will effectively transfer loads to wooden strongbacks.
- Maximum space between strongbacks should not exceed bolt diameter, plus 1/4".

Type	Bolt Diameter	Safe Working Load	Sizes
B11 Standard	1/2"	2,250 lbs.	3" x 4" x 1/4"
B11 Heavy	1/2"	3,375 lbs.	4" x 5" x 1/4"
B11 Standard	3/4"	3,375 lbs.	4" x 5" x 3/8"
B11 Heavy	3/4"	9,000 lbs.	5" x 5" x 3/8"
B11 Standard	1"	9,000 lbs.	5" x 5" 1/2"
B11 Heavy	1"	18,750 lbs.	7" x 7" x 3/4"
B11 Standard	1 - 1/4"	12,000 lbs.	5" x 5" x 5/8"
B11 Heavy	1 - 1/4"	18,750 lbs.	7" x 7" x 3/4"
B11 Standard	1 - 1/2"	18,750 lbs.	5" x 5" x 3/4"
B11 Heavy	1 - 1/2"	18,750 lbs.	7" x 7" x 3/4"

SWL provides a factor of safety of approximately 5 to 1, for tilt-up hardware.

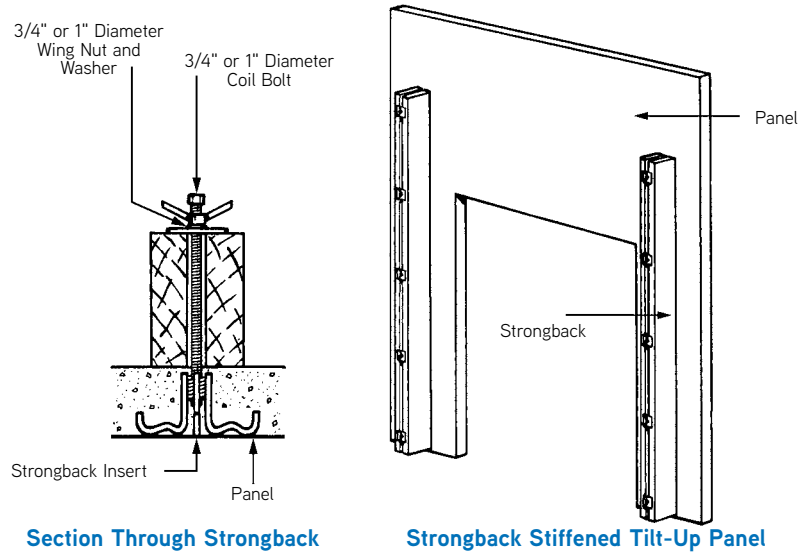


B11 Flat Washer



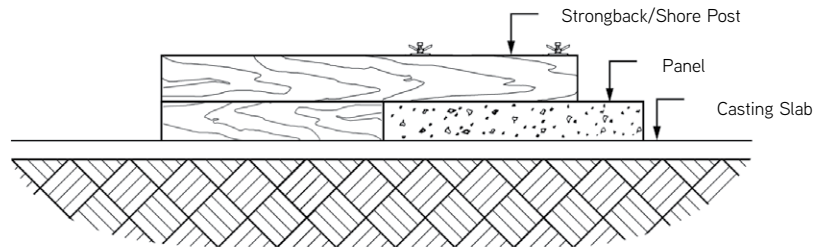
Strongbacks

When openings are required in a tilt-up panel, they often create extreme bending stresses in the remaining concrete sections. If additional reinforcing steel is not an option, strongbacks can be used effectively to stiffen the panel. Strongbacks may be fabricated from lumber, aluminum or steel and are usually reusable.

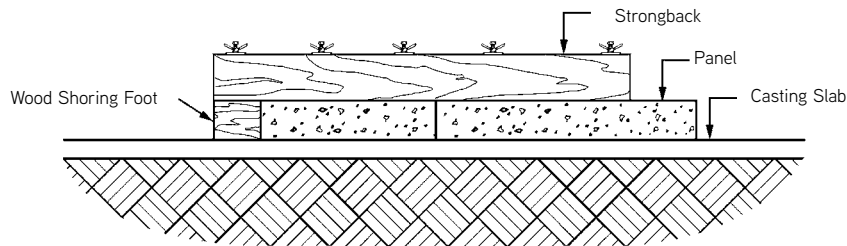


Section Through Strongback

Strongback Stiffened Tilt-Up Panel



Strongback/Shore Post



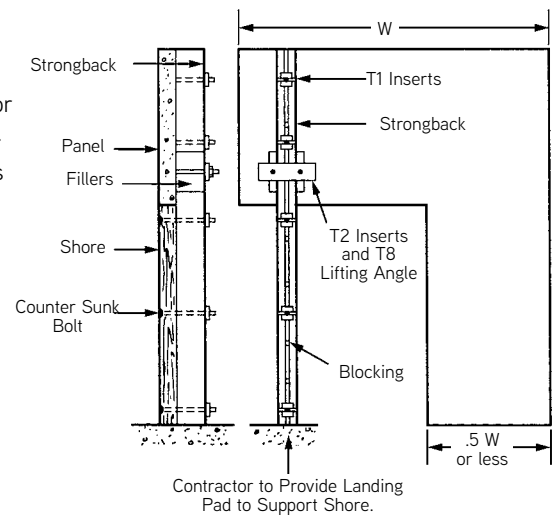
Strongback With Foot

Strongback System

Strongback-Shore

The strongback-shore system is used to reduce stresses during the lifting process and stabilize the panel during and after erection. Generally, this system should be utilized on panels where an offset opening is equal to or greater than 1/2 the panel width. The concrete leg section must be checked for stresses to determine if additional reinforcing steel or strongbacks are needed.

Strongback size should be of sufficient width and depth to carry erection loads and consist of material strong enough to withstand repeated use. The shore depth should be the same nominal size as the panel thickness, i.e., a 6" panel would require a 4x6 or 6x6 shore.



Strongbacks

When strongbacks are specified, they must be of the proper number, size and located as shown on the Panel Layout Sheet. Strongbacks, depending on type specified, must meet the following requirements:

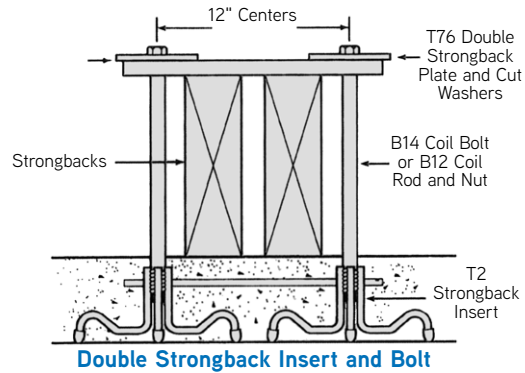
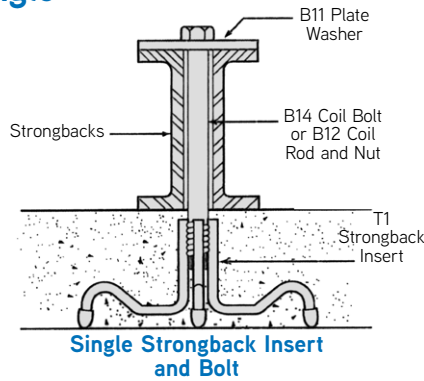
- Aluminum strongbacks must be Dayton Superior T63 Aluminum Strongbacks.
- Lumber strongbacks must be free of knots or defects, have a minimum f_b (allowable bending) stress of 1,500psi.
- Steel strongbacks must meet ASTM Standard A36.

Bolts used to attach strongbacks must be securely tightened to resist movement of the strongbacks during the erection process.

Maximum space between strongbacks is the bolt diameter plus 1/2".

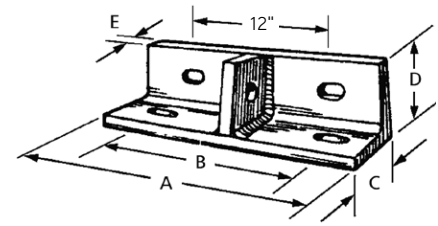
Strongbacks Using Coil Inserts, Coil Bolts and Flat Washers

T8 Lifting Angle



- Designed for use with T2 Double Pickup Inserts
- May be used for face lifting inserts and edge lifting inserts when panel thickness exceeds 6"
- Cut washers are required under head of all bolts
- Made from structural steel angle in the sizes shown below.
- Safe Working Load is 18,000 lbs.

Bolt Diameter	A	B	C	D	E	Clevis Hole
1"	18"	12"	6"	4"	5/8"	1-3/4" dia.
1-1/4" 1-1/2"	21"	15"	6"	6"	3/4"	1-1/2" dia.



T8 Lifting Angle

To Order:

Specify: (1) quantity, (2) name, (3) bolt diameter.

Example:

100, T8 Lifting Angles, 1-1/4" bolt diameter.

T63 Aluminum Strongback Beams

The Dayton Superior T63 Aluminum Strongback beams are heavy aluminum channels available in 10 ft., 15 ft., 20 ft., and 25 ft. lengths for use as strongbacks for concrete tilt-up panels. T63 beams are furnished in sets of two channels each.

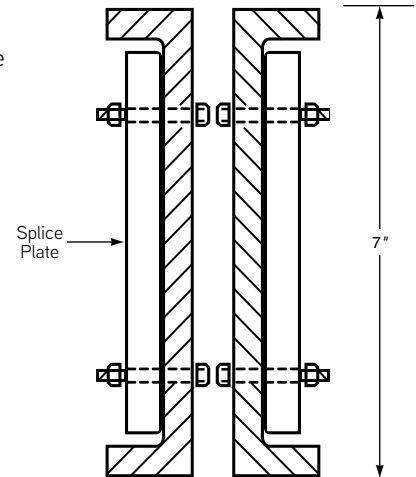
NOTE: All product located on the West Coast only.

To Order:

Specify: (1) quantity, (2) name, (3) length.

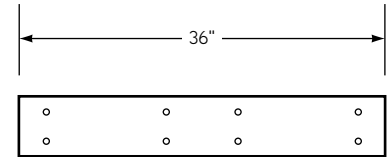
Example:

12 sets, T63 Aluminum Strongback Beams, 20' long.



T63S Splice Plate for T63 Beams

The Dayton Superior T63S Splice Plate is available for splicing T63 beams to extend their effective strongbacking length.



To Order:

Specify: (1) quantity, (2) name.

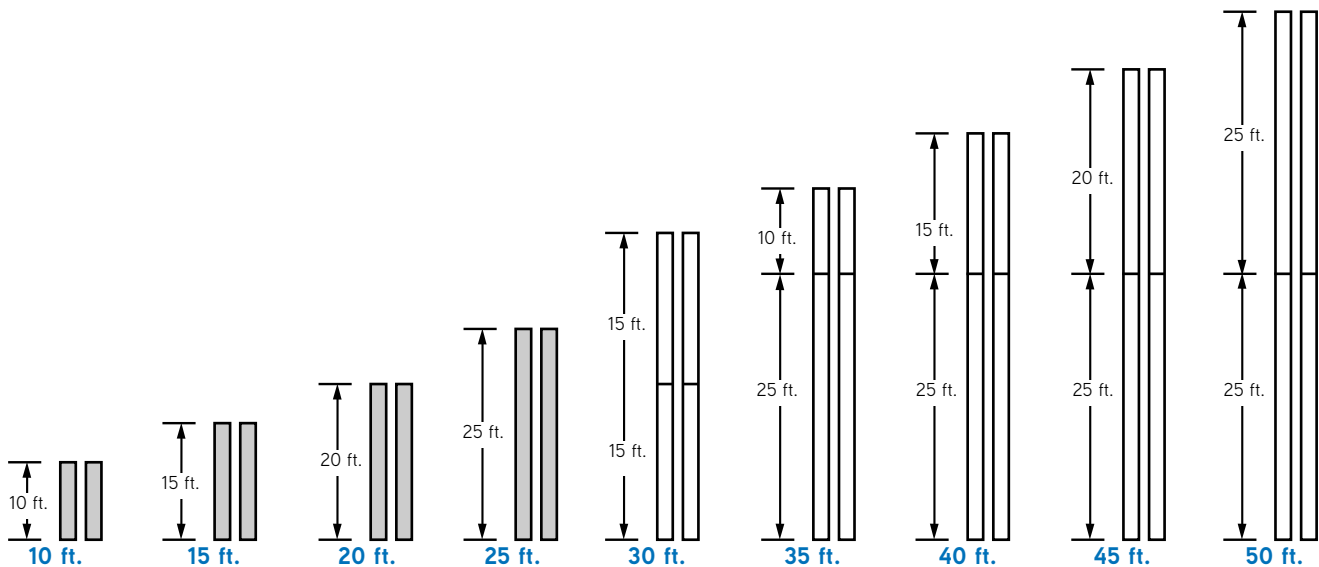
Example:

6 sets, T63S Splice Plates.

Strongback System

Strongback Assemblies

T63 Aluminum Strongbacks are available in stock lengths of 10 ft., 15 ft., 20 ft., and 25 ft. However, by using the T63S Aluminum Splice Plate Assembly to splice together various combinations of stock length strongbacks, you can also make up 30 ft., 35 ft., 40 ft., 45 ft. and 50 ft. lengths.



some methods of attaining the various lengths of strongbacks are illustrated below.

Brace Wind Loading

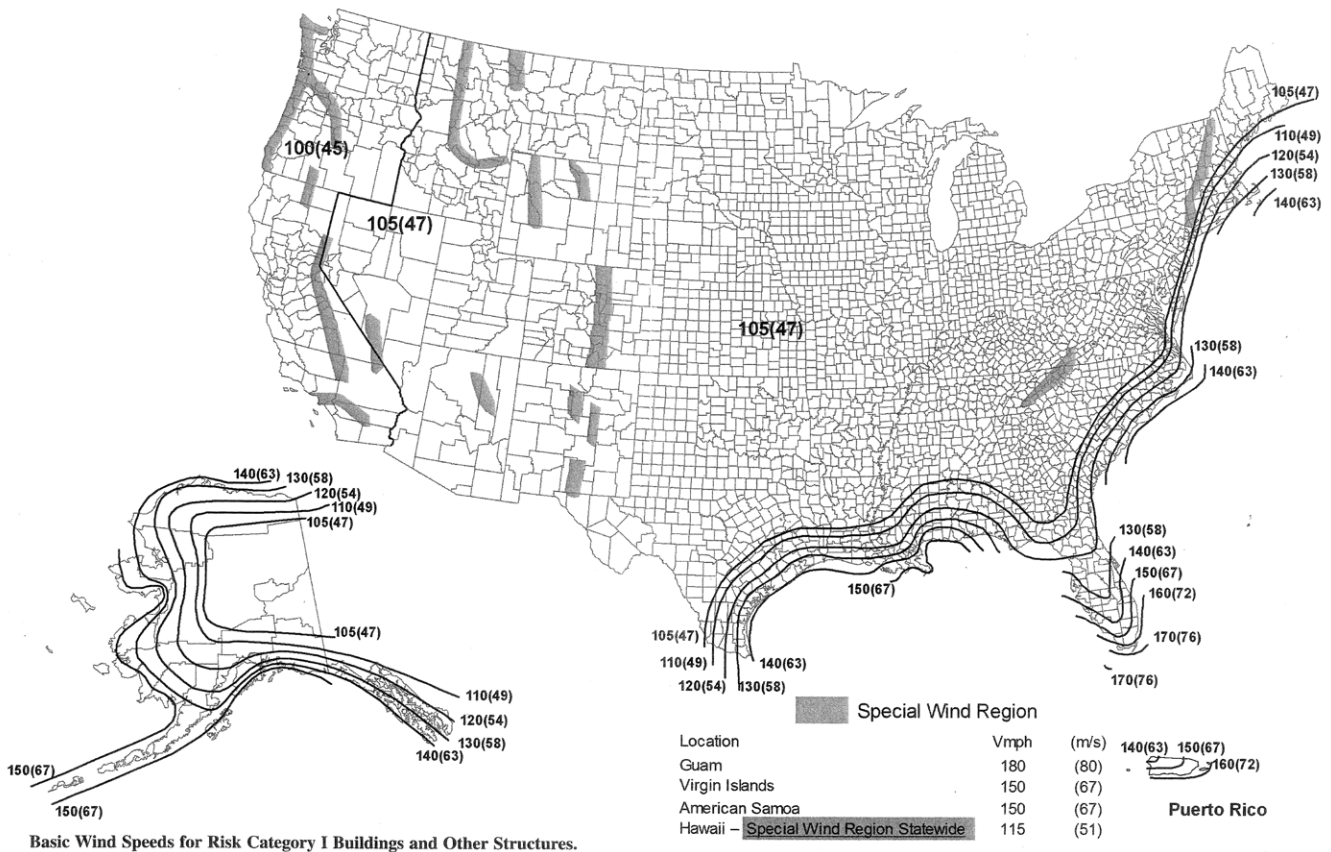
Bracing recommendations shown in these instructions are for the sole purpose of temporarily bracing fully erected tilt-up panels against wind loads only. Dayton Superior uses the wind load provisions defined in the latest editions of American Society of Civil Engineers (ASCE) *Minimum Design Loads for Building and Other Structures*, *ASCE-37 Design Loads of Structures During Construction*, and the Tilt-Up Concrete Association *Guideline for Temporary Wind Bracing* to determine the wind loads that are applied to an erected tilt-up panel.

The ASCE 7-10 standard specifies a basic wind speed of 105 mph for most areas of the United States. The 105 mph basic wind speed is based on a 15% probability of three second gust wind speed in exceedence at thirty-three feet above ground level.

The ASCE-37 standard allows and the Tilt-Up Association recommends, that the 105 mph basic wind speed be multiplied by a factor of 0.80 for projects where the construction period ranges from 6 weeks to one year. For projects of other duration, the reader should refer to ASCE-37 for the appropriate reduction factor. This allows the use of a construction period ultimate design wind speed of 84 mph in calculating ultimate brace loads for most areas of the United States.

For areas of the country having a basic wind speed different than 105 mph, reader shall refer to ASCE-7 for the applicable design wind speed.

Parts of the United states that are in the Special Wind Regions shown on the ASCE Basic Wind Speed map will require a higher construction period design wind speed than normal. The construction period design wind speed used in the design of the bracing for a project designed by Dayton Superior is shown in the lower left hand corner of each panel layout sheet. If the local building code requires a higher construction period design wind speed, DO NOT erect any panels before contacting Dayton Superior Technical Assistance for additional bracing recommendations.



Bracing Information

Warning: If wind loads of 35 mph occur, an inspection of all brace connections should be made. Loose connections can cause panels to fall. If local codes require a higher construction period design wind speed, contact Dayton Superior for additional bracing recommendations.

Location	V mph	V m/s
Hawaii	varies	varies
Puerto Rico	varies	varies
Alaska	varies	varies

Brace Wind Loading, continued

Bracing recommendations are for the sole purpose of temporarily bracing fully erected concrete tilt-up panels during construction — against wind loads only. This temporary bracing design is based on the latest editions of The American Society of Civil Engineers (ASCE-7) *Minimum Design Loads for Building and other Structures*, *ASCE-37 Design Loads of Structures During Construction*, and the Tilt-Up Concrete Association *Guideline for Temporary Wind Bracing* to determine the wind loads that are applied to an erected tilt-up panel. The ASCE standards and the TCA guideline allow the basic wind speed, which is based on a 15% probability of three second gust wind speed in exceedence at thirty-three feet above ground level.

Brace anchors and main, knee, lateral and/or end braces are not designed or intended to sustain impact loads. Precautions must be taken to arrange the panel erection sequence so as to avoid the potential for impacting upright panels or portions of the bracing system. Bracing recommendations for other loads or forces that might be applied to the bracing system are beyond the scope of Dayton Superior. For bracing recommendations other than wind loads, the user should engage a design agency with capabilities of performing such a service.

Brace Removal

This bracing system is designed to temporarily support tilt-up panels against wind loads until the building structure is complete and self supporting. The bracing system should never be disconnected or removed until the panels are secured by the permanent structural connections and all lateral load resisting systems are securely in place.

If the structural documents do not indicate when the temporary bracing system can be removed, the engineer of record should be consulted.

Safety Notes:

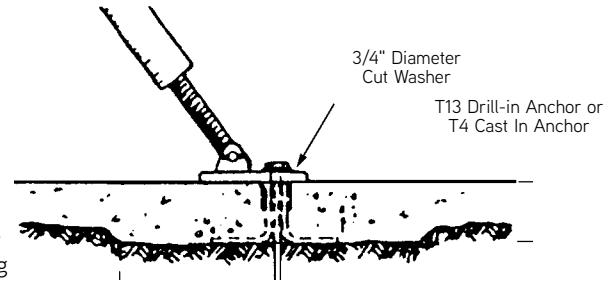
- Panel should be plumb with braces and knee braces installed before panels are released from the crane.
- Lateral bracing should be installed immediately upon the crane and crew clearing the braces and before the next panel is erected.
- Lateral bracing must be continuous, connected at each brace, and tied off with end braces at the end of each line.
- Panels require a minimum of two braces per panel.
- End braces to ground and/or cross-braces must be installed every 100 ft. to prevent lateral movement of braces and to provide total brace stability.
- All members of the brace system must be in place and secured at the end of each day.
- Knee and lateral bracing must be located as shown or the panel _____ generally near mid-length of pipe brace.
- Knee brace must be firmly fixed at bottom end to prevent possible upward buckling of main brace.
- Do not erect panels or continue working during excessive windy or adverse weather conditions.
- All brace inserts should be a minimum of 12" from any panel edge, opening, control joint or construction joint.
- Panel bracing is designed to withstand specified wind loads until panels are connected to the structural system of the building. Do not remove any members of the bracing system until all structural connections are completed.
- Use only the brace type as noted on the Panel Layout Sheet. No substitute brace hardware shall be used and all braces must be positioned at the specified locations.
- For special bracing conditions that require deviation from the bracing dimensions shown on the Panel Layout Sheet contact Dayton Superior for recommendations.
- See Panel Layout Sheet for type of brace, number of braces per panel, as well as knee and lateral bracing requirements.
- Welding or bolting the tilt-up panels in place might preclude the use of braces.
- After winds of 35 mph or more have been experienced at the job site, the tilt-up contractor must check the tightness of the bolts that secure the wall and foot plates to the concrete. Re-tightening of these bolts to the proper torque will assure that the pipe braces are secure.
- The safe working load of the panel's bracing system may be drastically reduced if other types of brace anchors are used as part of this project's bracing system, other than specified brace anchors.
- Slab design must be reviewed by the engineer of record to insure slab is capable of withstanding the loads being transferred from the braces.

Warning! Failure to install knee, lateral and end braces (when required) will greatly reduce the safe working load of the specified brace and may allow panels to fall causing severe injury or death.

Brace to Floor Slabs

Dayton Superior specifies ONLY the T4 cast-in-place anchor or the T13 COIL-ANCHOR drill-in anchor for use in attaching braces to the floor slab.

Warning! The floor slab sections may not be adequate to safely support the loads applied to the floor slab by the wall braces. It is the contractor's responsibility to decide if a section of floor slab can safely support the applied brace loads. Dayton Superior cannot make this determination as it has no control over floor slab thickness, control joint spacings, width of the floor slab "leave out" strip or other factors that may affect the load carrying capacity of the floor slab. Movement of a section of floor slab can cause panels to fall, which may result in property damage and/or severe personal injury. The floor slab should be designed by a competent engineer to resist the applied loads. To assist the contractor or engineer, the total brace load per panel is shown on each panel detail sheet provided by Dayton Superior.



Brace Length and Safe Working Loads

How to Calculate Brace Length

- D** = Elevation — top of panel above floor slab (not necessarily same as panel height).
- W** = Wall insert dimension = $2/3 D$
- F** = Floor insert dimension = $3/4 W$
- B** = Brace length = $5/4 W$

The brace dimension (W) must be a minimum of 5% of the panel's overall height above the panel's geometric and mass center of gravity. After the locations of the braces are determined, the panel structure should be checked to verify that it is strong enough to resist temporary wind loads.

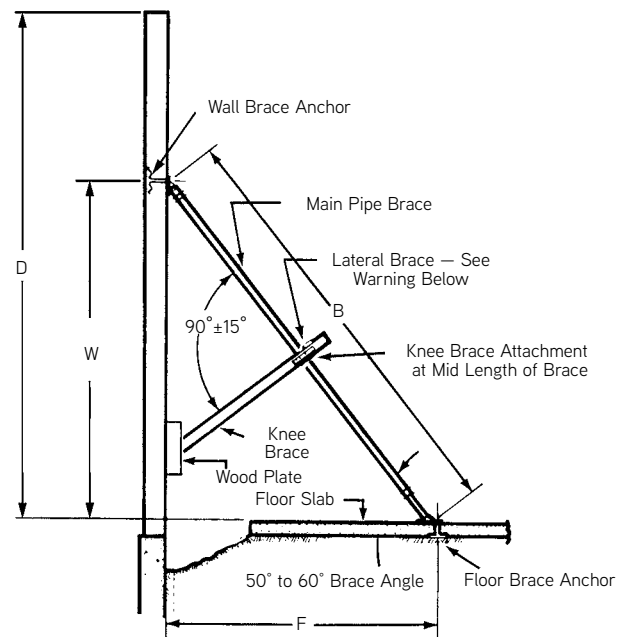
Brace locations other than those shown may drastically increase brace loads. Brace angles over 60° from the horizontal result in poor mechanical advantage and excessive vertical kick, while brace angles under 50° decrease brace buckling strength due to greater length and excessive sag.

Without knee brace means that brace type can be adjusted for various lengths of "B" shown, and brace may be used without knee, lateral or end bracing.

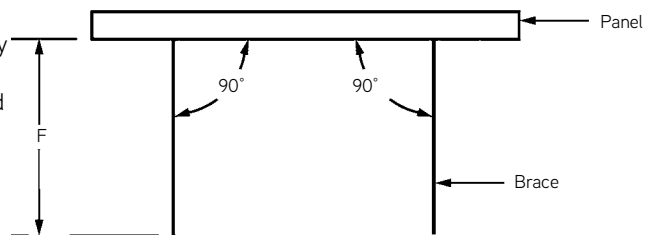
With knee brace means that brace type can be adjusted for various lengths of "B" shown and requires the use of knee, lateral and end bracing to obtain the SWL listed.

Danger! Bracing must be installed at $90^\circ \pm 5^\circ$ to plane of panel or brace safe working load will be greatly reduced.

The following is a quick "Rule of Thumb" to use in determining if a brace is installed at $90^\circ \pm 5^\circ$ to the panel: The brace may be skewed left or right 1 inch for every 1 foot that the brace anchor is located away from the wall. For example: If your dimension "F" is 15 ft, then your braces may be skewed 15" left or right and still stay within the required 5° tolerance. See panel layout sheets for proper "F" dimension.



Note: End braces to ground and/or crossbraces must be installed every 100 ft to prevent lateral movement of braces and to provide total brace stability.



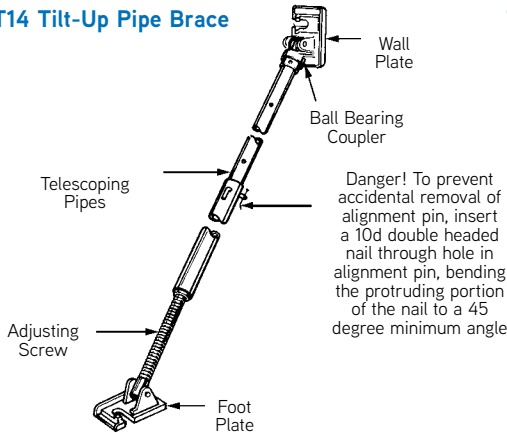
Plan View

T14 Tilt-Up Wall Braces

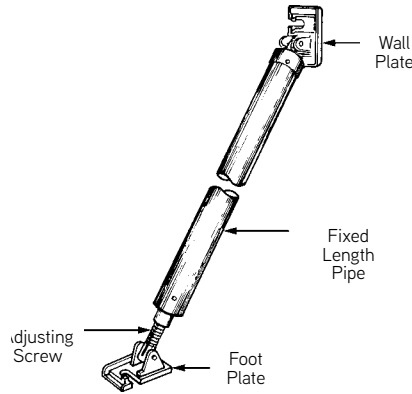
The T14 Tilt-Up Wall Braces are all steel, heavy duty wall braces designed to quickly and easily align and brace tilt-up wall panels. Rough adjustment of the T14 braces is easily accomplished by telescoping the pipes to the nearest incremental hole.

Final adjustment is then achieved by simply turning the brace. Dayton Superior wall braces are available in numerous sizes to provide a continuous range of tilt-up panel heights of fifty feet or more. Refer to the chart below for additional information.

T14 Tilt-Up Pipe Brace



T14 Tilt-Up Jumbo Brace



To Order:

Specify: (1) quantity, (2) name, (3) model.

Example:

200, T14 Tilt-Up Wall Braces. Model B8.

T14 Pipe Brace Selection Chart

Type	Description	Minimum and Maximum Brace Length	Brace Weight
B1A	Short Pipe Brace	8'-0" to 14'-0"	87
B4	Heavy Duty Regular Pipe Brace	14'-6" to 23'-6"	130
B5	Heavy Duty Long Pipe Brace	22'-6" to 39'-0"	208
B7	Short Jumbo Brace	17'-0" Fixed Length	107
B8	Jumbo Brace	22'-0" Fixed Length	130
B9	Jumbo Brace with 5'-0" Extension	27'-0" Fixed Length	172
B10	Jumbo Brace with 10'-0" Extension	32'-0" Fixed Length	193
B11	Tru-lift Brace	25'-6" to 40'-0"	505
B12	Jumbo 5-1/2"	32'-0" Fixed Length	245
B14*	B12 Jumbo Brace, 10'-0" Extension	42'-0" Fixed Length	382
B15*	B12 Jumbo Brace, 20'-0" Extension	52'-0" Fixed Length	410
B16	B12 Jumbo Brace, 5'-0" Extension	37'-0" Fixed Length	360
B18	Super Brace	52'-0" Fixed Length	984

Notes: * Field assembly is required for B14 and B15 braces.
 Fixed length allows for +/-9" of adjustment
 B11 brace available West Coast only
 Pipe Extensions: T15 for the B8 model and T20 for the B12 model

Pipe Brace Extensions

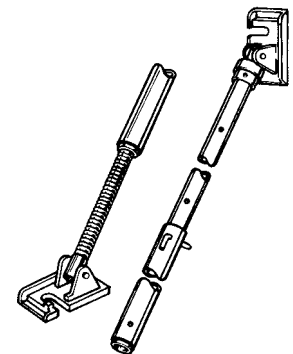
The Dayton Superior Pipe Brace Extensions are available for the B8 and B12 pipe brace models. The T15 extension for the B8 model extends the brace five feet or ten foot increments. The T20 extension for the B12 model extends the brace in five or 10 foot increments.

To Order:

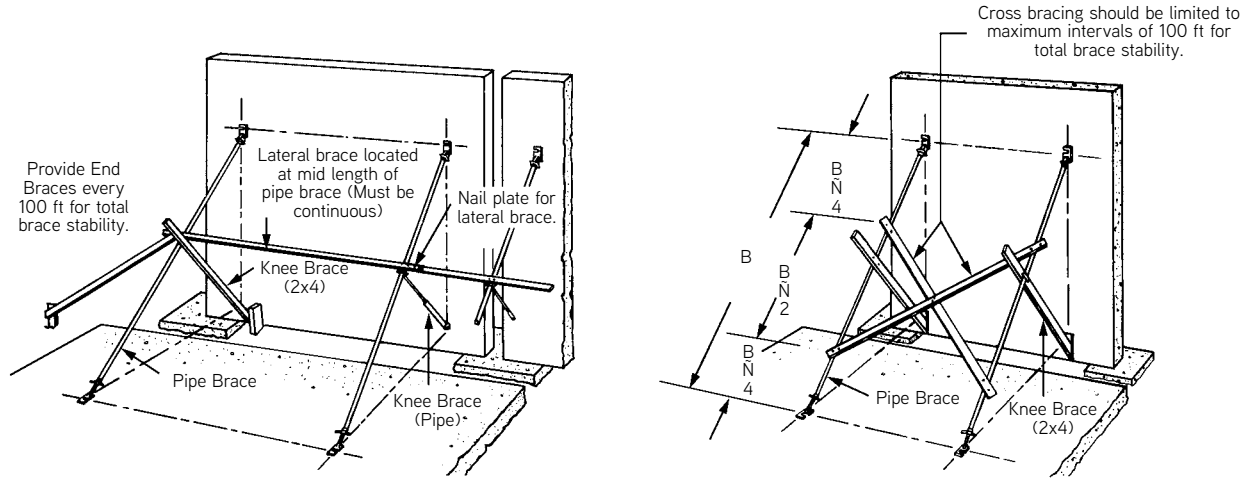
Specify: (1) quantity, (2) name, (3) model.

Example:

40, T15 Pipe Brace Extension, 5' extension for B8 braces.



Knee, Lateral and End Bracing



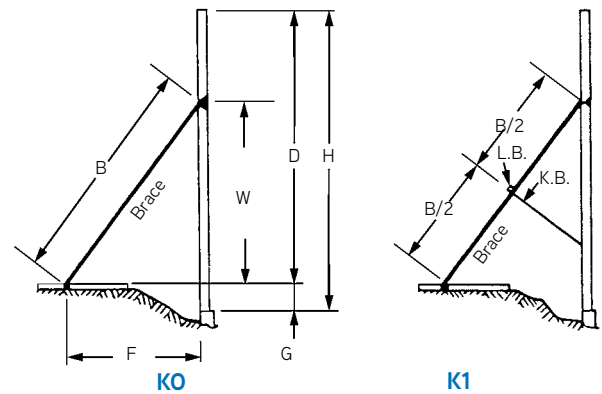
In order to properly strengthen the main pipe brace, knee bracing, lateral bracing and end bracing must be installed at the mid-point of the main pipe brace.

Cross bracing is an acceptable alternative to lateral bracing and end bracing. This method provides excellent panel stability when the erection sequence dictates that there are no adjacent panels that would make continuous lateral bracing possible.

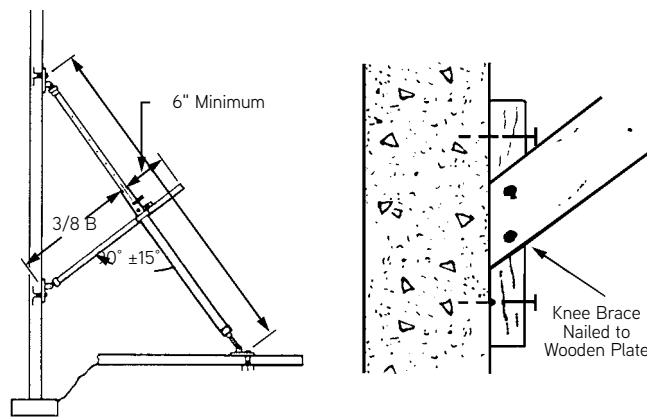
Lateral bracing must be limited to a maximum of 100 feet and each interval of lateral bracing must begin and end with either an end brace to ground or cross-bracing. In addition, each day a panel erection end or cross-bracing must be installed on the first and last wall brace to prevent compromise of the day's bracing activity.

Either lumber or pipe may be used as knee and end braces depending on the preference of the contractor.

Warning! It is common to refer to the sub-bracing support system of the main braces as knee bracing. However, the user is to be aware that when knee bracing is required, it means that lateral bracing and end bracing must also be included. This sub-support system is needed to reduce the buckling length of the main pipe braces and must have firm connections at all points. The knee brace must also be connected at its bottom end.

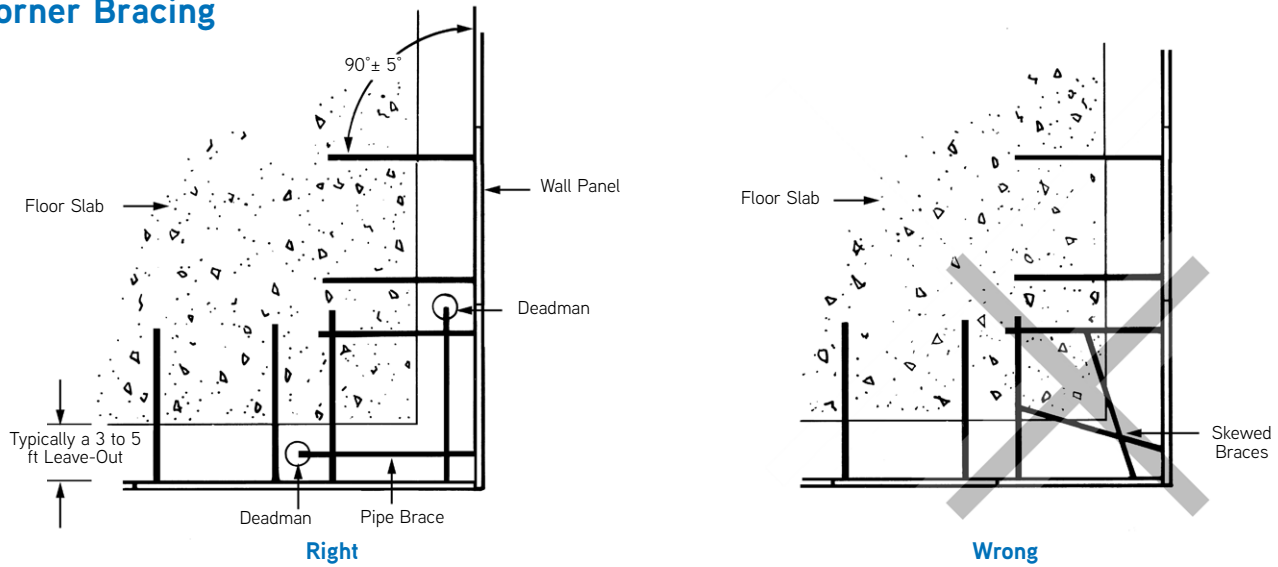


If KO is listed after the brace type, this indicates that the specified brace may be used without knee, lateral or end bracing. If K1 is listed after the brace type, this indicates that the specified brace shall be used only with knee, lateral and end bracing.



Warning! If winds over 35 miles per hour are experienced on the job site, all bolts that secure the wall and foot plates to the concrete must be checked and retightened to the proper torque to ensure that the pipe braces are secure.

Corner Bracing



The proper method of bracing corner panels is shown above. Attachment of braces to deadman in the leave-out area allows the braces to be properly located without having to skew the braces for attachment to the floor slab. Corner brace lengths must be adjusted to eliminate pipe interference.

Warning! Braces must be installed at $90^\circ \pm 5^\circ$ to plane of panel or brace safe working load will be drastically reduced. Panel stability may be jeopardized when braces are skewed.

Cast-In-Place Brace Anchor Loading

When using Dayton Superior T14 Tilt-Up Pie Braces the maximum brace load and safe working load per brace anchor that can be safely transferred to T6A, T5A or T4 Brace Anchors is as follows:

Insert Type	Insert Depth	Panel Thickness	Safe Working Load (lbs)		Torque Per Anchor	
			Tension	Shear	Minimum	Maximum
T5A	3"	4"	3,897	5,499	80 ft lbs	115 ft lbs
T5A Heavy	5.25"	6"	9,022	11,266	100 ft lbs	140 ft lbs

SWL provides a safety factor of approximately 2 to 1 in 2,500 psi Normal Weight Concrete.

Insert Type	Panel Thickness	Safe Working Load		Torque Per Anchor	
		Tension (lbs)	Shear (lbs)	Minimum	Maximum
T6A or T4	5"	6,280	4,920	100 ft lbs	140 ft lbs
T6A or T4	7.25"	8,980	9,640	100 ft lbs	140 ft lbs
T6S	5"	6,280	4,920	100 ft lbs	140 ft lbs
T6S	6"	8,700	7,200	100 ft lbs	140 ft lbs
T6S	7"	11,360	9,640	100 ft lbs	140 ft lbs
T6S	7.5"	12,780	11,015	100 ft lbs	140 ft lbs
T6S	8"	14,260	12,465	100 ft lbs	140 ft lbs

SWL provides a safety factor of approximately 2 to 1 in 2500 psi Normal Weight Concrete.

Corner or edge distances less than 1.5 times the embedment depth will proportionally reduce these ACI 318, App. D concrete limited capacities.

Dayton Superior specifies the use of T4, T5A, T6A cast-in-place brace anchors or the T13 Coil-Anchor drill-in brace anchor ONLY. Dayton Superior does not specify or approve any other type of cast-in-place or drill-in anchor for the bracing of tilt-up wall panels. **If any other type of brace anchor is used, the contractor does so at his own risk and assumes the risk of all serious personal injury, death or property damage which may result. By using such unspecified and unapproved brace anchor, the contractor agrees to indemnify and hold Dayton Superior harmless against all damages and losses that may occur.**

When two braces per panel are required, the normal brace insert location for solid panels is .1 to .2 of panel width, minimum of 12", inward from panel side. Contact Dayton Superior for recommendations on panels requiring 3 braces or more, on panels with openings or for other unusual conditions.

Note: Notify Dayton Superior Technical Services if slab thickness is less than 5" thick. Brace design must be changed for thinner slabs.

Bracing to Cylindrical Deadman

Use the chart at the right to select the proper size deadman if your project requires the use of a deadman for brace attachment in lieu of an anchor cast into a floor slab.

How to select the proper size deadman:

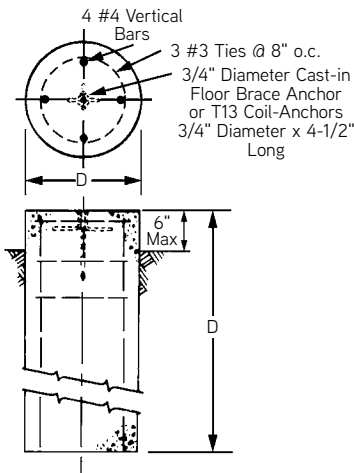
1. Determine the maximum applied brace load for the project.
2. The proper deadman must weigh at least as much as the maximum individual brace load.
3. Find a number on the deadman chart that is equal to or greater than the required deadman weight. Follow the numbers in the top column and the far left column of the chart for the proper diameter and height of the deadman.

Example:

Maximum applied brace load = 3,200 lb.

Acceptable deadman sizes:

Diameter	Height
30"	4'-6"
36"	3'-6"
42"	2'-6"



Height	Weight of Deadman (Pounds)				
	30" Diameter	36" Diameter	42" Diameter	48" Diameter	60" Diameter
2'-0"	1,470	2,120	2,890	3,770	5,888
2'-6"	1,840	2,650	3,610	4,710	7,360
3'-0"	2,210	3,180	4,330	5,650	8,832
3'-6"	2,580	3,710	5,050	6,600	10,304
4'-0"	2,950	4,240	5,770	7,536	
4'-6"	3,310	4,770	6,490	8,478	
5'-0"	3,680	5,300	7,220	9,420	
5'-6"	4,050	5,830	7,931		
6'-0"	4,420	6,360	8,652		
6'-6"	4,790	6,890	9,373		
7'-0"	5,150	7,420			
7'-6"	5,520	7,950			
8'-0"	5,890	8,480			
8'-6"	6,260	9,010			
9'-0"	6,630				

Note: Always hand or auger excavate hole for deadman.

Minimum allowable soil bearing pressure is to be 1,500 psf.

Minimum concrete compressive strength f'_c shall be = 2,500 psi at use.

1 Kip = 1,000 lbs.

Brace Maintenance

During the construction process braces may be exposed to adverse conditions that could damage or render them unusable. Braces should be inspected for proper operation, damage and wear

after each use.

This inspection is typically performed by Dayton Superior or Dayton Superior Certified Tilt-Up Dealer when the braces are returned. However, when braces are transferred from one job to another without being returned to Dayton Superior or its dealer for maintenance, the user must inspect all braces prior to their being reused.

This inspection should check for missing parts, wear, dings, kinks, straightness, indication of any application of heat and/or other damage.

Any brace that shows signs of wear, has missing parts, damage, or is questionable should be set aside and not used.

Accubrace® Total Bracing System



Accubrace is a total bracing system of Braces and Helical Ground Anchors engineered for unsurpassed speed and efficiency for tilt-up or precast applications. Installed by Dayton Superior professionals, this system provides an affordable, engineered solution.

Braces

A high-capacity brace designed to allow increased brace spacing for temporary stabilization of concrete wall panels.

Helical Ground Anchors

The Helical Ground Anchor (HGA) is part of a total bracing system designed for rapid installation and the ability to immediately load the helical ground anchor for unsurpassed speed and efficiency on any tilt-up or precast project.

HGA Extension

Certain sites where the foundation soils are lower strength may require the use of an HGA Extension. This shaft is the same section (1½" square bar) but is 4' in length and has a 10" helical plate set at 10" from the top of the extension.

Transition Brace Connector

The Transition Brace Connector connects the brace to the HGA. It leads to quicker installation and better alignment of the brace center-line to the HGA center-line.

Advantages:

- Reduces the number of braces needed by up to 60% to provide accelerated construction
- Engineered bracing system with documented load capacity
- Dayton Superior offers Professional Engineer review and stamp services
- Bracing on the outside of wall avoids structural steel erection
- Bracing on the inside of wall without a slab avoids holes in slab and/or vapor barrier
- Integrated in-line connection to the brace with the HGA and Transition Brace Connector
- Rapid, all-weather installation
- Recipient of the 2007 Robert Aiken Innovation Award sponsored by the TCA.
- Removable and reusable



Contact Customer Service for rental information.
Available exclusively through Dayton Superior Tilt-Up Dealers.

Accubrace Components

Braces



Brace	Outside Dimensions	Standard Brace Length	Brace Length Min.	Brace Length Max	Ultimate Load (Pull)	Brace Working Load (Pw)	Brace Weight*
B21F	4.0"	21'	21'-0"	23'-3"	23,250 lb	15,500 lb**	230 lb
B27BF	5.0"	27'	25'-7"	27'-3"	36,000 lb	24,000 lb**	350 lb
B32F	5.0"	32'	30'-9"	33'-3"	24,375 lb	16,250 lb**	405 lb
B33F	5.0"	33'	31'-9"	34'-3"	22,500 lb	15,000 lb	410 lb
B37F	5.0"	37'	35'-9"	38'-3"	17,250 lb	11,500 lb	460 lb
B42F	5.0"	42'	40'-9"	43'-3"	12,375 lb	8,250 lb	775 lb

NOTES: * Does not include weight of connectors.
 ** BWL based on adequate brace to HGA connection.
 Safety Factor is 1.5:1



Accubrace Components Brace Accessories



Bracing Information

Description	SWL Tension	Length
Standard HGA (1½" Square Bar with 10" Helical Plates)	12,000 lb	7'-2"
Standard HGA Extension* (1½" Square Bar with 10" Helical Plate)	15,000 lb	4'-0"

* **NOTE:** When an extension is used, the working load of the HGA increases to 15,000 lb for the installed torque of 2,200 ft/lb.



Standard Transition Brace Connector



Two-Hole Cast Wall Plate



Tang Bolt



Standard Wall and Floor Plate Bracket

Product Code	Description
139722	Standard Transition Brace Connector
121954	Two-Hole Cast Wall Plate
122514	Standard Wall and Floor Plate Bracket
	Tang Bolt

* **NOTE:** When an extension is used, the working load of the HGA increases to 15,000 lb for the installed torque of 2,200 ft/lb.

Overlap Multiplier for Bolts

Panel Thickness	Single T6S SWL	Double T6 SWL
5	6100	12000
5.5	7050	13862
6	8000	15600
6.5	9050	17363
7	10100	19027
7.5	11200	20701
8	12350	22376

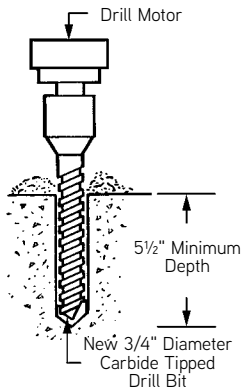
For connection to slab, overall size must be appropriate for brace load and approved by a Professional Engineer.

T13 Coil-Anchor™ 3/4" Diameter x 4-1/2" Long Application Sequence

<p>Drill Motor</p> <p>4" Minimum Depth</p> <p>New 3/4" Diameter Carbide Tipped Drill Bit</p>	<p>1. Drill a 3/4" diameter hole perpendicular to the floor surface with a new carbide tipped drill. Depth of the hole must be a minimum 4". Holes drilled through slabs that are 5" or greater are acceptable. Do not use core bits for T13 anchor holes. Minimum compressive strength of the concrete must be 2,500 psi prior to installation of T13 anchors. Minimum edge distance for the T13 anchor is 12".</p>							
<p>T13 Coil Anchor Bolt Patent #5,006,023 3/4" Dia. x 4-1/2" Long</p> <p>Washer</p> <p>4 Turn Tang</p> <p>.74" Maximum Tang O.D.</p>	<p>3. Thread the Tang onto the T13 bolt. Finger tight is sufficient, no more than 1-1/2 turn.</p> <p>Caution! Do not attempt to pre-expand the Tang. For proper load capacity, the Tang must not be installed over 1-1/2 turn on the bolt.</p>	<p>Brace Foot Plate</p>						
<p>6. The tension safe working load (SWL) per T13 Coil-Anchor is shown below:</p>	<p>Warning! Do not attempt to use a standard coil bolt with the T13 Coil-Anchor Tang. The Coil-Anchor Bolt is a tapered bolt and is not interchangeable with standard coil bolts.</p> <p>T13G Thread Gauge</p> <p>Note: T13G Thread Gauges are recommended, to check T13 bolt thread wear, when reusing T13 Coil-Anchor Bolts.</p>	<p>5. Tighten the T13 anchor with a 3/4" impact wrench, then use a torque wrench to insure correct tightness. Refer to the chart for proper torquing values.</p> <p>Warning! If wind loads over 35 miles per hour are experienced on the job site, all T13 anchors should be checked with a torque wrench to verify proper torque values are maintained.</p>						
<table border="1"> <thead> <tr> <th>Floor Slab Thickness</th> <th>SWL Tension per Anchor</th> <th>Minimum Torque per Anchor</th> </tr> </thead> <tbody> <tr> <td>5" or Thicker</td> <td>7,500 lbs</td> <td>200 ft lbs</td> </tr> </tbody> </table>	Floor Slab Thickness	SWL Tension per Anchor	Minimum Torque per Anchor	5" or Thicker	7,500 lbs	200 ft lbs	<p>4. Insert the T13 anchor through the foot plate of the wall brace and into the properly drilled hole. Drive the bolt down until the cut washer rests on the foot plate.</p>	<h3>T13L Set-Eez™ Dry Film Lubricant</h3>
Floor Slab Thickness	SWL Tension per Anchor	Minimum Torque per Anchor						
5" or Thicker	7,500 lbs	200 ft lbs						
<p>Notes: Safe working loads are based on an approximate factor of safety of 2:1. This assumes a minimum slab compressive strength of 2,500 psi and a properly installed T13 anchor as detailed above.</p> <p>Warning: When using T13 Coil-Anchor Bolts, always clean and lubricate the bolt with T13L Set-Eez. Failure to do so will result in bolt wear, lower than expected load capacity and possible premature failure.</p>	<p>The Dayton Superior T13L Set-Eez Dry Film Lubricant is designed to facilitate the reuse of the T13 Coil-Anchor bolt. The T13L lubricant is available in 6 oz. jars.</p>							
<p>To Order: Specify: (1) quantity, (2) name.</p> <p>Example: 4 bottles, T13L Set-Eez Dry Film Lubricant.</p>								

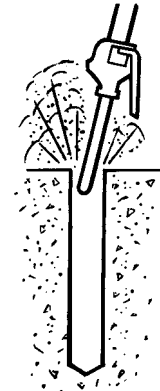
Bracing Information

T13 Coil-Anchor™ 3/4" Diameter x 6" Long Application Sequence



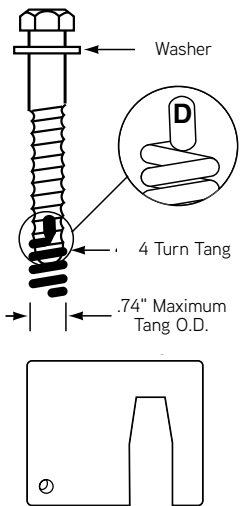
1. Drill a 3/4" diameter hole perpendicular to the floor surface with a new carbide tipped drill. Depth of the hole must be a minimum 5-1/2". Holes drilled through slabs that are 6" or greater are acceptable.
Do not use core bits for T13 anchor holes.
Minimum compressive strength of the concrete must be 2,500 psi prior to installation of T13 anchors.
Minimum edge distance for the T13 anchor is 12".

Warning! Do not use T13 (6") anchors in slabs less than 6" thick. The insufficient embedment depth will not allow required load capacity.



2. Thoroughly clean the drilled hole with compressed air.

T13 Coil Anchor Bolt
Patent #5,006,023
3/4" Dia. x 4-1/2" Long



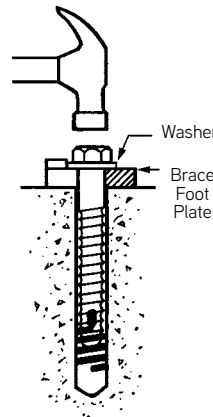
3. Thread the Tang onto the T13 bolt. Finger tight is sufficient, no more than 1-1/2 turn.

Caution! Do not attempt to pre-expand the Tang. For proper load capacity, the Tang must not be installed over 1-1/2 turn on the bolt.

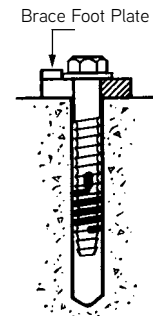
Warning! Do not attempt to use a standard coil bolt with the T13 Coil-Anchor Tang. The Coil-Anchor Bolt is a tapered bolt and is not interchangeable with standard coil bolts.

T13G Thread Gauge

Note: T13G Thread Gauges are recommended, to check T13 bolt thread wear, when reusing T13 Coil Anchor Bolts.



4. Insert the T13 anchor through the foot plate of the wall brace and into the properly drilled hole. Drive the bolt down until the cut washer rests on the foot plate.



5. Tighten the T13 anchor with a 3/4" impact wrench, then use a torque wrench to insure correct tightness. Refer to the chart for proper torquing values.

Warning! If wind loads over 35 miles per hour are experienced on the job site, all T13 anchors should be checked with a torque wrench to verify proper torque values are maintained.

6. The tension safe working load (SWL) per T13 Coil Anchor is shown below:

Floor Slab Thickness	SWL Tension per Anchor	Minimum Torque per Anchor
6" or Thicker	10,400 lbs	200 ft lbs

Notes: Safe working loads are based on an approximate factor of safety of 2:1. This assumes a minimum slab compressive strength of 2,500 psi and a properly installed T13 anchor as detailed above.

Warning: When using T13 Coil Anchor Bolts, always clean and lubricate the bolt with T13L Set-Eez. Failure to do so will result in bolt wear, lower than expected load capacity and possible premature failure.

T4 Brace Anchor for Fill

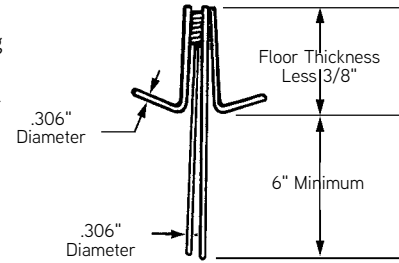
The Dayton Superior T4 Brace Anchor for Fill is a 3/4" diameter insert designed for anchoring wall braces to the floor slab. The angular offset of the legs provides a gauge and stop when the anchor is pushed into the fill. The T4 anchor is furnished with a T21 Locator Plug factory-installed.

To Order:

Specify: (1) quantity, (2) name, (3) slab thickness.

Example:

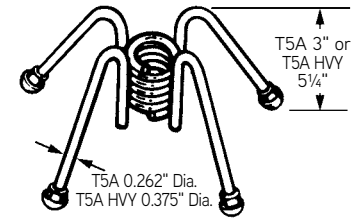
120, T4 Brace Anchors for 6" slab.



T4 Brace Anchor for Fill

T5A Inverted Wall Brace Anchor

The Dayton Superior T5A Inverted Wall Brace Anchor is designed to place the 3/4" diameter anchorage coil at the bottom of the poured panel. The anchorage is then available for fastening the brace to the cast-down face of the panel after it has been lifted and set in place. The T5A anchor is furnished with plastic tipped feet and a T21 Locator Plug. Standard height of the T5A anchor is 3",



T5A Inverted Wall Brace Anchor

To Order:

Specify: (1) quantity, (2) name.

Example:

200, T5A Inverted Brace Anchors.

minimum panel thickness is 4". Standard height for T5A HVY is 5-1/4", minimum panel thickness is 6".

T6A and T6S Brace Anchor

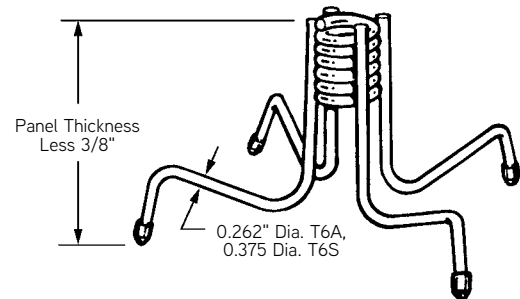
The Dayton Superior T6A and T6S Brace Anchors are 3/4" diameter coil inserts

To Order:

Specify: (1) quantity, (2) name, (3) type of corrosion protection, (4) type of locator plug, (5) slab thickness.

Example:

200, T6A Brace Anchors with plastic tipped feet and T21 locator plugs for 6" slab thickness.

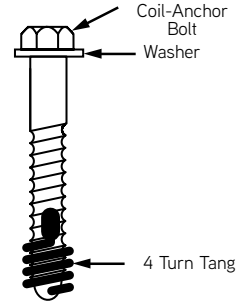


T6A and T6S Brace Anchor

designed to be easily positioned and tied into the rebar mat of a tilt-up panel. The T6A and T6S anchors are available with plastic dipped, plastic tipped or stainless steel feet and with a T21 locator plug factory installed. They are used with B14 Coil Bolts.

T13 Coil-Anchor

The Dayton Superior T13 Coil-Anchor is a drill-in expansion anchor designed for use in the floor slabs of tilt-up buildings to attach and anchor wall braces. Each T13 plug includes the bolt, one cut washer and one tang. Available in 3/4" diameter x 4-1/2" or 6" lengths as specified.



T13 Coil-Anchor

To Order:

Specify: (1) quantity, (2) name, (3) length.

Example:

200, T13 Coil-Anchors x 4-1/2" long.

Available exclusively through Dayton Tilt-Up 3 Dealers

Brace Length and Axial Working Loads

B1A Short Pipe Brace				
D	W	F	B	Axial Safe Working Load
				Without Knee Bracing
9'-0"	6'-0"	4'-6"	7'-6"	6,500 LBS
9'-6"	6'-5"	4'-9"	7'-11"	6,500 LBS
10'-0"	6'-8"	5'-0"	8'-4"	6,500 LBS
10'-6"	7'-0"	5'-3"	8'-9"	6,500 LBS
12'-0"	8'-0"	6'-0"	10'-0"	6,500 LBS
13'-0"	8'-9"	6'-6"	10'-9"	6,450 LBS
14'-0"	9'-6"	7'-0"	11'-8"	5,225 LBS
15'-0"	10'-0"	7'-6"	12'-5"	4,450 LBS
16'-0"	10'-9"	8'-0"	13'-3"	3,750 LBS

B4 Heavy Duty Regular Pipe Brace					
D	W	F	B	Axial Safe Working Load	
				Without Knee Bracing	With Knee Bracing
18'-0"	12'-0"	9'-0"	15'-0"	6,500 lbs	6,500 lbs
19'-0"	12'-8"	9'-6"	15'-10"	6,500 lbs	6,500 lbs
20'-0"	13'-4"	10'-0"	16'-8"	6,500 lbs	6,500 lbs
21'-0"	14'-0"	10'-6"	17'-6"	5,925 lbs	6,500 lbs
22'-0"	14'-8"	11'-0"	18'-4"	4,800 lbs	6,500 lbs
23'-0"	15'-4"	11'-6"	19'-2"	3,925 lbs	6,500 lbs
24'-0"	16'-0"	12'-0"	20'-0"	3,575 lbs	6,500 lbs
25'-0"	16'-8"	12'-6"	20'-10"	2,975 lbs	6,500 lbs
26'-0"	17'-4"	13'-0"	21'-8"	2,500 lbs	6,500 lbs
27'-0"	18'-0"	13'-6"	22'-6"	2,275 lbs	6,500 lbs
28'-0"	18'-8"	14'-0"	23'-4"	1,950 lbs	6,500 lbs

Note: Depending on panel thickness and height, a double mat of reinforcing steel may be required to resist the bending stresses of temporary wind loads.

SWL provides a minimum factor of safety of 1.5 to 1.

Danger! With Knee Bracing means that knee, lateral and end bracing must be installed in order to obtain SWL's shown.

Brace Length and Safe Working Loads

B5 Heavy Duty Long Pipe Brace					
D	W	F	B	Axial Safe Working Load	
				Without Knee Bracing	With Knee Bracing
27'-0"	18'-0"	13'-6"	22'-6"	5,975 lbs	6,500 lbs
28'-0"	18'-8"	14'-0"	23'-4"	5,325 lbs	6,500 lbs
29'-0"	19'-4"	14'-6"	24'-2"	4,800 lbs	6,500 lbs
30'-0"	20'-0"	15'-0"	25'-0"	4,250 lbs	6,500 lbs
31'-0"	20'-8"	15'-6"	25'-10"	3,450 lbs	6,500 lbs
32'-0"	21'-4"	16'-0"	26'-8"	2,825 lbs	6,500 lbs
33'-0"	22'-0"	16'-6"	27'-6"	2,550 lbs	6,500 lbs
34'-0"	22'-8"	17'-0"	28'-4"	2,100 lbs	6,500 lbs
35'-0"	23'-4"	17'-6"	29'-2"	1,750 lbs	6,500 lbs
36'-0"	24'-0"	18'-0"	30'-0"	1,600 lbs	6,500 lbs
37'-0"	24'-8"	18'-6"	30'-10"	1,350 lbs	6,500 lbs
38'-0"	25'-4"	19'-0"	31'-8"	Not Recommended	6,300 lbs
39'-0"	26'-0"	19'-6"	32'-6"	Not Recommended	6,000 lbs
40'-0"	26'-8"	20'-0"	33'-4"	Not Recommended	5,600 lbs
41'-0"	27'-4"	20'-6"	34'-2"	Not Recommended	5,200 lbs
42'-0"	28'-0"	21'-0"	35'-0"	Not Recommended	5,000 lbs
43'-0"	28'-8"	21'-6"	35'-10"	Not Recommended	4,650 lbs
44'-0"	29'-4"	22'-0"	36'-8"	Not Recommended	4,325 lbs
45'-0"	30'-0"	22'-6"	37'-6"	Not Recommended	4,175 lbs
46'-0"	30'-8"	23'-0"	38'-4"	Not Recommended	3,900 lbs
47'-0"	31'-4"	23'-6"	39'-0"	Not Recommended	3,775 lbs

Note: Depending on panel thickness and height, a double mat of reinforcing steel may be required to resist the bending stresses of temporary wind loads.

SWL provides a minimum factor of safety of 1.5 to 1.

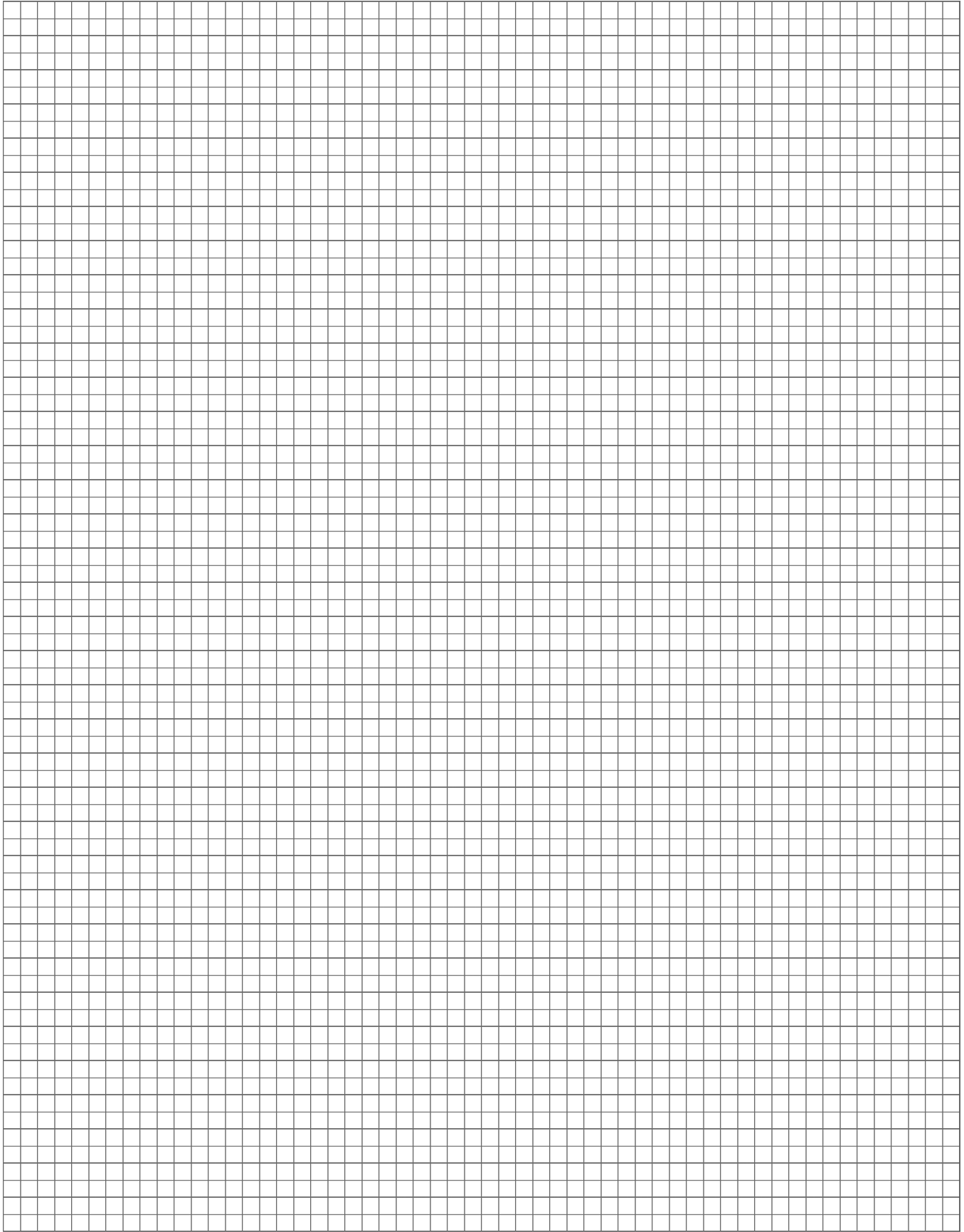
Danger! With Knee Bracing means that knee, lateral and end bracing must be installed in order to obtain SWL's shown.

Jumbo Pipe Braces					
Type	D	W	F	B	Axial Safe Working Load Without Knee, Lateral and End Bracing
B7	15'-0" to 24'-0"	13'-6"	10'-3"	17'-0"	8,700 lbs
B8	19'-0" to 31'-0"	17'-6"	13'-3"	22'-0"	6,500 lbs
B9	23'-0" to 39'-0"	21'-6"	16'-3"	27'-0"	4,800 lbs
B10	27'-0" to 46'-0"	25'-6"	19'-3"	32'-0"	3,600 lbs
B11	22'-0"	20'-5"	15'-4"	25'-6" Min.	9,000 lbs
B11	58'-0"	32'-0"	24'-0"	40'-0" Max.	9,000 lbs
B12	27'-0" to 46'-0"	25'-6"	19'-3"	32'-0"	9,000 lbs
B14	35'-0" to 60'-0"	33'-6"	25'-3"	42'-0"	5,200 lbs
B15	43'-0" to 60'-0"	41'-6"	31'-3"	52'-0"	3,800 lbs
B16	42'-0"	28'-9"	21'-8"	37'-0"	8,000 lbs
B18	52'-0"	41'-6"	31'-3"	52'-0"	12,800 lbs

Note: Depending on panel thickness and height, a double mat of reinforcing steel may be required to resist the bending stresses of temporary wind loads.

SWL provides a minimum factor of safety of 1.5 to 1.

Note! When calculating maximum brace spacing always compare the selected brace safe working load with the maximum brace load that can be safely carried by the brace anchor.



Bracing Information

P24 Delta Tie

The Dayton Superior P24 Delta Tie is a unique insulated tilt-up concrete panel connector. It allows the contractor to fabricate a highly energy-efficient, insulated concrete sandwich wall panel using the insulating foam of his choice.

This versatile connector allows the foam insulation to be placed from panel edge to panel edge, eliminating thermal bridges and costly energy loss. The foam insulation is sandwiched between two concrete wythes, or layers, to form a long-lasting, energy-efficient concrete sandwich wall panel. The three wythes are tied together using P24 Delta Ties. Spacing of the Delta Ties varies, based on the panel's required composite moment capacity.

The Delta Tie is produced using an engineered composite matrix. It consists of a geometrically configured, two-dimensional truss manufactured from continuous wound fiberglass embedded in an alkali resistant resin. The design of the Delta Tie produces a connector of remarkable strength and durability.

The non-metallic, non-corrosive design of the Delta Tie eliminates any thermal transfer through the panel, increasing the insulating efficiency of the panel.

Advantages

- Increased load bearing
- Stiffer insulated panels, easier to handle
- Design flexibility.
- Material, labor and transportation cost reduction
- Quick and easy installation
- Applicable to all brands of foam panel insulation

The standard Delta Tie dimensions are shown in the accompanying detail

The connector is designed so that it can be oriented in the panel either on end or side, depending on For example, the 5" x 7" size can be used on its side in a 1" to 2" insulation or on end for 2" to 4" insulation. The Delta Tie can be used with any rigid insulation from 1" to 4" thick. This versatile, dual-use feature adds to the Delta Tie's effective application compatibility and, at the same time, reduces inventory and storage requirements.

In individual connector specimen and full size panel tests the Delta Tie has exhibited excellent loading behavior and load capacities.

Increased Load Bearing

Tests have verified the excellent tension and shear strength characteristics of the Delta Tie insulated panel connector.

The P24 Delta Tie has the following ultimate capacities:

- 3,220 lbs in shear.
- 3,100 lbs in tension.

Stiffer Insulated Concrete Panels

The inherent capabilities of the truss design greatly increase the stiffness of the panel. The added stiffness makes the panel easier to lift, handle, store and/or transport.

Design Flexibility

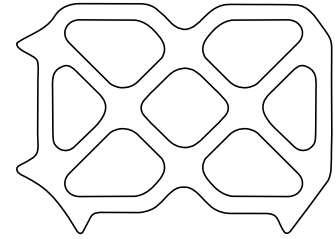
Due to the composite action gained by using the Delta Tie, panels may be cast in longer lengths or with thinner concrete wythes. Contact Dayton Superior for design programs for Engineers.

Cost Savings

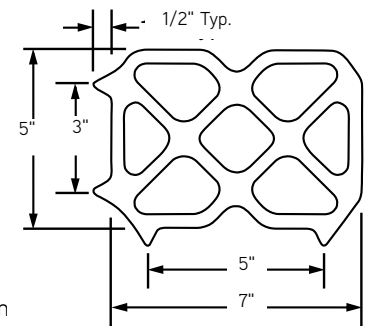
The Delta Tie design provides a fast and easy installation to save labor. It produces stiffer panels to lessen handling. The connector's design flexibility allows the cost saving attributes to be designed into the panel. Delta Tie connectors are purchased as a separate item, allowing the contractor to provide the foam insulation of their choice.

Quick and Easy Installation

The two-dimensional design of the Delta Tie lends itself to easy installation. No drilling or special tools required. Simply use the foam as a straight-edge template to quickly place the connectors. Maximum recommended spacing is 8 square feet of panel per panel connector. For spacing other than 8 square feet of panel per connector, contact Dayton Superior Technical Assistance.



P24 Delta Tie
Patent Pending



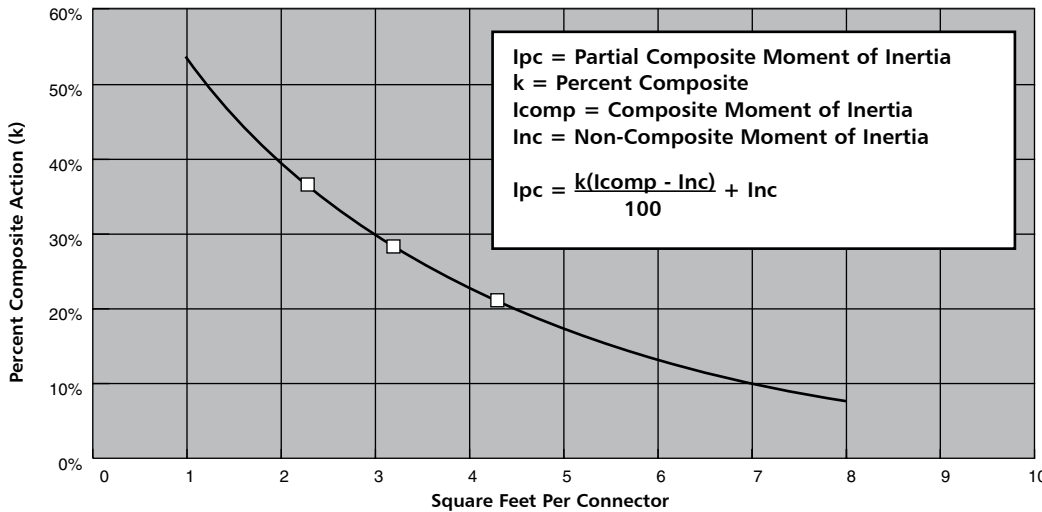
To Order:

Specify: (1) quantity, (2) name.

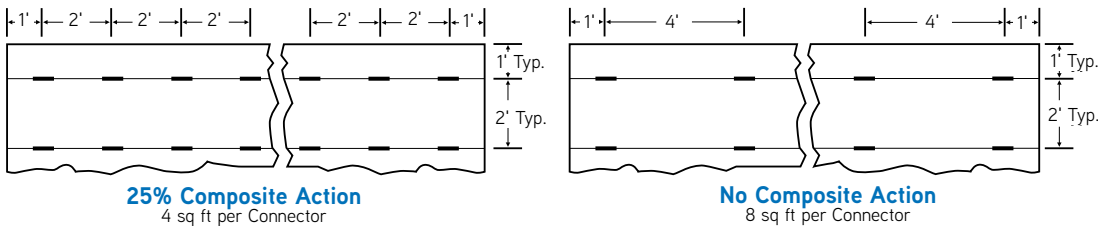
Example:

500, P24 Delta Ties.

P24 Delta Tie Design Chart



Typical Delta Tie Placement

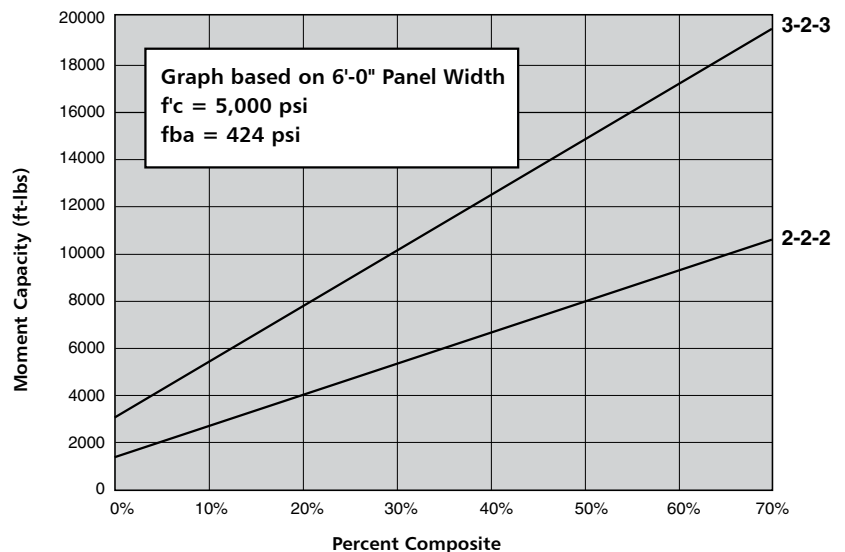


Composite Moment Capacity

For any given sandwich panel, the shear and moment diagrams define the required panel stiffness. The panel stiffness may be altered, as necessary, pending panel parameters, by adjusting the tie distribution as a function of the internal shear and moment forces. The two examples, below, illustrate the required stiffness (percent composite action) necessary to develop the shear and moment forces.

1. A panel measuring 37'-0" long by 6'-0" wide, with a 3-2-3 wythe pattern, must have a 5% composite action to achieve a flat lift with 4x2 rigging.
2. A 2-2-2 panel of same size requires a 10% composite action for the same rigging.

In order to employ the least amount of concrete to save weight, the percent of composite action must increase. A small upward adjustment can be realized by a minimal addition of connectors strategically placed at the zones of maximum shear.



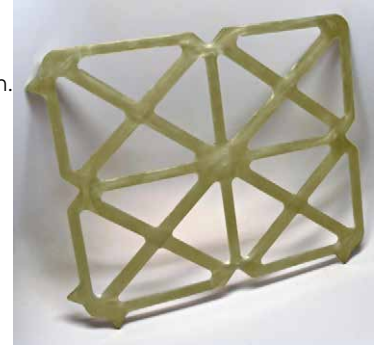
P24XL Delta Tie

The Dayton Superior P24XL Delta Tie is a two-dimensional truss of structurally non-conductive, non-corrosive fiber composite used as a wythe connector for concrete sandwich panel construction. The P24XL Delta Tie is just like the widely used P24, it is designed for applications with 5" to 8" of insulation.

The P24XL size is 9" x 11" x 5/32" with 1/2" tabs and v-notch installation aids.

Advantages

- The same fast and adaptable installation as the smaller P24
- Use with the rigid foam insulation of your choice
- Up to 75% fewer ties versus comparable systems
- No thermal bridging between wythes
- Provides a range of composite action levels
- Passed ASTM E-119 (4 hr) and NFPA 285 fire testing
- New applications software to aid with design and layout

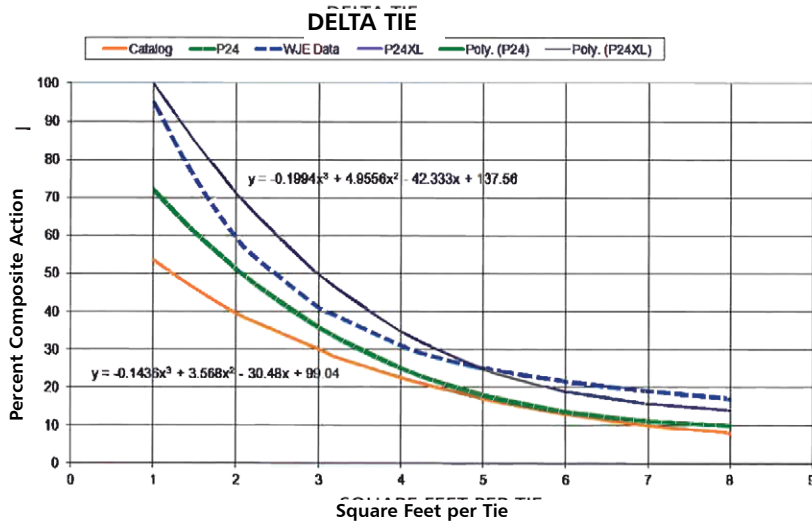


Load Capacities

Delta Tie Type	Insulation Thickness	Tension Capacity* (lbs)	Shear Capacity* (lbs)
P24 (5"x7")	1" to 4"	3100	3400
P24XL (9"x11")	1" to 5"	5800	3700
P24XL (9"x11")	6"	3400	3075
P24XL (9"x11")	7"	4000	2800
P24XL (9"x11")	8"	3200	1650

* Ultimate Strength per tie. Factor of Safety is variable based on the panel configuration.

Composite Action Levels



Panel Connections

Delta Tie Installation Information

How is Spacing Achieved in the Field?

Dayton Superior recommends 4'-0" wide x 8'-0" long sheets of extruded insulation foam when using the P24 Delta Tie. This allows the contractor to space ties at 4'-0" centers across the width of the panel and then vary the vertical spacing depending on percentage of composite action desired. Sheets, 2'-0" x 8'-0", can be utilized for other spacing.

What are the Installation Steps for the Delta Tie?

1. Install the required reinforcing, then place and screed the concrete for the outer wythe to its designed thickness.
2. Cut the first strip of foam to a width not exceeding 12" and place it tightly against the side of the form and on top of the just placed concrete while concrete is still in its wet or plastic state.
3. Insert the first row of Delta Ties tight against the edge of the foam, spaced vertically from top to bottom of panel. Minimum tie embedment into the fresh concrete is 1-1/2".
If the tie hits the reinforcing mesh prior to reaching its minimum embedment depth, move the tie slightly so that the reinforcing mesh sits in the depressed "V" section of the tie.
4. Place a full 4'-0" wide section of foam tight against the first row of P24 ties, then insert the second row of Delta Ties from top to bottom of panel.
5. Repeat the process across the width of the panel until there is 12" or less between the last full sheet of foam and the side form.
6. Install the last strip of foam cut to size in width, and force it between the last row of Delta Ties and the side form.
7. Once the concrete in the bottom wythe has stiffened, complete the balance of the panel by installing the required reinforcing steel, embeds and concrete. Finish and cure the backside of the panel per the project's specifications.

It is critical and required that Steps #1 through #6 above be completed immediately after the bottom wythe has been consolidated and leveled to required thickness. This is to ensure that the concrete mix is in a wet or plastic state and workable to be able to embed the Delta Tie properly. If the Delta Tie is not embedded into the concrete while the concrete is still plastic, the concrete will not properly flow through the openings in the tie, which "locks" and holds the tie into the concrete. This could result in failure of the panel.

Important Installation Notes:

1. The person that is installing the foam insulation and Delta Ties should lightly step several times on the foam immediately adjacent to and surrounding the tie to make certain concrete is consolidated around the tie and flows in and around the "anchoring" holes in the tie.
2. Set time of concrete varies as a function of many factors, including (but not limited to): mix design, concrete temperature, ambient temperature and mix time. The installer must ensure that the concrete has not reached initial set before ties are installed.
3. As the P24 Delta Tie is a one-way shear connector, meaning it is stronger in one direction than it is in the other direction, care must be taken to make certain it is installed in its intended orientation in the panel.
4. With the Delta Tie visible above the foam, it is easy to verify if the Delta Tie is set at its proper depth. Utilize a tape measure to randomly check that the ties have a minimum of 1-1/2" above the foam.

What Criteria Determines What Direction the Delta Tie Should be Placed (5" or 7" Vertical) with Different Foam Thicknesses?

Delta Ties are installed to achieve a minimum of 1-1/2" in each concrete wythe. The tie is rotated using either the 5" or 7" dimension to achieve this minimum concrete depth. The chart below details the correct direction of the Delta Tie based on insulation thickness:

Insulation Thickness	Horizontal Dimension of Tie to Panel Face
1"	7"
1-1/2"	7"
2"	7"
2-1/2"	5"
3"	5"
3-1/2"	5"
4"	5"

What is the Learning Curve on Installing Delta Ties?

Contractors have been able to learn quickly how to efficiently install the Delta Tie. In fact, at one jobsite, the crew was able to install the ties so quickly that it was estimated they had reduced the time to install the ties and insulation by almost 50% over the time it took to install a competitive system.

P30 Corewall® Nut Type Slotted Insert

P31 Corewall® Strap Type Slotted Insert

Corewall inserts are an economical way to connect tilt-up panel to panel or panel to structural building. Corewall Slotted Inserts and accessories are engineered for performance and have proven to be one of the most advanced, adjustable inserts available on the market today. The slotted inserts feature a plastic back and a removable plastic slot cover that keeps the insert clean and saves you valuable time during the erection process.

Corewall slotted inserts from Dayton Superior are available in two different types, the P30 Nut Type Slotted Insert and the P31 Strap Type Slotted Insert. Both types have tabs on each end of the insert for easy attachment to your forms.

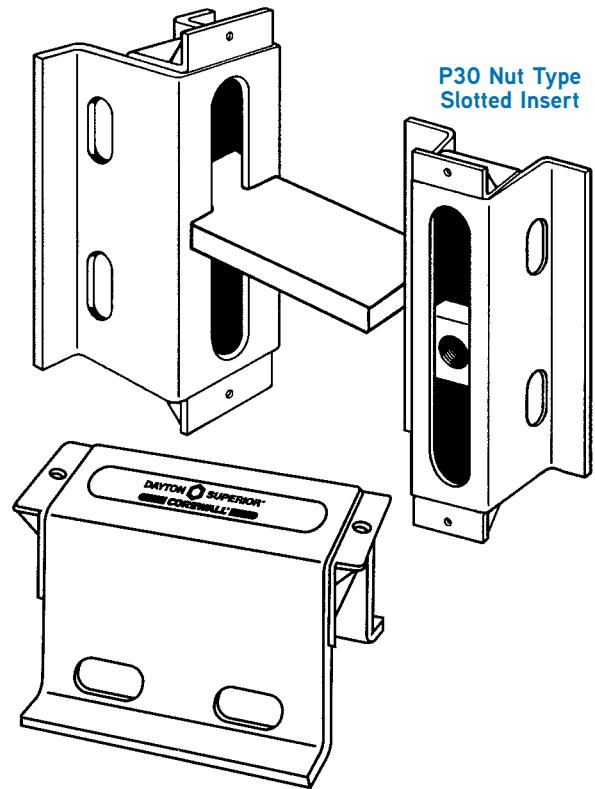
The P30 Nut Type Slotted Insert uses a spring loaded, zinc-plated, heavy duty 3/4"-10 National Course (NC) threaded nut to provide fast, efficient and reliable connections. The P31 Strap Type Slotted Insert is used with either the P32 Standard Strap Anchor or the P33 Slotted Strap Anchor, depending upon your erection requirements. The P34 Threaded Strap Anchor is used with the P30 Nut Type Slotted Insert.

The design of the strap anchor allows for fast installation of the anchor into the slotted insert. This speeds up the erection process and saves valuable installation time. As part of the erection process, the strap anchor is welded to the building's structural frame to make a ductile connection. All Corewall products are manufactured from a weldable grade of steel.

Dayton Superior Corewall slotted inserts are ideal for use in precast concrete industrial wall panels, architectural panels, structural panels or precast parking structures. The Corewall slotted inserts are also suitable for use in seismic areas.

P31 Strap Type Slotted Insert

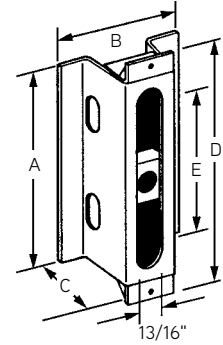
P30 Nut Type Slotted Insert



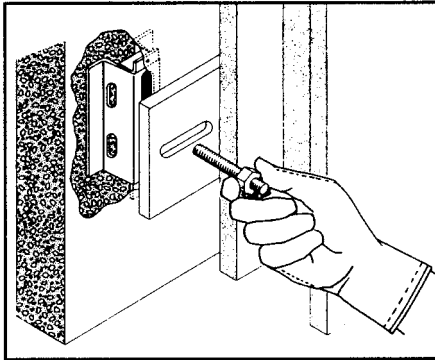
Fast, High Strength, Reliable Concrete Connection Inserts

P30 Corewall® Nut Type Slotted Insert

The Dayton Superior P30 Nut Type Slotted Insert uses a spring loaded, zinc plated, heavy duty 3/4"-10 NC threaded nut to provide fast, efficient and reliable connections. The P30 insert can be used with standard NC threaded bolts or a P34 Threaded Strap Anchor, if a welded connection is required. P30 inserts are available in 4", 6" and 8" standard lengths with either blue epoxy-polyester or hot dipped galvanized (HDG) finish. Type 304 or 316 stainless steel is available on request.



P30 Corewall Slotted Insert Nut Type



For proper connection to the structural frame of the building, use either a 3/4"-10 NC threaded bolt or rod meeting ASTM A-325 or SAE Grade 5 Standards.

To Order:

Specify: (1) quantity, (2) name, (3) part number, (4) finish.

Example:

200, P30 Corewall Nut Type Slotted Inserts, #CS425, hot-dip galvanized.

P30 Corewall Nut Type Slotted Insert Selection Table

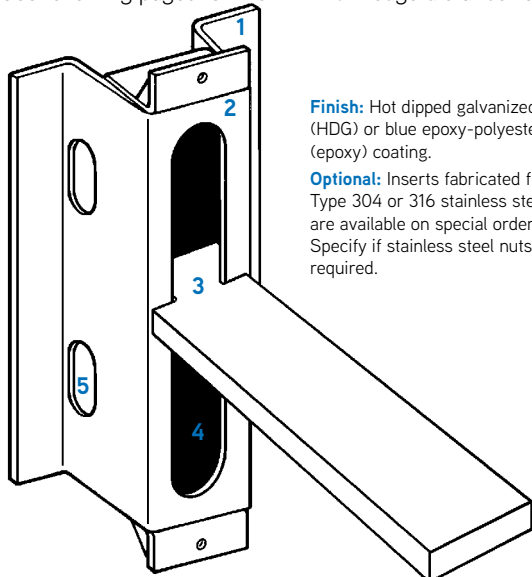
Product Code	Tension Safe Working Load	Shear Safe Working Load	A	B	C	D	Adjustment E
CS425	4,000 lbs.	6,650 lbs.	4"	3-3/16"	2-1/2"	5-1/2"	2-1/2"
CS625	4,000 lbs.	6,650 lbs.	6"	3-3/16"	2-1/2"	7-1/2"	4-1/2"
CS825	4,000 lbs.	6,650 lbs.	8"	3-3/16"	2-1/2"	9-1/2"	6-1/2"
CS435	5,350 lbs.	6,650 lbs.	4"	3-3/8"	3-1/2"	5-1/2"	2-1/2"
CS635	5,350 lbs.	6,650 lbs.	6"	3-3/8"	3-1/2"	7-1/2"	4-1/2"
CS835	5,350 lbs.	6,650 lbs.	8"	3-3/8"	3-1/2"	9-1/2"	6-1/2"
CS445	6,650 lbs.	6,650 lbs.	4"	3-11/16"	4-1/2"	5-1/2"	2-1/2"
CS645	6,650 lbs.	6,650 lbs.	6"	3-11/16"	4-1/2"	7-1/2"	4-1/2"
CS845	6,650 lbs.	6,650 lbs.	8"	3-11/16"	4-1/2"	9-1/2"	6-1/2"

Safe Working Loads provide a factor of safety of approximately 3 to 1 in 5,000 psi normal weight concrete.

P31 Corewall® Strap Type Slotted Insert P32 Corewall® Strap Anchor

The P31 Corewall Strap Type Slotted Insert and the P30 Corewall Nut Type Slotted Insert are both quick and versatile precast concrete connection inserts. When used with the slot running in the same direction as the applied load, the inserts act as a tension tie to the structural frame. However, when the inserts are installed so that the slot runs 90° to the applied load, the inserts can support both shear and tension loads.

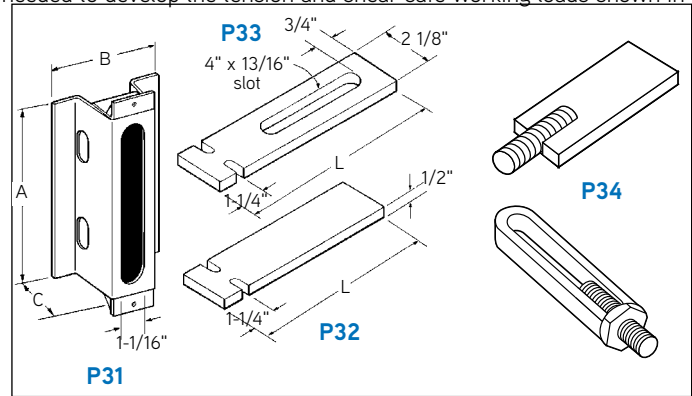
See following pages for the minimum edge distance requirements needed to develop the tension and shear safe working loads shown in



Finish: Hot dipped galvanized (HDG) or blue epoxy-polyester (epoxy) coating.
Optional: Inserts fabricated from Type 304 or 316 stainless steel are available on special order. Specify if stainless steel nuts are required.

P31 Corewall Strap Type Slotted Insert

P32 Corewall Strap Anchor



1. Tabs for easy attachment to forms.
2. Weldable grade of steel.
3. Notch in strap anchor assures positive connection to insert
4. Slot allows adjustment for erection tolerances.
5. Slotted holes for extra reinforcement where required.

the chart below.

P31 Corewall Strap Type Slotted Insert Selection Table

Insert Style	Tension Safe Working Load	Shear Safe Working Load		A	B	C
		Up to 2' Eccentricity	Up to 3' Eccentricity			
SA 1425	4,000 lbs.	6,650 lbs.	4,000 lbs.	4"	4-3/16"	2-1/2"
SA 1625	4,000 lbs.	6,650 lbs.	4,000 lbs.	6"	4-3/16"	2-1/2"
SA 1825	4,000 lbs.	6,650 lbs.	4,000 lbs.	8"	4-3/16"	2-1/2"
SA 1435	5,350 lbs.	6,650 lbs.	4,000 lbs.	4"	4-3/8"	3-1/2"
SA 1635	5,350 lbs.	6,650 lbs.	4,000 lbs.	6"	4-3/8"	3-1/2"
SA 1835	5,350 lbs.	6,650 lbs.	4,000 lbs.	8"	4-3/8"	3-1/2"

Safe Working Load provides a factor of safety of approximately 3 to 1 in 5,000 psi normal weight concrete. Eccentricity is measured from face of insert to midpoint of the weld connecting the strap anchor to the structural frame.

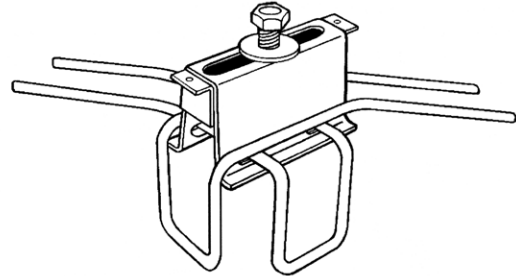
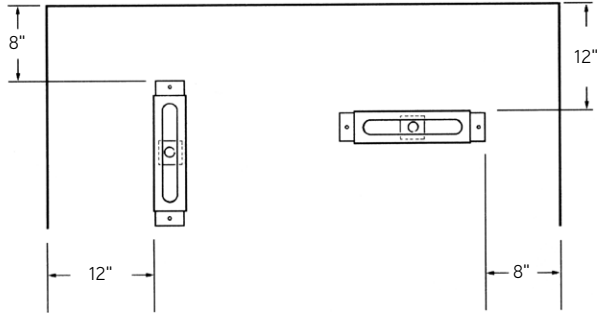
Corewall Strap Anchor Selection Table

P32 Standard Strap Anchor		P33 Slotted Strap Anchor		P34 Threaded Channel Strap Anchor		P34 Threaded Plate Strap Anchor	
Part Number	Length	Part Number	Length	Part Number	Length	Part Number	Length
CE 806	6"	CE 906	6"	CE 675	6"	CE 600	6"
CE 808	8"	CE 908	8"	CE 875	8"	CE 800	8"
CE 810	10"	CE 910	10"	CE 1075	10"	CE 1000	10"
CE 812	12"	CE 912	12"	CE 1275	12"	CE 1200	12"

Note: Longer lengths are available on special order. The P34 Threaded Strap Anchor is used with the P30 Nut Type Slotted Insert and P38 Slotted Insert II.

Corewall® Edge and Corner Details

Minimum edge distance, without the use of additional reinforcing steel, is shown below. Edge distance can be reduced if additional reinforcing steel is installed in the insert slots, as shown.



A variety of configurations of extra reinforcing bars can be easily placed through the slotted holes in the legs of the insert. This will allow the insert to be used in seismic areas, as well as close to corners or edges of a precast concrete panel.

<p>Corner Detail-</p> <p>Plan</p> <p>Section</p>	<p>Edge Perpendicular Detail</p> <p>Plan</p> <p>Section</p>	<p>Slot Details</p> <p>4" Insert</p> <p>6" Insert</p> <p>8" Insert</p>
<p>Edge Parallel Detail-</p> <p>Plan</p> <p>Section</p>	<p>Corner Detail-</p> <p>Plan</p> <p>Section</p>	<p>Stepped Hairpin</p> <p>Half Stepped Hairpin</p>

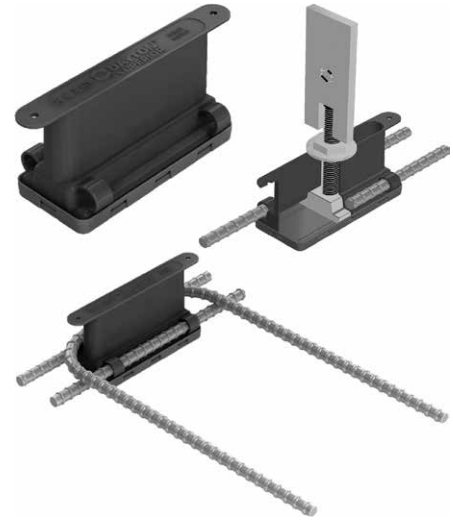
Panel Connectors

P39 Corewall® Generation III Insert

Dayton Superior P39 Corewall Generation III Insert is the next generation product in the Corewall legacy. This insert is an economical way to connect precast panel to panel or panel to structural building.

FEATURES

- PATENT PENDING
- P39 Corewall III Inserts are engineered for consistent performance and have proven to be one of the most advanced, adjustable inserts available on the market today.
- The design has been improved to create a higher load capacity and greater ease to install the product which significantly reduces erection costs
- The P39 insert uses heavy duty electro galvanized ¾"-10 NC threaded nut to provide fast, efficient and reliable connections
- Stainless steel but is available on special order
- The P39 Corewall Inserts are made from an engineered grade of polymer material that can withstand temperatures from 0°F to 140°F.
- Minimum edge distance, without the use of additional reinforcing steel is 12"



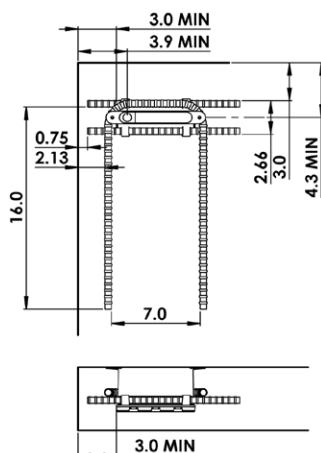
Technical Information

Product Code	Size	Condition	Horizontal Reinforcing	fc'=5,000 psi	
				Ultimate Tension	Ultimate Shear
145643	2.5" x 6"	12" Away From the Edge	None	10,700	10,050
145643	2.5" x 6"		#3 x 9" Long	11,200	15,100
145643	2.5" x 6"		#4 x 12" Long	14,500	15,100
145644	3.5" x 6"		None	16,850	14,650
145644	3.5" x 6"		#3 x 9" Long	21,300	28,650
145644	3.5" x 6"		#4 x 12" Long	32,550	32,250
145645	4.5" x 6"		None	27,800	39,100
145645	4.5" x 6"		#3 x 9" Long	31,100	46,150
145645	4.5" x 6"		#4 x 12" Long	31,700	46,350
145643	2.5" x 6"		Edge	U-Shaped Bar	8,400
145644	3.5" x 6"	Edge	U-Shaped Bar	12,750	8,300
145645	4.5" x 6"	Edge	U-Shaped Bar	16,800	8,300
145643	2.5" x 6"	Corner	U-Shaped Bar	8,400	7,440
145644	3.5" x 6"	Corner	U-Shaped Bar	12,400	6,150
145645	4.5" x 6"	Corner	U-Shaped Bar	13,800	6,150

Load Capacity of P34L Strap Anchor

Eccentricity	Ult. Shear Load (lbs)	Ult. Tension Load (lbs)
1"	21,800	39,550
1.5"	21,700	
2"	20,100	
2.5"	18,100	
3"	15,300	

Edge / Corner Details

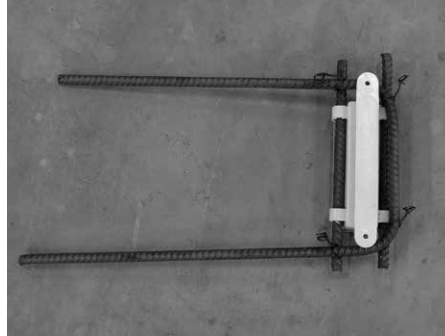


P39 Corewall Generation III Insert Order Information

Product Code	Depth	Length	Nut Adjustment	Color	Weight (lbs)
145643	2.5"	6"	4.5"	White	0.415
145644	3.5"	6"	4.5"	Red	0.447
145645	4.5"	6"	4.5"	Black	0.476

Corewall Insert Installation Procedure

1. P39 Corewall Inserts can be used in three different ways:
 - a. Without any additional rebar
 - b. With additional horizontal bars (#3x9" or #4x12" long) for increased load capacity
 - c. With additional bent bars if inserts are installed close to panel edge or corners



2. There are 3 ways to install P39 Corewall Inserts into concrete panels:
 - a. Inserts can be installed by nailing them to the wood that runs across the top of the panels
 - b. Inserts can be installed upside down by gluing them down to the steel forms
 - c. Inserts can be mucked-in after concrete is poured
3. After installing the required inserts, bar supports, rebar and lifting inserts, place and screed the concrete to the specified thickness.
4. At the jobsite, open up the insert's lid to get access to the steel nuts inside.

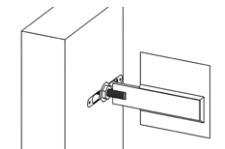


5. Attach the threaded rod, or a strap anchor, into the corewall steel T-nut.

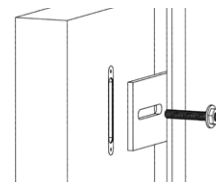
Note: it is recommended that jam nut and washer are always used with both P34L Strap Anchors and threaded rods to resist compression forces.



6. On the other end, the strap anchor will be welded to the steel structure



7. Or, the threaded rod will be bolted to the steel structure



D410 Sleeve-Lock® Grout Sleeve

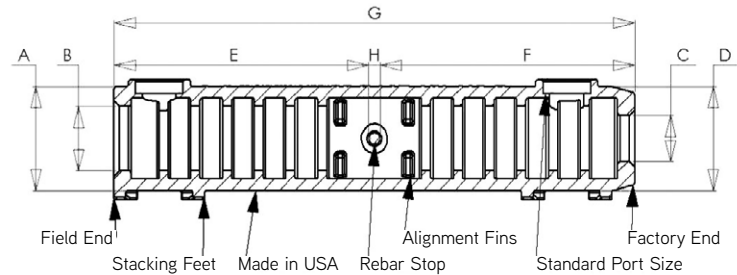
The Dayton Superior Sleeve-Lock Grout Sleeve is a one-piece mechanical coupler designed to butt-splice reinforcing steel in concrete structures. The Sleeve-Lock is available in seven (7) sizes to accommodate deformed bar sizes #4 through #18. Bars of like size or of different sizes can be effectively spliced by the System. Typical Sleeve-Lock applications include precast, tilt-up and cast-in-place concrete structures.



The Sleeve-Lock is a ductile casting with a minimum yield strength of 55,000 psi and a minimum tensile strength of 80,000 psi. It exceeds all known building codes and agency standards. The System achieves 160% fy strength criteria with the Sleeve-Lock Grout D490 high strength, non-shrink grout.

The Sleeve has several unique features:

- Rebar Stop – An integrated post that acts as a precise stop when inserting rebar
- Alignment Fins – Positioning fins that keep inserted rebar centered
- Standard Port Sizes – Ports designed to accept standard 0.75" SCH40 PVC; ports use the same size PVC
- Stacking Feet – Feet stabilize the product during shipping and on the shelf while assisting in wire-tying and acting as a platform for a rebar chair.
- Made In USA – The sleeve is 100% made in the USA.



SIZE		SLEEVE-LOCK DIMENSIONS (Inches)						REBAR EMBEDMENT LENGTH			
		A	B	C	D	G	H	E, MAX	E, MIN	F, MAX	F, MIN
#4	13MM	2.14	1.26	0.87	2.14	9.50	0.25	4.63	3.30	4.63	3.30
#5	16MM	2.14	1.26	0.87	2.14	9.50	0.25	4.63	4.13	4.63	4.13
#6	19MM	2.61	1.73	1.14	2.61	13.00	0.25	6.38	4.92	6.38	4.92
#7	22MM	2.61	1.73	1.14	2.61	13.00	0.25	6.38	5.71	6.38	5.71
#8	25MM	2.89	2.01	1.42	2.89	16.52	0.38	8.07	6.50	8.07	6.50
#9	29MM	2.89	2.01	1.42	2.89	16.52	0.38	8.07	7.40	8.07	7.40
#10	32MM	3.04	2.16	1.57	3.04	17.99	0.50	8.75	8.19	8.75	8.19
#11	36MM	3.32	2.32	1.73	3.32	19.54	0.50	9.52	8.98	9.52	8.98
#14	43MM	3.73	2.60	2.01	3.73	24.50	0.50	12.00	11.42	12.00	11.42
#18	57MM	4.77	3.27	2.68	4.77	36.00	0.50	17.75	17.00	17.75	17.00

Sleeve-Lock Components

Approvals/Compliances

- ACI 318-11 Type 2
- ICC AC-133
- CALTRANS Ultimate Splice
- Ministries of Transportation, Canada
- Army Corps of Engineers, CW 03210
- State Departments of Transportation, USA
- AASHTO
- International Building Codes (IBC)
- City of Los Angeles Department of Building and Safety

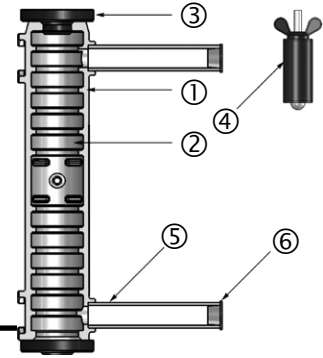


Panel Connections

"By using the Sleeve-Lock Grout Sleeve, we could make two panels instead of one and use a more maneuverable and smaller crane, while still complying with the tough OSHA safety guidelines. This substitution allowed us to save over \$100K in crane rental costs, lost work time, and decreased efficiencies associated with a larger crane." – Florida Tilt

Components are available through Dayton Superior and some are available at local suppliers.

Item No.	Cat ID	Description	Included	Order Separately	Obtain Locally
1	D410	Sleeve-Lock® Grout Sleeve	X		
2	D490	Sleeve-Lock® Grout		X	
3	D487	Sleeve-Lock® Seal Plug		X	
4	D491	Sleeve-Lock® Form Plug		X	
5	D492	Sleeve-Lock® ¾" SCH40 PVC		X	X
6	D493	Sleeve-Lock® Port Plug		X	



D490 Sleeve-Lock® Grout

How to Specify:

Specific: Mechanical splices shall be the Sleeve-Lock® Grout Sleeve System manufactured by Dayton Superior Corporation.

Generic: The mechanical connection shall meet building code requirements of developing in tension and compression, as required, by local standards and codes. Grouting must be performed in accordance with the manufacturer's recommended grouting procedures.

Sleeve-Lock Grout D490 is specifically designed and manufactured by DSC for the Sleeve-Lock System. It is a flowable grout capable of achieving 11,000ksi when mixed following the recommended mixing instructions. Available in 50lb bags, yield per bag, noting that grout used in PVC tubing is not accounted for, is as shown in table.

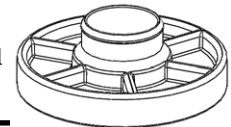
Use only potable water for mixing. A 50 pound (22.7 kg) of grout will require approximately 6.5 pints (3.07 liters) of water to achieve a flowable consistency. The water amount can be adjusted +/- 0.5 pints (0.23 liters) to achieve desired consistency. Determine correct water amount by mixing of a test batch prior to commencing grouting operation.

Size	Sleeves / Bag of Grout	
#4	13MM	37
#5	16MM	40
#6	19MM	16
#7	22MM	30
#8	25MM	11
#9	29MM	11
#10	32MM	9
#11	36MM	8
#14	43MM	5
#18	57MM	3

Amounts are approximate.

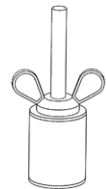
D487 Sleeve-Lock® Seal Plug

The Sleeve-Lock Seal Plug is a rubberized plug used to seal the connection between the Sleeve-Lock Grout Sleeve and the reinforcing bar. It is designed to keep concrete from entering the inner cavity of the Sleeve-Lock Grout Sleeve on the Factory End and to contain the pumped in grout on the Field End. Per size, the Sleeve-Lock Seal Plug can be used on either end meaning that only one size Sleeve-Lock Seal Plug (QTY 2) per sleeve need be stocked.



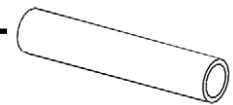
D491 Sleeve-Lock® Form Plug

The Sleeve-Lock Form Plug is a device using a rubberized grommet and a clamping device and used to attach the Sleeve-Lock Grout Sleeve to a piece of formwork i.e. steel, lumber, composite. It is designed to fasten the sleeve to the formwork while keeping concrete out of the sleeve's inner chamber. It is to be used on the Field End only and is not designed to be used as a structural connection.



D492 Sleeve-Lock® ¾" SCH40 PVC

The Sleeve-Lock ¾" SCH40 PVC is standard, off the shelf, PVC, used to fill the inner chamber of the Sleeve-Lock Grout Sleeve. Either port of the sleeve uses the same size PVC. It is available locally or through DSC.



D493 Sleeve-Lock® Port Plug

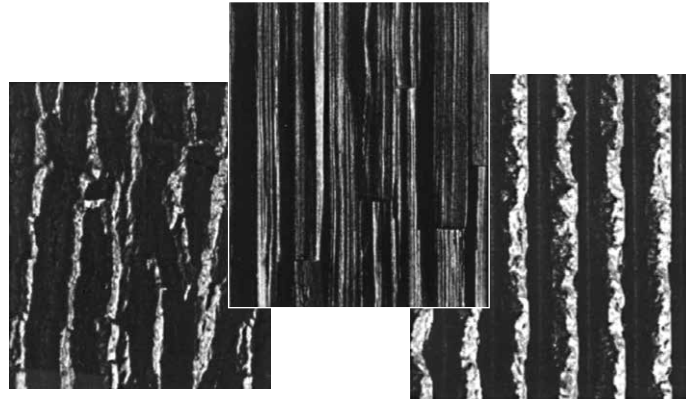
The Sleeve-Lock Port Plug is a plastic plug used during jobsite shipping to plug the ports in order to keep debris from entering the inner chamber of the sleeve. They can also be used to plug the PVC before or after grouting. One size will fit either end port or PVC.



When it is time to choose concrete formliners, make your first choice Dayton Superior. For stock or custom orders, we have you covered.

Easy to install and easy to strip, Dayton Superior Formliners come in more than a wide variety of contemporary designs and are available in Single Use and Medium Reuse. Repeat patterns eliminate seam lines.

Best of all, our formliners are labor saving and money saving, and they provide esthetics to your precast project.

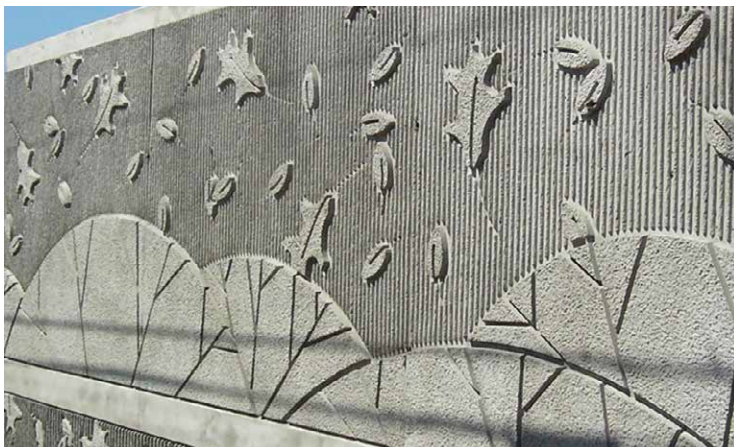


Thermoform™ Vacuum-Formed Formliners

Thermoform Concrete formliners are rigid plastic liners that are used to achieve detailed patterns and textured concrete surfaces for architectural concrete. You may select from a variety of patterns, or custom order to fit your needs – at only a nominal additional cost. All patterns are available in two different ranges: single use and medium reuse.

The single use version, made from styrene, is ideal where the formliner will be used only once. The medium reuse, made from ABS materials, can be used up to 6 times.

The vacuum-forming technology used in this product line allows virtually unlimited texturing opportunities, offering the most flexibility in custom designed patterns. This low cost reproduction process allows you to add exceptional economic options to the design integrity of your concrete projects. Due to the stretching of the plastic sheet material that occurs during the reshaping of the thermoforming process, some patterns with a high degree of texture or relief should not be produced in the thinner, single-use material. Usually supplied in 4' x 10' sheets to cut or combine to produce almost any dimension.

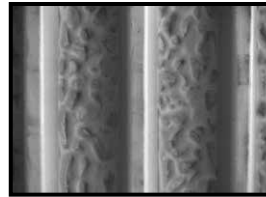


Formliners
Architectural Concrete

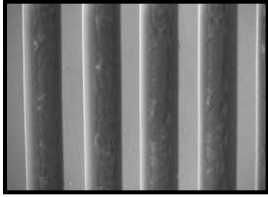
Fractured Patterns



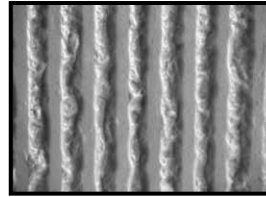
Fractured Rope Rib (2" OC rope)
 P/C 230715 0.090 mil Styrene
 P/C 230475 0.110 mil ABS



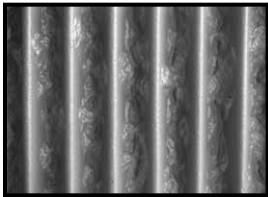
2" Broken Rock Rib ($3\frac{7}{16}$ " OC rib)
 P/C 230719 0.150 mil Styrene
 P/C 230451 0.150 mil ABS



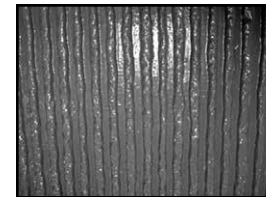
Fine Stone Rib (2" OC rib)
 P/C 230716 0.090 mil Styrene
 P/C 230448 0.110 mil ABS



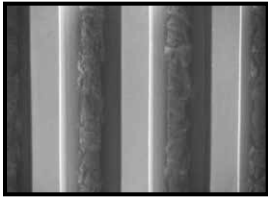
Fluted Fractured Fin ($1\frac{1}{4}$ " OC rib)
 P/C 230732 0.090 mil Styrene
 P/C 230431 0.110 mil ABS



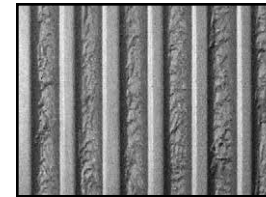
$\frac{3}{4}$ " Fractured Fin ($1\frac{1}{2}$ " OC fin)
 P/C 230717 0.090 mil Styrene
 P/C 230449 0.110 mil ABS



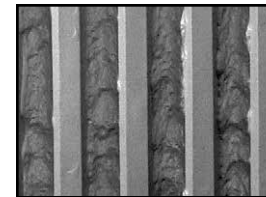
1" Fractured Fin (2.35" OC rib)
 P/C 270341 0.090 mil Styrene
 P/C 270343 0.110 mil ABS



$1\frac{1}{4}$ " Fractured Fin (3" OC fin)
 P/C 230718 0.150 mil Styrene
 P/C 230499 0.150 mil ABS

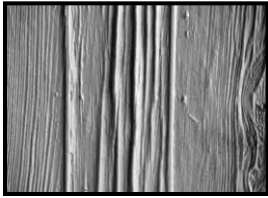


1" Fractured Fin
 (2" OC rib; open end)
 P/C 270580 0.090 mil Styrene
 P/C 270505 0.110 mil ABS

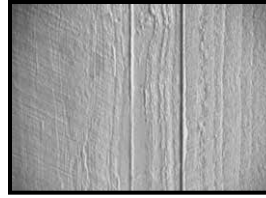


$1\frac{1}{2}$ " Fractured Fin
 (3" OC rib; open end)
 P/C 270581 0.150 mil Styrene
 P/C 270506 0.150 mil ABS

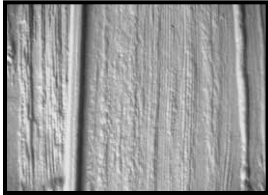
Wood Patterns



4" Wide Aged Wood
(actual 3 1/2" width)
P/C 230703 0.070 mil Styrene
P/C 230249 0.070 mil ABS



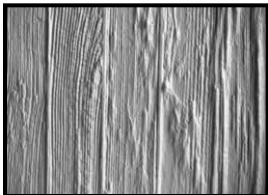
Rough Sawn
Random Length Plank
P/C 230707 0.070 mil Styrene
P/C 230481 0.070 mil ABS



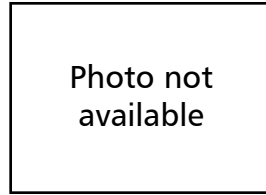
Random Grooved Barnwood
P/C 230704 0.070 mil Styrene
P/C 230450 0.070 mil ABS



4" Variable Depth Rough Cedar
P/C 947007 0.090 mil Styrene
P/C 940005 0.110 mil ABS
P/C 230618 Dura-Tex Lite
P/C 230921 Elasto-Tex

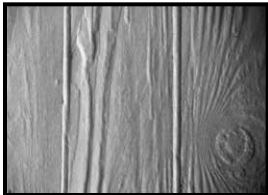


2" Wide Aged Wood
P/C 230705 0.070 mil Styrene
P/C 230479 0.070 mil ABS



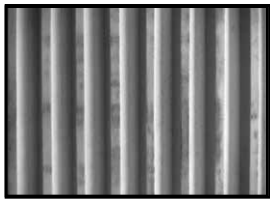
Weathered Wood
P/C 947011 0.070 mil Styrene
P/C 940003 0.070 mil ABS

Photo not available

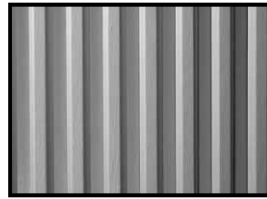


4" Wide Aged Cedar
P/C 230706 0.070 mil Styrene
P/C 230480 0.070 mil ABS

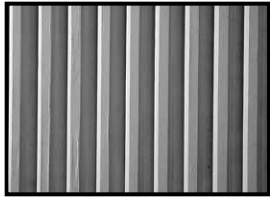
Smooth Flute Patterns



1/2" Deep Rib
(1 1/4" OC rib; closed end)
P/C 230709 0.090 mil Styrene
P/C 230244 0.110 mil ABS



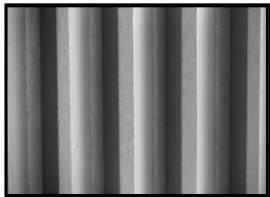
3/4" Deep Rib
(2" OC rib; open end)
P/C 270321 0.090 mil Styrene
P/C 270261 0.110 mil ABS



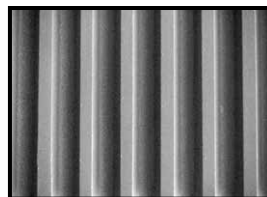
1/2" Deep Rib
(1 1/2" OC rib; open end)
P/C 270322 0.090 mil Styrene
P/C 270262 0.110 mil ABS



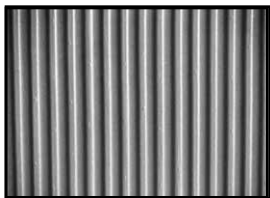
3/4" Deep Rib
(6" OC rib; open end)
P/C 270323 0.090 mil Styrene
P/C 270263 0.110 mil ABS



1" Deep Rib
(2 1/8" OC; rib closed end)
P/C 230714 0.090 mil Styrene
P/C 230489 0.110 mil ABS



3/4" Deep Rib
(1 1/2" OC rib; open end)
P/C 270324 0.090 mil Styrene
P/C 270264 0.110 mil ABS



1/4" Deep Rib
(5/8" OC rib; open end)
P/C 230708 0.070 mil Styrene
P/C 230472 0.070 mil ABS



3/4" Deep Special Rib
(4" OC rib; open end)
P/C 270325 0.090 mil Styrene
P/C 270265 0.110 mil ABS

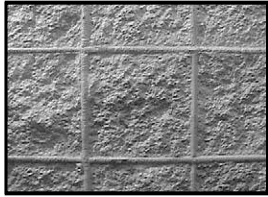


1 1/2" Deep Rib
(4" OC rib; open end)
P/C 270320 0.150 mil Styrene
P/C 270260 0.150 mil ABS



3/4" Deep Rib
(4" OC rib; open end)
P/C 270326 0.090 mil Styrene
P/C 270266 0.110 mil ABS

Block Patterns



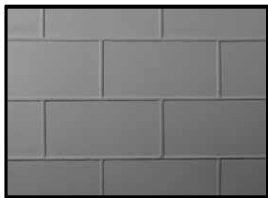
8" x 8" Rock Face Block
 P/C 270330 0.090 mil Styrene
 P/C 270270 0.110 mil ABS



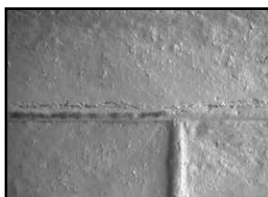
8" x 16" Rock Face Block
 P/C 270331 0.090 mil Styrene
 P/C 270271 0.110 mil ABS



8" x 16" Rock Face Stacked Bond
 P/C 270332 0.090 mil Styrene
 P/C 270272 0.110 mil ABS



8" x 16" Smooth Face Block
 P/C 270333 0.090 mil Styrene
 P/C 270273 0.110 mil ABS

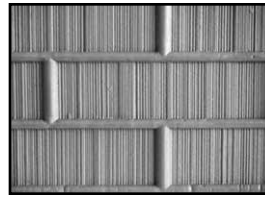


Masonry Slump Block
 P/C 230734 0.090 mil Styrene
 P/C 230426 0.110 mil ABS

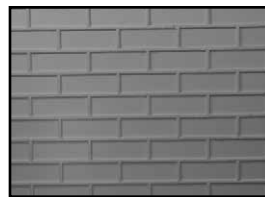
Brick Patterns



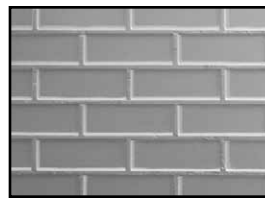
Rustic Brick
 P/C 230723 0.070 mil Styrene
 P/C 230247 0.110 mil ABS



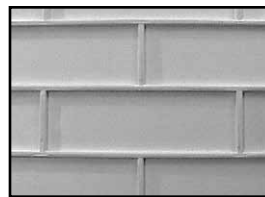
Striated Brick
 P/C 230724 0.070 mil Styrene
 P/C 230222 0.070 mil ABS



2 1/2" x 8" Smooth Brick
 (square mortar)
 P/C 270327 0.070 mil Styrene
 P/C 270267 0.070 mil ABS



2 1/2" x 8" Smooth Brick
 (rounded mortar)
 P/C 270598 0.070 mil Styrene
 P/C 270515 0.070 mil ABS

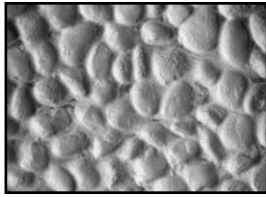


4" x 12" Smooth Brick
 (on-center square mortar)
 P/C 270328 0.090 mil Styrene
 P/C 270268 0.110 mil ABS



4" x 12" Smooth Brick
 (off-center square mortar)
 P/C 270329 0.090 mil Styrene
 P/C 270269 0.110 mil ABS

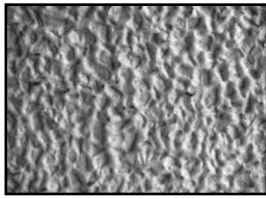
Stone Patterns



Round Stone
P/C 230722 0.070 mil Styrene
P/C 230251 0.070 mil ABS



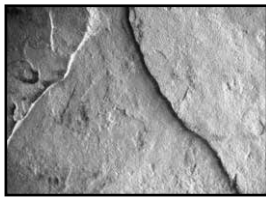
Large Dry Stack Stone
P/C 270582 0.150 mil Styrene
P/C 270507 0.150 mil ABS



Small Crushed Stone
P/C 230721 0.070 mil Styrene
P/C 230250 0.070 mil ABS



Fractured Concrete
P/C 270583 0.090 mil Styrene
P/C 270508 0.110 mil ABS



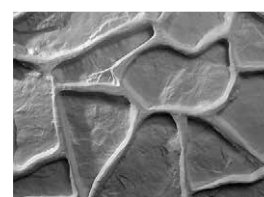
Vertical Flagstone
P/C 270559 0.090 Styrene
P/C 270516 0.110 ABS



Colonial Dry Stack
P/C 270593 0.150 mil Styrene
P/C 270510 0.150 mil ABS



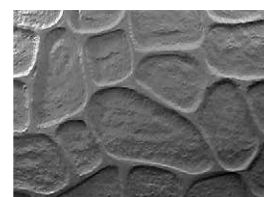
Old Ashlar Stone
P/C 230429 0.090 mil Styrene
P/C 230427 0.110 mil ABS



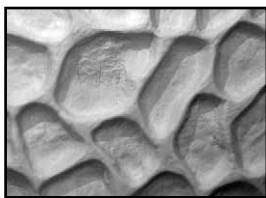
Hill Country Flagstone
P/C 270594 0.150 mil Styrene
P/C 270511 0.150 mil ABS



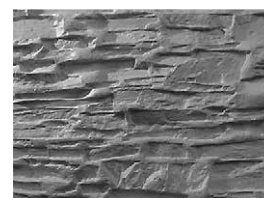
Southwest Ashlar Stone
P/C 230430 0.150 mil Styrene
P/C 230428 0.150 mil ABS



Shallow Fieldstone
P/C 270576 0.090 mil Styrene
P/C 270501 0.110 mil ABS



Random Fieldstone Large
P/C 270334 0.150 mil Styrene
P/C 270274 0.150 mil ABS

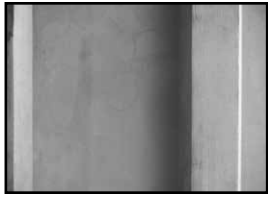


Standard Dry Stack
P/C 270578 0.150 mil Styrene
P/C 270503 0.150 mil ABS

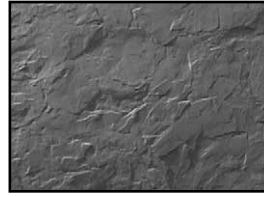


Running Bond Ashlar Stone
P/C 270340 0.150 mil Styrene
P/C 270342 0.150 mil ABS

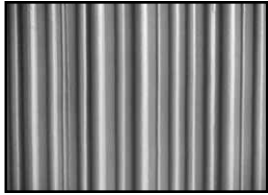
Other Patterns



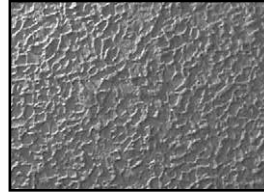
Random Vertical Rustication
P/C 230728 0.150 mil Styrene
P/C 230487 0.150 mil ABS



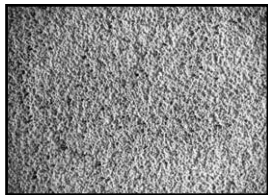
Split Slate
P/C 270597 0.070 mil Styrene
P/C 270514 0.070 mil ABS



$\frac{3}{8}$ " Striated Random
P/C 230726 0.070 mil Styrene
P/C 230493 0.070 mil ABS



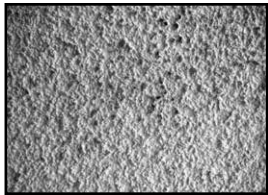
Bush Hammer
P/C 270592 0.090 mil Styrene
P/C 270509 0.110 mil ABS



Sandblast - Fine to Medium
P/C 270596 0.070 mil Styrene
P/C 270513 0.070 mil ABS



Smooth Sheet
P/C 230702 0.070 mil Styrene
P/C 230435 0.070 mil ABS



Sandblast - Coarse
P/C 230423 0.070 mil Styrene
P/C 230422 0.070 mil ABS

Application Guide

Tilt-Up Applications

Single use SPS plastic is most frequently used for Tilt-Up applications. Basic procedures for attachment are as follows:

1. Identify the pour side of the formliner. The pour side can be identified by the roughened, "hair cell" texture or as the side with the highest resolution in the pattern. The shiny or slick side of the liner will be placed against the slab or formwork.
2. Because of the nature of plastic to expand and contract, it may be necessary for the material to be trimmed. The easiest way to cut is to use a circular hand saw (such as a Skilsaw) with a fine tooth, plywood blade such as the type used for cutting fine veneer paneling. Formliner without much relief may be trimmed by scoring with a sharp knife and breaking off the excess.
3. The effects of temperature, thermal expansion and contraction must be considered. The size of the liner will expand and contract approximately 1/16" in 10' with each 10° temperature change. Formliner should be installed at about the same temperature as expected during the placement of concrete. Early morning is recommended.
4. In Tilt-Up applications, the recommended method of formliner attachment is to place the liner on the slab, drill a hole through the liner and into the concrete, place a wooden dowel into the drilled hole, break the dowel off flush with the surface, and then use a large-headed roofing nail to hold the liner in place.
5. Double-sided foam tape may be used for Tilt-Up jobs. Make sure the casting slab and formliner are clean, dry and free of dust.
6. Heavy duct tape can be applied to the formliner at joints on the slab or formwork side. This is the recommended method for pre-assembling large liners for precast or Tilt-Up beds. The liner is assembled upside down and alongside the bed and then rolled into the formwork.
7. Seal all joints and contain liner on all sides so that concrete cannot move under it. Be sure the liner is flat against the casting surface, insuring that no deformations are present in the formliner. Do not allow formliner to move around freely.

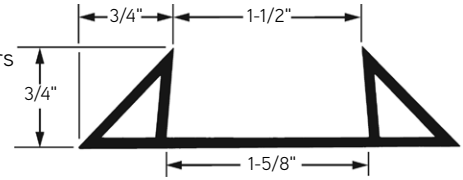
Concrete Design

The design of the concrete mix will affect the finished formliner appearance because it causes changes in workability, pressure, color, set and strength.

Load concrete onto the formliner from the centers, moving the concrete towards the outside perimeter with rakes. Do not allow concrete to be pushed under the formliner at joints.

T58 Double Chamfer Strip

Dayton Superior T58 Double Chamfer Strip is an ideal product for use in forming chamfers on both sides of 2x form lumber. It is an .062 thick extruded PVC (Polyvinyl Chloride) Plastic available in 8ft. lengths.



To Order:

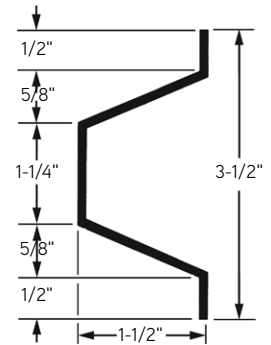
Specify: (1) quantity, (2) name.

Example:

200 (2,000 linear feet), T58 Double Chamfer Strips.

T59 Plastic Keyway

Dayton Superior T59 Plastic Keyway is an extruded plastic keyway for general use on a tilt-up project. Simple to use, just nail to 2x form lumber. Available in 10 ft. lengths.



To Order:

Specify: (1) quantity, (2) name.

Example:

50 (500 linear feet), T59 Plastic Keyway.

T66 Tilt Bracket™

Tilt-Up Forming System

The Tilt Bracket (US Patent #8186645) consists of lightweight, reusable plastic brackets and an adhesive backed shoe plate. The bracket snaps into the shoe plate that is held firmly to the casting slab by the adhesive base.

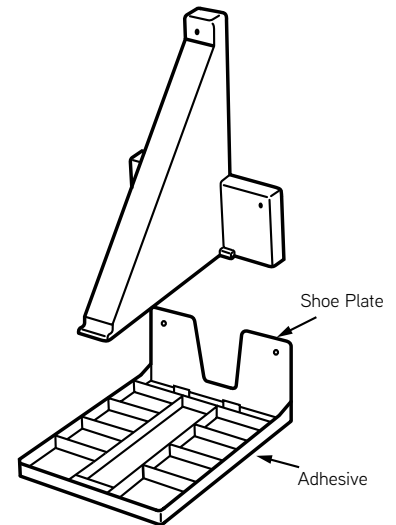
Brackets come in two sizes 5" for form height 5" to 7" and 7" for form height 7" to 11". Maximum recommended spacing is 18".

To Order:

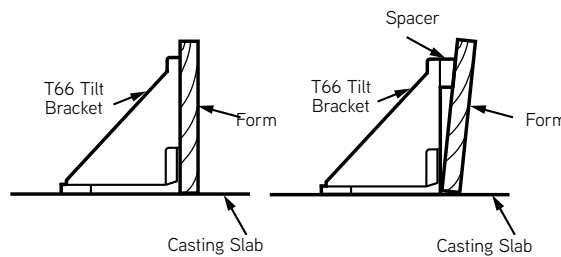
Specify: (1) quantity, (2) name, (3) size.

Example:

400, T66 Tilt Brackets™, 7" size.



T66 Tilt Bracket
Patent Pending



90° Application

Battered Application

T68 ACA-1000 Construction Spray Adhesive

The Dayton Superior T68 ACA 1000 Construction Spray Adhesive is a fast drying, high strength spray adhesive designed for bonding most construction related materials. T68 spray adhesive is available in 22 oz. cans (sold by the 12 can case).



**T68 ACA-1000
Construction
Spray Adhesive**

To Order:

Specify: (1) quantity, (2) name.

Example:

5 cases, T68 ACA-1000 Construction Spray Adhesive.

GluDown

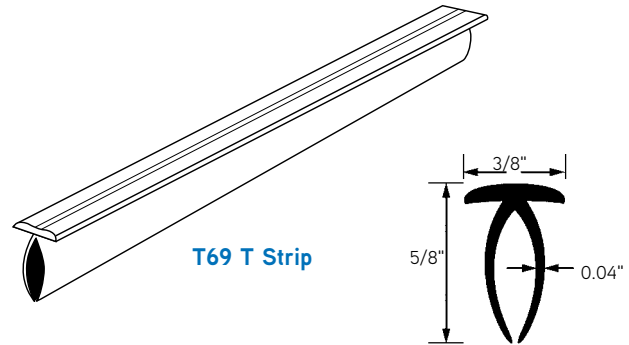
Dayton Superior offers two GluDown products: Extension Applicator and Upright Spray Can. GluDown Spray Adhesive is a fast drying, high strength spray adhesive designed for bonding most construction related material. Glu-Down Adhesive is used to bond:

- Reveal strips
- Forming brackets
- Chamfers
- Certain types of moisture barriers
- Brick veneer
- Expansion joint materials
- Insulation and block-outs to concrete



T69 T Strip

The Dayton Superior T69 T Strip is a quality strip designed to be inserted into saw cut joints to prevent spalling and to keep the joint free of dirt and debris. T69 T Strips are fabricated in 8' lengths and packaged 125 pieces per box. T69 T Strips can be ordered by the box (125 pieces, 1,000 L.F.) or by total linear feet.



To Order:

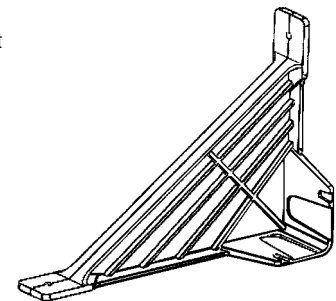
Specify: (1) quantity, (2) name.

Example:

500 L.F., T69 T Strip.

T70 EZ Nail Form Bracket

The Dayton Superior T70 EZ Nail Form Bracket is a reusable, inexpensive composite plastic bracket designed for quick and easy fastening of tilt-up panel forms to the casting slab. This unique dual-bracket design provides nail-down installation for 5" through 10" panel form heights.



T70 EZ Nail Form Bracket

To Order:

Specify: (1) quantity, (2) name.

Example:

125 T70 EZ Nail Form Brackets.

Rustications, Chamfers and Other Products Manufactured by Victory Bear

Rustications, chamfers and other products manufactured by Victory Bear provide innovative solutions to the designer and the contractor. These products provide significant labor savings in the installation of the rustications and chamfers along with eliminating much of the building finish problems which occur with wood products. And now these products can be found at a Dayton Superior distribution center near you.

Slab Saver

2" PVC Edge pieces installed in the bottom of wall panels used to protect floors during panel erection, eliminating damage to the floor slab during panel erection.

Rustication

3/4" x 45 degree PVC rustication in widths of 2.25", 2.5", 3.5", 5.5", 8.0" and 11.5". These have the patented Flex Edge Seal, insuring a tight joint with the concrete slab and these utilize the Victory Bear Base Clip for easy installation. 1/2" x 60 degree low profile rustication also available.

Snap Rustication

3/4" Triangular PVC rustication which opens to allow easy installation and then snaps shut to prevent concrete seepage.

Bulkhead

3/4" PVC bulkhead chamfer providing chamfer on both sides of the bulkhead. This product is used with both 3/4" plywood and 2x materials. It features both the patented Flex Edge Seal and utilizes the Base Clip to secure the product to the floor slab.

Bullnose

PVC Single Bullnose chamfers provide the radius edges when the designer desires a different effect from the traditional triangular building edges.

Radius Corner

6" PVC Radius Corner provides a distinct radius at a fraction of the cost.

Chamfers

3/4" x 45 degree PVC chamfers in both single and double chamfer versions. This product utilizes the patented Flex Edge Seal and is attached to the floor slab with adhesives or traditional nails or screws.

Chamfers – Low Profile

1/2" x 60 degree PVC chamfers in both single and double chamfer versions. This product utilizes the patented Flex Edge Seal and is attached to the floor slab with adhesives or traditional nails or screws.

Drip Edge Chamfer

3/4" x 45 degree PVC drip edge chamfer for use where doors, windows, dock doors and archways require both a chamfer and drip edge. This product utilizes the patented Flex Edge Seal and is attached to the floor slab with adhesives or traditional nails or screws.

Recessed Window System

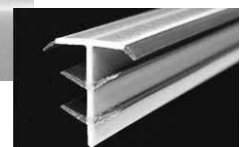
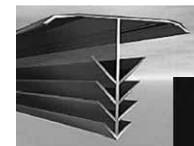
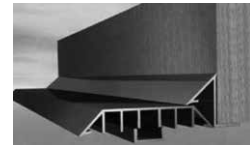
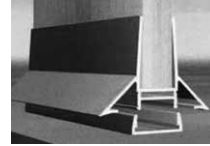
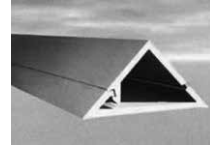
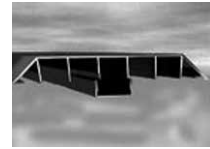
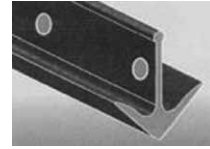
A unique utilization of several of the above products with a recessed window chamfer to add a classic detail for doors and windows in the concrete wall panels.

Joint Cover

PVC Joint Covers provide the building owner an attractive cover for the joints inside of the building. Joint Covers will fit into panel joints between 1/4" and 1" gaps.

Saw Cut Cover

PVC Saw Cut Cover temporarily seals the floor slab joints with a unique low profile design.



T75 and T75HD Special Drill-in Lift Plate

Dayton Superior T75 Drill-in Lift Plate is designed and tested for use as an emergency repair lift plate in special situations where a normal cast-in-place tilt-up face pickup insert is missing, tipped over, improperly located or otherwise unusable.

The lift plate is to be installed so that it is centered over the original insert location. When the lift plate cannot be installed at the original insert location, contact Dayton Superior.

When installing the T75 Drill-in Lift plate, always check to make certain the Lifting Lug is aligned in the direction of the cables. DO NOT apply loads at an angle to the flat side of the lifting lug!

The T75 Drill-in Lift Plate is to be attached to the face of the precast concrete tilt-up wall panel using either four or six properly installed Dayton Superior T13 Coil-Anchors, 3/4" diameter x 6" long drill-In expansion anchors. Minimum edge distance from center line of Coil-Anchor bolts is 12". Edge distances of less than 12" may result in a reduced lifting capacity.

To install the T75 Special Drill-in Lift plate, set the plate in its proper position and mark the hole locations. Drill the required number of holes using a new 3/4" diameter carbide tipped drill bit. Depth of drilled holes must be at least 5-1/2" with all holes drilled at 90 degrees to the surface of the panel.

Using compressed air, just before installation of the Coil-Anchor bolts, clean out all of the drilled holes. Failure to properly clean the holes may result in a reduced lift plate load carrying capacity.

Insert the assembled T13 Coil-Anchor bolts through the holes in the lift plate into properly drilled and cleaned holes. Using a hammer, tap the Coil-Anchor bolts all the way into the holes so that the washer and bolt heads come to rest on the top surface of the lift plate.

Tighten the T13 Coil-Anchor bolts using a 3/4" air impact wrench. The bolts must be checked with a torque wrench to make certain that they have been torqued to 200 ft. lb. Use the crane to place a light load onto the lift plate. Release the load and check all bolts to make certain they are still tightened to 200 ft. lb. Bolts torqued to a lower value will have a reduced load carrying capacity.

Do not attempt to pre-expand the Coil-Anchor Tang. For proper load carrying capacity, the Tang must not be installed more than 1-1/2 turns onto the bolt. Do not attempt to use a standard coil bolt with the Coil-Anchor Tang, as this combination will not develop any load carrying capacity. The Coil-Anchor bolt is a special tapered bolt and is not interchangeable with standard coil bolts.

The safe working loads (SWL) of these drill-in expansion anchors and lift plate are shown below. The safe working loads are determined by the number of T13 expansion anchors actually used to attach the lift plate to the tilt-up panel.

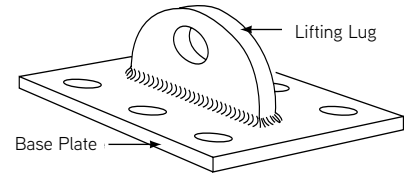
Item	Number of T13 Drill-in Expansion Anchors	Tension or Shear Safe Working Load
T75	4 bolts (2 per each side)	8,500 lbs.
T75	6 bolts (3 per each side)	15,000 lbs.
T75HD	8 bolts (2 per each side)	24,000 lbs.

Note: Insert SWL's are based on approximately a 2 to 1 factor of safety. Lift plate develops approximately a 5 to 1 factor of safety based on a maximum SWL of 15,000 lb. The above SWL's are based on the lifting plate being installed so that the raised lifting lug is aligned with the direction of the lifting cables.

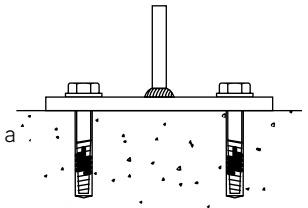
In order to develop the safe working loads of the T75 Special Drill-in Lift Plate, the normal weight concrete in the panel must have attained a minimum compressive strength of 2,500 psi. These safe working loads assume the T13 Coil-Anchor expansion anchors have been properly installed.

The base of the lift plate is 5/8" x 12" x 12" and has six 1" diameter holes drilled at 4" centers vertically and 8" centers horizontally.

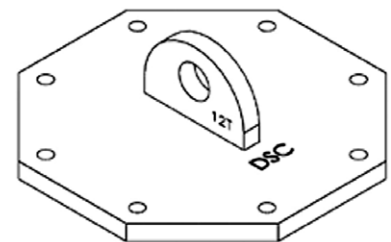
Use only the 6" T13 Coil-Anchor with the T75 Special Drill-In Lift Plate. Do not use the 4-1/2" version.



T75 Special Drill-in Lift Plate



T75 Special Drill-in Lift Plate Typical Application

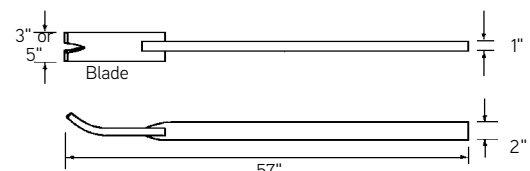


T75HD Special Drill-in Lift Plate

A95 Dayton Bar

The A95 Dayton Bar is manufactured with a 1" x 2" structural tube handle that has been carefully Mig welded to a heat-treated milled blade. This bar is an ideal tool for use by the tilt-up erector — you will find many uses for it, from adjusting and/or stripping side forms to "jockeying" tilt-up wall panels into position.

Available with either a 3" or 5" wide blade. Please specify blade width when ordering.



A95 Dayton Bar

To Order:

Specify: (1) quantity, (2) name, (3) blade width.

Example:

4, A95 Dayton Bars with 3" blades.

P80 Shim Strips

Dayton Superior P80 Shim Strips assure accurate placing and leveling of tilt-up panels and other architectural and structural components because it:

- is made in convenient thicknesses, lengths and widths allowing precise leveling and alignment.
- permits field changes in load bearing requirements with stock on hand.
- is less expensive and safer than steel. It has extreme stability and eliminates rust, stained concrete and spalling.
- is size scored for convenience of application. Prevents waste — material can be readily picked up and stored in the open for future use.
- will not fracture under load.
- Thicknesses of 1/16", 1/8" and 1/4" in lengths of 3" and 4" are available from stock. The widths of 3" x 24" are scored every 3" and the widths of 4" x 24" are scored every 2". This allows for easy snap off as needed. Additional sizes available on request.
- is impervious to liquids and ground chemicals, alkalis and microorganisms. The continuing performance characteristics are stable and predictable.
- will not rust, rot or leach when exposed to wet surfaces and it has no odor.
- arrives at the job site in precise thicknesses and lengths.
- eliminates the need for saws, hand tools or cutters. A definite saving in time, labor and money is realized. The strips are easily applied and lay flat.
- Point projection of aggregate is absorbed without fracture or effect on the load-bearing characteristics decreasing damage potential to the adjacent concrete components.

Engineering Data: The pertinent physical properties of Dayton Superior plastic shims are presented as follows:

- Compressive strength of 8,000 to 9,000 psi with no fracture even at 26,000 psi.
- Classed as slow burning with no toxic fumes.
- Negligible cold flow characteristics; i.e., less than 1% at 1,000 psi and 73° F. for 10,000 hrs.
- Coefficient of linear expansion is 3 to 5 x 10⁻⁵ inches/inch/°C

To Order:

Specify: (1) quantity, (2) thickness, (3) length, (4) name.

Example:

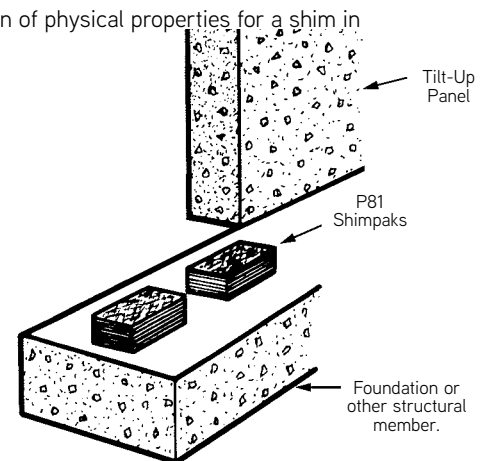
Example: 300, 1/4" x 4" P80 Shim Strips.

P81 Shimpak

Dayton Superior shimming material is an engineered multipolymer plastic specifically formulated for use by the construction industry.

It is an engineered multipolymer plastic material which provides an optimum combination of physical properties for a shim in applications where high compressive strength and load bearing is important. It facilitates the placement of tilt-up structural and other architectural members.

- These pre-assembled packages of heavy duty shims are designed for large load bearing of precast units.
- Shimpaks are very advantageous in precise placing and leveling of large panels.
- Their use eliminates time consuming correction of elastomeric drift and makes alignment safer and easier.
- Popular sizes are 4" x 6" and 4" x 4" paks which are 1-1/16" thick. Shimpaks are made up of shims in the following thickness sequence; one 1/16th, three 1/4ths and two 1/8ths. Tilt-up panels can be levelled within 1/16" by removing or adding one or more elements.
- Shimpaks are held together with a resilient band for easy removal or addition of elements.
- Alternate sizes available on request.



To Order:

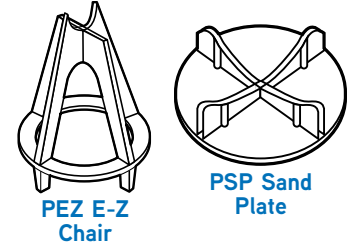
Specify: (1) quantity, (2) size, (3) name.

Example:

Example: 200 packs, 4" x 6" P81 Shimpaks.

E-Z Chair™

E-Z Chairs are designed for superior strength and stability. They are well suited for tilt-up, precast and poured in place slab applications. E-Z Chairs are available in 3/4" to 6" cover heights for rebar sizes up to #11. E-Z Chairs are sold in full cartons only.



To Order:

Specify: (1) quantity, (2) name, (3) cover height.

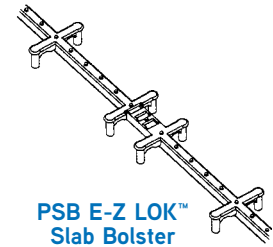
Example:

4 boxes (700), 121271, E-Z Chairs, 4" cover.

An optional Sand Plate is available for use on grade or in Sandwich Panels.

E-Z LOK™ Slab Bolster

E-Z LOK Slab Bolster provides a strong, stable support and spacer for rebar in slab or wall applications. The E-Z LOK Slab Bolster can be used in individual 32" sections or the sections can be snapped together to satisfy any job-required length. E-Z LOK Slab Bolster is available in 3/4" to 3" cover heights and is sold in full cartons only.



To Order:

Specify: (1) quantity, (2) name, (3) cover height.

Example:

2 boxes (300), 78066, E-Z LOK™ Slab Bolster, 2" cover.

Aztec Strongback SBU (Slab Bolster Upper) PSBU

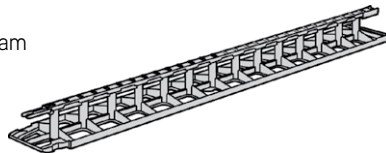
PATENT PENDING

The Aztec Strongback SBU supports top layer in Double Mat application, Rebar or Wire Mesh, Slabs, Heavy Duty On-Grade, Corrugated Decking, Side-Form Spacer-below-grade applications only, and Precast.

Cover Height: From 1" to 3-1/4" (1/4" increments)

Features:

- Designed for use with Epoxy-Coated/FRP/Stainless Steel/Galvanized rebar
- Intended for use in corrosive environments
- Spans corrugations in elevated deck applications
- Suitable for use on Vapor Barriers or Insulating Foam
- No overlap required
- Manufactured in 30" lengths in standard boxes
- Special packaging available in 5' or 10' sections, bundled and palletized
- Strong as metal SBU



PRODUCT CODE	COVER	FT. BOX	QTY/ BOX	WT. LBS. PER BOX
220165	1"	100	40	40
220335	1-1/4"	100	40	40
220166	1-1/2"	75	30	30
220312	1-3/4"	75	30	30
220167	2"	75	30	30
220313	2-1/4"	75	30	30
220297	2-1/2"	50	20	20
220314	2-3/4"	50	20	20
220296	3"	50	20	20
220315	3-1/4"	50	20	20
220384	3-1/2"	50	20	20
220461	3-3/4"	50	20	20
220382	4"	50	20	20
220462	4-1/4"	50	20	20
220385	4-1/2"	50	20	20
220463	4-3/4"	50	20	20
220386	5"	50	20	20

Aztec Straddle Chair - PSC

Application: Single Mat -Rebar or Wire Mesh, Bottom Layer Double Mat-Rebar or Wire Mesh, Tilt Wall, Side-Form Spacer, On-Grade: when used with Sand Plate

Cover Height: From 3" to 7-3/4"

Features • Fits rebar #3 to #11

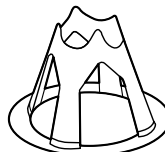
- Minimal footprint with staple down feature
- With 2 sizes per chair
- Straddles lower rebar mat
- Same material characteristics as Aztec tower chair



PRODUCT CODE	COVER	QTY/ BOX	WT. LBS. PER BOX
126299	3" - 3-3/4"	250	27
126300	3-1/2" - 3-3/4"	200	26
126301	4" - 4-1/4"	200	32
126302	4-1/2" - 4-3/4"	200	34
126303	5" - 5-1/4"	150	29
126304	5-1/2" - 5-3/4"	150	30
126305	6" - 6-1/4"	150	32
126306	6-1/2" - 6-3/4"	150	34
126307	7" - 7-1/4"	125	36
126308	7-1/2" - 7-3/4"	125	38

Castle Chair™

Castle Chairs are uniquely designed with a wide base ring to provide stability on poorly compacted or expansive soils. Two cover heights allow for variation in grading. Castle Chairs are strong enough to carry the weight of ironworkers and concrete finishers, but will not damage moisture protection membranes. Castle chairs are available in 1-1/2" to 4-1/4" cover heights. Sold in full cartons only.



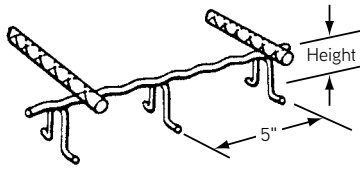
To Order:

Specify: (1) quantity, (2) name, (3) cover height.

Example:

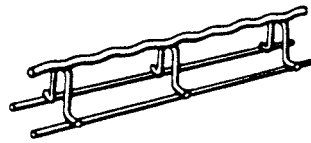
2 boxes (300), 122837, Castle Chairs, 2-1/2" to 2-3/4" cover.

Metal Supports for Rebar and Wire Mesh



SB-Slab Bolster

Available in heights of 3/4" to 3" in increments of 1/4" in 5 ft. lengths

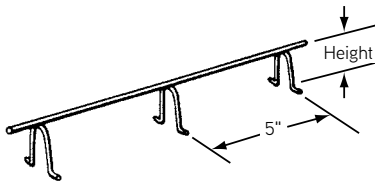


SBU-Slab Bolster Upper



BC-Bar Chair

Available in heights of 3/4" 1" and 1-1/2"



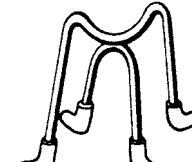
CHC-Continuous High Chair

Available in heights of 2" to 20" in increments of 1/4" in 5' lengths



PC-Precast Chair

Made from Type 430 Stainless Steel.



HC Individual High Chair

(Plastic Tipped Legs Available)

Available in heights of 2" to 40" in increments of 1/4"

Wire and Related Accessories Tie Wire - WTW

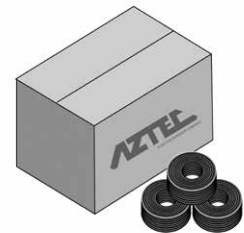
BLACK ANNEALED

Application: Wire Features:

- Individual coils are shrink wrapped to prevent rust
- Packaged 20 coils per box with 48 boxes per pallet
- Properly spooled for tangle-free dispensing
- Annealed for ease of tying
- Fits all standard tie wire reels

Product Code	Gauge	Description	Wt. Lbs. Per Box
220374	16.5	BLACK ANNEALED	70
220373	16	BLACK ANNEALED	70
220372	15	BLACK ANNEALED	70
220275	16	EPOXY COATED	70

Call for discount on quantity purchases



Loop End Wire Ties - WBT

Application: Wire

Features:

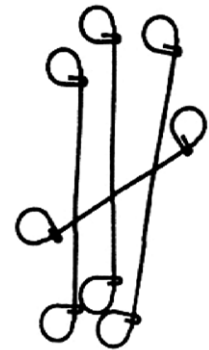
- Convenient loop-ends allow for ease of installation
- Used in tying rebar, as bag closures, carpet rolls, etc.
- Other wire gauges and lengths available on an individual inquiry basis
- Epoxy-coated and galvanized wire is available on an individual inquiry basis

Product Applications:

Slab, Side Form Spacer, Tilt-up, Foundations, Precast, D.O.T., and Industry

Note: Best used in conjunction with wire tying tools

PRODUCT CODE	LENGTH	QTY/ BAG	WT. LBS. PER BAG
220227	4"	5000	31
220230	5"	5000	35
220233	6"	5000	39
220236	7"	5000	44
220239	8"	5000	33
220242	10"	2500	30
220245	12"	2500	32
220248	14"	2500	35
220249	16"	2500	39
220250	18"	2500	44
220251	20"	2500	48
220252	21"	2500	50
220253	24"	2500	56



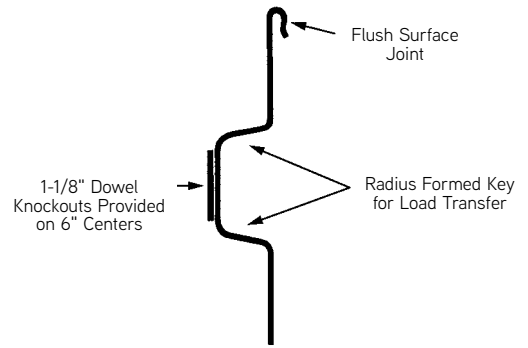
G33 Screed Key Joint

G33 Screed Key Joint is available in heights of 3-1/2", 4-1/2" and 5-1/2" for use in 4", 5" and 6" concrete slabs on grade. Screed key gives a smooth, flush surface joint which requires no filling.

The use of screed key joints minimizes random cracking and provides proper load transfer from slab to slab.

The use of screed key is more economical than simple bulk-headed forms which must be prepared, installed, stripped, cleaned, repaired or replaced and stored. By using screed key, instead of bulk-headed joints, you are able to pour entire slabs or strips at one time. Costly and time-consuming checker boarding is eliminated. you simply install screed key, pour the concrete — finish flush to joint and you are finished.

By using screed key you will have a floor that is ready for covering without any expensive joint filling or treatment, you eliminate any uneven settling and the resulting cost of joint repair and patching. Dayton Superior Screed Key joint saves you money in initial cost, maintenance and upkeep.

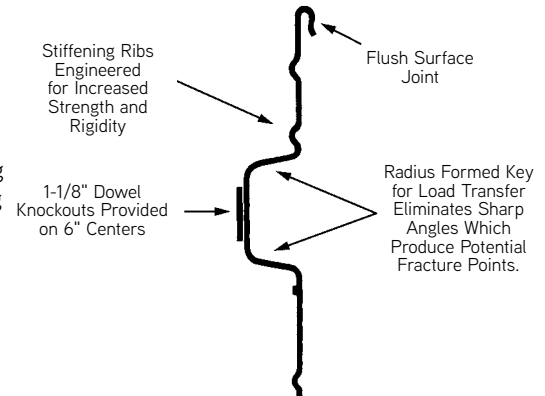


G34 Load Key Joint

G34 Load key Joint is available in heights of 7-1/2" or 9-1/2". It is furnished in 10 foot lengths for use in 8" or 10" slabs and thickened joints. The use of load key allows you to have a floor that is ready to use "as is" or to cover without the expense of costly joint filling.

The use of load key assures you of a strong high quality floor in your new building at a low initial price. It minimizes for years the maintenance cost of joint patching and repair.

Thickened joint slab specifications can be met economically with pre-engineered load transfer by using the easily installed and left in place load key joint.



G37 Stake

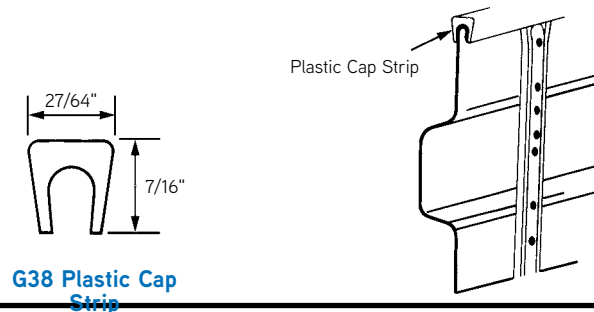
16 Gauge x 1" wide stake.

Available in 12", 15", 18" or 24" lengths.



G38 Plastic Cap Strip

Where joint sealants are specified, plastic cap strip should be used. It is easily removed after the concrete hardens, leaving a wedge shaped joint for easy and economical sealant application.



Material

Screed Key Joint and Load Key Joint are manufactured from .022" to .025" thick corrosive resistant galvanized steel with 1-1/8" diameter dowel knockouts 6" on center. They are both available in stock lengths of 10 foot. Supporting steel stakes 16 gauge x 1" wide are available in 12", 15", 18" or 24" lengths as required.

Note: Screed Key joint or load key joint is not recommended for use in warehouse floor slabs which are subjected to high volume traffic consisting of fork trucks, heavily loaded hand pallet trucks or heavily loaded steel wheel carts.

Cures and Bondbreakers for Tilt-Up

Cures

Proper, and immediate, curing is vital to the success of a tilt-wall project

1. Timing is more critical on the cure coat than the bondbreaker coat
2. Proper curing will help create a less porous, more dense surface
3. The more dense the surface, the easier the panels will lift
4. For projects requiring an ASTM C-309 cure, use the Dayton System:

Prior to placement of the J6, cure the slab with one of the following:

1. J6 @ 100*-200 Ft²/gal (2.4 - 4.9 M²/L)
2. J22 @ 300-350 Ft²/gal (7.36 - 8.59 M²/L)
3. J23 @ 300-400 Ft²/gal (7.36 - 9.81 M²/L)

Prior to placement of the J6WB, cure the slab with one of the following:

1. J6 @ 100*-200 Ft²/gal (2.4 - 4.9 M²/L)
2. J18 @ 200-300 Ft²/gal (4.9 - 7.36 M²/L)
3. J22 @ 300-350 Ft²/gal (7.36 - 8.59 M²/L)
4. J23 @ 300-400 Ft²/gal (7.36 - 9.81 M²/L)
5. J2W @ 200 Ft²/gal (4.9 M²/L)

* Meets ASTM C 309 moisture retention requirements on a steel troweled surface.

Bondbreakers

A bondbreaker is a 'material used to prevent adhesion of the newly placed concrete and the substrate*. When a bondbreaker is needed at a construction joint, a curing compound, form release agent and the like can act as a bondbreaker. Bondbreakers used in tilt-wall construction, however, are specifically formulated for that purpose and the chemistry involved with these bondbreakers is different than that of other "bondbreakers".

* AC1116 Cement and Concrete terminology

Dayton Superior Bondbreakers

Sure-Lift (J6) Solvent-based
 Sure-Lift (J6WB) Water-based

Preparation for Applying Bondbreaker

- All surfaces must be clean
- For hot weather precautions, prior to the first bondbreaker application, soak the slab to satisfy it's 'thirst' and reduce it's porosity; After soaking, squeegee off the excess water then immediately apply the bond breaker. This procedure will help to keep the bondbreaker on the surface, not in the concrete.

Placement of Bondbreaker

- Always read and follow the instructions in the current data sheet
- Apply the bondbreaker evenly, being sure not to leave puddles
- It is best to have several lighter applications than one heavy application

"Good Indications"

Three quick checks that indicate good parting of the panels:

1. Feel a soapy residue on the surface
2. Beading of water
3. Observing an uniform appearance of the bondbreaker

Solvent-Based vs Water-Based

Water has very high surface tension while solvents are low. Surface tension is directly related to wetting and adhesion. Liquids with a high surface tension, like water, are not necessarily as efficient in this respect as the lower surface tension materials like solvents. This is the reason why water-based materials do not lay down as easily as solvent-based materials and why water based are easier to over apply.

Dayton Superior Bondbreaker Comparisons

Condition	J6	J6WB
Shelf Life	12 months	9 months
Mixing	Not required, but good to do occasionally	Agitation required prior to each use
Flammability	High	No
Warehouse storage per Uniform Fire Code	Limited Quantities	Unlimited Quantities
Freezable	No	Yes

BONDBREAKERS

Sure Lift™ with Dye J6D

Solvent Based Bondbreaker

Sure Lift with Dye J6D is a reactive and membrane forming bondbreaker for use in tilt wall construction. Sure Lift with Dye J6D is a special formula of polymers and propriety ingredients designed to provide clean, easy lifting of tilt panels.

Sure Lift™ J6WB

Water Based Bondbreaker

Sure Lift J6WB is a liquid, V.O.C. compliant, water base, reactive and membrane forming bondbreaker for use in tilt wall construction. Sure Lift J6WB is a special formula of polymers and propriety ingredients designed to provide clean, easy lifting of tilt panels.

Maxi Tilt with Dye

Water Based Bondbreaker

Maxi Tilt with Dye is a liquid, V.O.C. compliant, water base, reactive and membrane forming bondbreaker for use in tilt wall construction. Maxi Tilt with Dye is a special formula of polymers and propriety ingredients designed to provide clean, easy lifting of tilt panels. Maxi Tilt with Dye has a fugitive dye for ease of visual inspection during application.

CURE & SEAL COMPOUNDS

Cure & Seal LV 25% J20UV

Solvent Based Cure & Seal

Cure & Seal LV 25% J20UV is an acrylic copolymer cure, seal and dustproofing compound in an aromatic solvent containing 25% solids. It is designed for ease of application and better atomization when spraying in a wide temperature range from 35°F to 90°F (2°C to 32°C). Cure & Seal LV 25% J20UV will be ultraviolet stable and resist yellowing. The higher acrylic solids content will form an excellent surface coating with a high gloss finish that provides an outstanding cure performance. Complies with ASTM C-1315.

Cure & Seal 25% J22UV

Solvent Based Cure & Seal

Cure & Seal 25% J22UV is an acrylic copolymer cure, seal and dustproofing compound in an aromatic solvent containing 25% solids with special U.V. stabilizers. The higher acrylic solids content will form an excellent surface coating with a high gloss finish and will provide an outstanding cure performance. Cure & Seal 25% J22UV is ultraviolet light stable and resists yellowing. Complies with ASTM C-1315.

Cure & Seal 309 J18

Water Based Cure & Seal

Cure & Seal 309 J18 is a water based acrylic copolymer that offers a combination curing, sealing and dustproofing for freshly finished concrete surfaces. This product dries to produce a non-yellowing, durable, clear film on concrete. Cure & Seal 309 J18 is ideal for interior applications because it is free of noxious flammable fumes. Complies with ASTM C-309.

DENSIFIERS, SEALERS, POLYMER FLOOR COATINGS

Pentra-Hard® Densifier

Lithium Concrete Hardener for Concrete

Pentra-Hard Densifier is advanced lithium chemistry that hardens and dustproofs new and existing concrete. This easy-to-use water-based solution requires no rinsing and is VOC compliant in all areas of the world. When sprayed on new or existing concrete, it penetrates into the concrete, where it reacts with free calcium to form insoluble calcium silica hydrate, which makes concrete more water, stain, and abrasion resistant for easier maintenance and longer life. It is also suitable for concrete polishing procedures and helps prolong the life of polished finishes.

Pentra-Hard® Guard

High Performance Finish, Stain, Wear Protector

Pentra-Hard Guard is a high performance finish that adds shine, stain resistance and abrasion resistance to concrete. Effective on all concrete and cement containing floors, this water-based, lithium-fortified material cures quickly to form a clear, extremely hard, micro-coating that protects the substrate, even in demanding industrial and commercial environments. This new chemistry makes concrete surfaces more attractive and easier to maintain, and eliminates the need for waxes, polishes, and acrylics.

Sure Hard™ Densifier J17

Liquid Densifier for Concrete

Sure Hard Densifier J17 is a colorless, odorless solution of specialized reactive chemicals that penetrate concrete surfaces to seal, densify and harden the material. Sure Hard Densifier J17 is a water based product and as a result is V.O.C. compliant in every area of the country and environmentally safe to use.

Ultra Seal EF™

Earth Friendly Concrete Sealer

Ultra Seal EF is an Earth Friendly (EF) acrylic, non-yellowing concrete sealer that may contribute to LEED Credits. The formula is low odor and contains VOC < 100 g/L, making it VOC compliant in all areas. It is designed to seal, protect and add an attractive gloss to existing concrete and decorative concrete surfaces. Ultra Seal EF is blush resistant and has good resistance to common chemicals such as motor oil, antifreeze, vinegar and bleach.



Spec Cote 100

100% Solids, High Build Coating

Spec Cote 100 is a 100% solids, two-component epoxy coating used to protect and seal concrete floors, steel and other compatible materials for interior applications. Spec Cote 100 can be mixed with various aggregates for use as a trowel grade epoxy mortar or as a colored base for broadcasting silica/quartz aggregates for a decorative or non skid floor.

Spec Cote 100 Clear

100% Solids, Clear, High Build Coating

Spec Cote 100 Clear is a 100% solids, two-component waterclear epoxy coating used to protect and seal concrete floors, steel and other compatible materials for interior applications. Spec Cote 100

Clear can be mixed with various aggregates for use as a trowel grade epoxy mortar or as a base for broadcasting silica/quartz aggregates for a decorative or nonskid floor.

Spec Cote 100 CR

High Build, Chemical Resistant Epoxy Coating

Spec Cote 100 CR is a 96% solids, two-component Novolac Epoxy offering a high degree of chemical and abrasion resistance to protect and seal concrete floors.

Spec Cote Urethane

Two Component, Chemical Resistant Urethane Coating

Spec Cote Urethane is a two component aliphatic polyurethane coating with outstanding resistance to chemicals, abrasion and weather. It is a color stable, non-yellowing urethane coating that has excellent impact resistance, U.V. stability and weathering properties and can be used indoors or outdoors to deliver a smooth high-gloss finish with outstanding protection.

EVAPORATION REDUCERS

AquaFilm™ Concentrate J74

Evaporation Retardant

AquaFilm Concentrate J74 is a proprietary emulsion of unique organic compounds designed to minimize moisture loss from fresh concrete. It is economical as a concentrate and is diluted with potable water at a 9 to 1 ratio. As a water based polymer, AquaFilm Concentrate J74 is V.O.C. compliant and contains a blue fugitive dye for ease of visual inspection during application.

AquaFilm™ J74RTU

Evaporation Retardant

AquaFilm J74RTU is a ready-to-use proprietary emulsion of unique organic compounds designed to minimize moisture loss from fresh concrete. As a water based polymer, AquaFilm J74RTU is V.O.C. compliant and contains a yellow fugitive dye.

EPOXY JOINT FILL FOR SAW CUTS

Sure Fil™ J52

Epoxy Joint Filler

Sure Fil J52 is a 100% solids, two component, low shrink, moisture tolerant joint filler and crack repair material.

LATEX BONDING AGENTS / ADMIXTURES

Acrylic Bonding Agent J40

Bonding Agent

A ready-to-use, non-reemulsifiable acrylic admixture and bonding agent designed to improve the adhesion and durability of concrete, masonry, terrazzo and portland cement-sand mixes to horizontal and vertical concrete and other surfaces.

PVA Bonding Agent J41

Bonding Agent

PVA Bonding Agent J41 is a concentrated reemulsifiable/rewettable polyvinyl acetate (PVA) emulsion for use as a bonding agent for application on concrete, cement board or masonry prior to installing patches, mortars, stucco and plaster.

NON-SHRINK GROUT

1107 Advantage Grout™

Cement Based Grout

1107 Advantage Grout is a non-shrink, non-corrosive, non-metallic cementitious grout. 1107 Advantage Grout is designed to provide a controlled, positive expansion to ensure an excellent bearing area. 1107 Advantage Grout can be mixed from a fluid to a stiff plastic consistency.

PANEL SMOOTHING / PREP AND SPRAY Adhesive

Architectural Finish™

Rubbing and Sacking Repair Mortar

Architectural Finish is a single component, cement based material specially formulated for rubbing, smoothing, repairing and restoring vertical or overhead concrete surfaces.

GluDown

Spray Adhesive

Dayton Superior offers two GluDown products: Extension Applicator and Upright Spray Can. GluDown Spray Adhesive is a fast drying, high strength spray adhesive designed for bonding most construction related material. Glu-Down Adhesive bonds:

- Reveal strips
- Forming brackets
- Chamfers
- Certain types of moisture barriers
- Brick veneer
- Expansion joint materials
- Insulation and concrete block-outs



For safety, the tilt-up contractor must perform the following checks to verify dimensions and conditions before casting or erecting panels. The contractor must also consult with the crane contractor to make certain that the crane and rigging is sized properly and that a safe and efficient panel erection sequence is planned and followed.

Check:	Panel Number or Type															
Panel Width and Height																
Panel Opening and Location																
Panel Thickness – Structural and Overall																
Panel Cast Correct Face Up																
Sufficient Bondbreaker Applied																
Reinforcing Size and Location																
Lift Insert Type and Size																
Lift Insert Location																
Brace Anchor Type and Size																
Brace Anchor Location																
Strongback Insert Type and Size																
Strongback Location																
Inserts Correctly Tied in Place																
Exposed Aggregate Size (if used)																
Specified Compressive Strength																
Sufficient Bolt Penetration																
Proper Lifting Hardware																
Cable Lengths and Rigging Configuration																

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

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

Worn Working Parts

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

Shop or Field Modification

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

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

Interchangeability

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

Installation

WARNING

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

THE CUSTOMER IS RESPONSIBLE FOR THE FOLLOWING:

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

SAFETY INSTRUCTIONS:

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

Design Changes

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

Note: See Safety Notes and Safety Factor Information.



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SUPERIOR

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**PERFORM
WITH
PRECISION**