



Formliners can be used with any concrete forming system to provide unique designs and economical solutions to forming architectural concrete surfaces.

## FORMWORK CONSIDERATIONS

Formliners can be used with any concrete forming system, including Steel-Ply<sup>®</sup>, Versiform<sup>®</sup> or Max-A-Form<sup>®</sup> concrete forming systems. They provide unique designs and economical solutions to forming architectural concrete surfaces.

**CAUTION:** Failure to provide adequate support against the concrete pressures could result in a “blowout,” subjecting workers to injury and causing job delays or costly rework.

Formliners can also be used in tilt-up and precast applications. A Dayton Superior representative should be consulted when considering such forming applications.

### Form Placement

It is important that forms for architectural concrete be aligned and in common planes. A “stack up” of manufacturing tolerances can result in forms being in different planes. This creates a noticeable “step” in the finished surface, particularly with shallow formliner patterns.

All formwork should be sufficiently rigid to remain sealed during concrete placement and vibration. Seal all joints and tie holes by caulking or gasketing to prevent grout leakage. Further recommendations are contained in ACI 347-88.

Do not “lap” formwork over previous pours which have uneven architectural surfaces. Such lapping will result in a form offset with leakage that distorts the finished concrete appearance.

### Tie Placement

Plan formwork so that tie placement is at rustications, reveals or other inconspicuous locations, to minimize the visual effect in the finished surface. Remember to allow for the depth of the formliner when calculating the breakback requirement for ties.

When using a rib pattern formliner, locate ties at the high point of the formliner rib. This places the tie in the recess of the finished surface where it is less noticeable. The maximum diameter of the tie (cone, She-Bolt, Taper Tie) should not exceed the minimum width of the rib. Provide a minimum of 1" concrete cover for ties requiring breakback. If

cones are used, the diameter of the cone should be less than its depth to facilitate patching.

To minimize grout leakage through tie holes when using ABS plastic formliner, foam tape or foam rod should be used. This packing material is used to fill any space around the tie. Packing should be done from the face of the form and extend 1/8" through the formliner.

The rubber-like nature of Elasto-Tex<sup>®</sup> formliners simplifies sealing the tie holes. A slightly smaller tie hole diameter (1/16" less) in the formliner will create a gasket effect and minimize grout leakage. Of course, the tie hole in the plywood or steel backing must be large enough to accept the tie being used.

**CAUTION:** Burning tie holes in the formliner with a heated tie or other tool emits toxic fumes that may cause debilitating injury if inhaled. If workers inhale fumes, remove them to fresh air and contact a physician immediately.

### Formliner Joints

It is very difficult to match pattern features at joints and make the surface appear continuous. Slight differences in shape, thickness and texture will have a visible impact on the finished surface. For this reason, avoid or minimize both vertical and horizontal joints.

When joints are unavoidable, make the joint along the main features of the pattern. Match pattern features carefully, and minimize grout leakage at the joint with foam tape. This practice will help reduce the visible effect on the finished surface.

Consider the pattern dimensions to achieve an overall balanced design. It is especially important to consider pattern dimensions when planning for unavoidable joints, boxouts and corners in the finished surface.

### Rustication

Rustication strips are often used at formliner joints. This not only accentuates the pattern, but eliminates the need to produce a perfect pattern joint. It is recommended that rustication be applied as a closure on the top of the pattern and sealed with foam tape.

Dayton Superior offers many different types of reusable rustications that are compatible with formliners. The rustication is strong enough to resist concrete pressures and flexible enough to conform to curves.

### **Boxouts**

There are two methods of forming boxouts; one requires permanently modifying the formliner, the other applies a closure to the face of the formliner.

Boxouts by modification require that the formliners be cut to accommodate the boxouts. The location of the pattern features should be determined before fabricating the required boxouts.

Boxouts by closure do not require that the formliners be cut. The required boxouts are placed over the formliner, and materials are used to fill the voids between the boxouts and the formliner surface. The materials used are dependent on the configuration of the formliners and the concrete pressures. Access through the boxout should be considered when box out exceeds 2' in width.

### **Corners**

Corners by modification require that the formliners be cut to accommodate the corners. The location of the pattern features should be determined before fabricating the required corners.

Corners by closure do not require that the formliners be cut. A smooth reveal is used at inside or outside corners to simplify corner formwork construction and minimize pattern misalignment at the corners.

### **Reinforcing Steel**

Locate reinforcing steel accurately to insure proper cover and eliminate rust stains on the finished concrete surface. The clear distance between the outermost reinforcing bar and the surface should be at least 2" for plastic formliner and 1½" for urethane formliner. Remember to allow for the thickness of the formliner pattern when calculating the proper cover for the reinforcing steel.

Provide a minimum of 5" x 5" clear opening in reinforcing steel throughout, for proper placement and vibration of concrete. Use maximum diameters in calculating steel spacing and clear openings. These placement and vibration openings

should be consistent with the capabilities of the vibration equipment. Further recommendations are contained in ACI 309-92.

### **Test Pour**

Before actual construction, a test pour is recommended to demonstrate the results on the finished concrete surface. The test pour should simulate as many phases of the actual construction as possible and include typical tie holes, boxouts, corners, reveals, wall intersections and joints. The test pour should be the height of the maximum wall to be produced.

Upon approval, the actual construction should proceed using the same methods and materials to assure uniformity throughout the entire project.

## **ATTACHMENT PROCEDURES FOR ABS PLASTIC FORM LINERS**

ABS plastic formliner is manufactured from premium quality ABS plastic, and thermoformed to provide the contractor with low range re-use projects. ABS plastic formliner exhibits excellent impact resistance and contains an ultraviolet shielding compound which reduces the damaging effects of sunlight.

ABS plastic formliners are available in standard 4' x 10' sheets in more than 40 patterns. Most patterns are pressure rated at 1000 psf.

**CAUTION:** Temperatures in excess of 140° F will cause permanent thermal decomposition in ABS plastic formliners.

**CAUTION:** Most plastics degrade when exposed to intense sunlight for extended periods of time. Cover the formliner with a tarpaulin or black plastic to protect the forming surface whenever it is not in use. This will prolong the life of the formliner material and keep the forming surface clean.

### **Handling**

Plastic formliners are shipped in a closed crate for protection. It is recommended that they remain in the crate until needed on the work site. This will protect the material from sunlight, dirt and debris.

Once attached to formwork, ABS plastic formliners should be stored on edge. Care should be taken to avoid striking the face with heavy, sharp or heated objects that could cause permanent damage.

### Materials and Tools

The basic materials needed to attach and modify ABS plastic formliners include:

- Staples ( $\frac{9}{16}$ " or  $\frac{3}{4}$ " depending on pattern thickness) for attachment to plywood
- Nails for attachment to plywood (may enhance the finished look of wood patterns)
- Plastic pipe cement or external grade panel glue can be used when mechanical attachment is not permissible
- Foam tape grout seal blocks may be required for voids and modifications
- Silicone caulking for voids and modifications.
- Liner Kote™, Magic Kote® or Action Kote™ form release

The quantities of materials needed will vary with the size of the project and the method of attachment.

The basic tools needed to attach and modify ABS plastic formliners include:

- Tape measure
- Chalk line
- Circular saw with carbide tipped blade
- Power sander or grinder, 30 grit or less
- Power stapler
- Electric drill
- Hammer
- Other hand tools depending on attachment method
- Sprayer with wand extension
- Personal safety equipment
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The quantities of tools needed will vary with the size of the project and the method of attachment.

**CAUTION:** Cutting and drilling can create dust and rough edges. Workers should wear appropriate safety equipment.

The rough edges created by cutting and drilling can be dressed with sander. Remember to remove all dust and debris from the surface.

**CAUTION:** Sanding can create dust that might be inhaled. Long term exposure to this dust may be harmful. Workers should wear appropriate safety equipment.

### Cutting and Drilling

ABS plastic formliners can be modified by cutting and drilling with a circular saw and electric drill. These operations should be performed on ABS plastic formliners that are securely clamped to a work bench with a cutting guide or drilling template. The work pace should be steady to prevent any "chatter" that can fracture the surface.

ABS plastic formliners can be attached to handset systems, gangform systems and plywood (for subsequent mounting to gangform systems or casting beds).

### Attachment - Handset Systems

Procedures for attachment to handset forms:

1. Apply foam tape to the plate or sill that supports formwork to prevent grout leakage at the base of the plastic formliner.
2. Assemble and brace the architectural side of the formwork first. Attach plastic formliners before setting ties or opposite formwork side.
3. Apply foam tape to back side of plastic formliner along all edges. Allow foam tape to extend beyond the edge when the formliner will be jointed.
4. Position plastic formliner against the formwork so that edges, pattern and joints are square. Work with one sheet at a time.
5. Staple the plastic formliner on 3" centers and around all tie locations. Staple heads should be driven flush with the surface (adequate electrical power must reach stapler to drive staples flush).
6. Foam tape should be positioned behind the joint of two pieces and pressed down firmly. If a ribbed pattern is used, insert grout seal block to support joint and prevent grout seepage.

7. Grout seal blocks may also be needed to seal tie holes, fill voids in boxouts and open-ended patterns or support especially deep patterns.

### **Attachment - Gangs**

Procedures for attachment to gangs:

1. Level and square the formwork so that attachment can be made accurately in a horizontal plane. Dimensions should be marked so that edges, patterns and joints are square.
2. If strongbacks are required, they should be attached to the formwork holding the plastic formliner.
3. Apply foam tape to the plate or sill that supports formwork to prevent grout leakage at the base of the plastic formliner.
4. Apply foam tape to back side of plastic formliner along all edges. Allow foam tape to extend beyond the edge when the formliner will be jointed.
5. Position plastic formliner against the formwork so that edges, pattern and joints are square. Work with one sheet at a time.
6. Staple the plastic formliner on 3" centers and around all tie locations. Staple heads should be driven flush with surface (adequate electrical power must reach stapler to drive staples flush).
7. Foam tape should be positioned behind the joint of two pieces and pressed down firmly. Attachment can then be made.
8. Grout seal blocks may also be needed to seal tie holes, fill voids in boxouts and open-ended patterns or support especially deep patterns.

### **Attachment - Plywood**

Procedures for attachment to plywood include:

1. If a secondary underlayment is attached to forms, and the formliner attached to it, 1/2" or 3/4" unvoiled plywood should be used. If the form face sheet is not sacrificial, the best method of attachment is with Tee Nuts (1/4" min.) placed at 1' on center for 1/2" plywood, and at 2' on center for 3/4" plywood. A washer is required on the back side of a plywood face sheet form.

2. Apply foam tape to back side of plastic formliner along all edges.
3. Position plastic formliner against the plywood so that edges are square and press down firmly. Work with one sheet at a time.
4. Staple the plastic formliner on 3" center and around all tie locations (be sure adequate electrical power reaches stapler to drive staples flush).
5. Attach the plywood with plastic formliner to the form face. Screws should be driven from the back of the form face into the plywood. Screws should be positioned on 12" centers and capture 3/4 of the plywood thickness.
6. Subsequent plywood with plastic formliner should be carefully aligned on the formwork and foam tape used at all joints.
7. Grout seal blocks may be needed to provide additional backing at formliner joints, fill voids in boxouts and open-ended patterns or support especially deep patterns.

### **Repair**

Small breaks in ABS plastic formliner can be repaired by stapling the affected area to the formwork. The repaired area will be visible on the finished surface. If this is not acceptable, the damaged piece must be carefully replaced.

### **Form Release**

Plastic formliners should be sprayed with Liner Kote™, Magic Kote® or Action Kote form release before each use and within the same day that concrete is placed. (If plasticizers or micro silica are in the concrete, Action Kote™ should be used.) A form release sprayer should be used and the spraying angle varied to insure complete coverage of all pattern features.

None of the form releases will adversely effect plastic formliners or concrete. They provide consistent release for easy stripping and prolong the useful life of plastic formliners. They will not stain concrete or leave residue, virtually eliminating concrete dusting.

**CAUTION:** Reprocessed oils used as form releases can damage formliners and cause degradation of liner material and stripping difficulties.

### ATTACHMENT PROCEDURES FOR ELASTO-TEX<sup>®</sup>

Elasto-TEX formliner is a premium formliner, combining great resilience and high tensile strength. This material provides superior toughness and wear resistance so that reproduction of even the most difficult undercut and complex designs is consistent, even after many re-uses.

Elasto-TEX formliners are available in standard 4'x 10' sheets in more than 40 patterns. Some patterns are available in larger sizes and all patterns can be ordered in smaller sizes. These formliners expand and contract with temperature changes and are shipped with 1" to 2" extra trim length. It is best to install formliners at the temperature conditions that most closely approximate the time of concrete placement.

Thermal compatibility can be achieved by "letting in" a fiberglass mat when the formliner is in the fluid state during manufacture.

**CAUTION:** Temperatures in excess of 140°F will cause permanent thermal decomposition in Dura-TEX formliners.

**CAUTION:** Elastomers can degrade when exposed to intense sunlight for extended periods of time. Cover the formliner surface with a tarpaulin or black plastic to shade the forming surface whenever it is not in use. This prolongs the life of the formliner material and keep the forming surface clean.

### Handling

Elasto-TEX formliners are shipped in a closed crate for protection. Keep them in the crate until needed on the work site. This will protect the material from sunlight, dirt and debris.

Once attached to formwork, store formliners on edge. Avoid striking the face with heavy, sharp or heated objects that could cause permanent damage to the material.

### Materials and Tools

The basic materials needed for field attachment and modification of Elasto-TEX formliners include:

- Wood tack strips
- 2" x 4" lumber
- Box nails (6d) and finishing nails (#6)
- Disposable one gallon mixing containers
- Mixing sticks
- Resi-Chem<sup>®</sup> P-1241 adhesive
- Methylene chloride cleaning solvent
- Cotton rags
- Foam tape for voids and modifications
- Silicone caulking for voids and modifications
- Sanding disks, #36 or #24 grit
- Liner Kote<sup>™</sup>, Magic Kote<sup>®</sup> or Action Kote<sup>™</sup> form release
- Paint brush with natural bristles
- Deck brush with natural bristles

The quantities of materials needed will vary with the size of the project and the method of attachment.

The basic tools needed to attach and modify Elasto-TEX formliners include:

- Tape measure
- Chalk line
- Utility knife
- Power rotary rasp
- Saber saw with knife blade
- Power sander or grinder
- Hammer
- Electric drill with hole saw
- Measuring cup
- Serrated trowel (1/16")
- Sprayer with wand extension
- Personal safety equipment

The quantities of tools needed will vary with the size of the project and the method of attachment.

### Cutting and Drilling

Elasto-TEX formliners can be modified by cutting and drilling. Use a utility knife or saber saw with a knife blade for cutting. A cylinder type hole saw can be used for drilling. Perform these operations on formliners that are securely clamped to a work bench with a cutting guide or drilling template.

The work pace should be steady to prevent excess friction that can melt formliners and disable tools.

**CAUTION:** Sanding, cutting and drilling can create dust that might be inhaled. Long term exposure to this dust may be harmful. Workers should wear appropriate safety equipment.

The rough edges created by cutting and drilling can be dressed with a sander. Remember to remove all dust and debris from the surface.

Elasto-Tex formliners can be attached to handset systems, gangform systems or plywood (for subsequent mounting to gangform systems).

### **Attachment - Handset Systems**

Procedures for attachment to handset forms:

1. Assemble and brace the architectural side of the formwork first. Attach formliners before setting ties or opposite formwork side.
2. Position formliner against the formwork so that edges, pattern and joints are square. Work with one sheet at a time.
3. Tack top edge with box nails (or staples) approximately 6" on center, to hold position.
4. Using box nails (or staples), nail one side edge to the formwork approximately 6" on center. Check overall dimensions and position.
5. Continue using box nails (or staples) approximately 12" on center in both directions throughout the field of the formliner and 6" on center along the perimeters to complete the attachment.
6. Apply compressible adhesive backed foam tape to formliner edges and then firmly butt edges. Compress the joint as tightly as possible, without buckling or distorting the pattern.
7. Dress joints and edges with a power rotary rasp or sander to match pattern features as closely as possible.

### **Attachment - Gangs**

Procedures for attachment to gangs:

1. Level and square the formwork so that attachment can be made in a horizontal plane. Mark dimensions so that edges, patterns and joints are square.
2. Roughen formwork face and back side of formliners to accept the adhesive. Clean dust and debris from both surfaces with solvent.

**CAUTION:** Adhesives will not provide adequate attachment if formwork contains residual form release.

3. Snap lines on form for positioning. Position the formliners and roll back more than half onto itself. Work with one sheet at a time.
4. Prepare the adhesive according to instructions, and spread uniformly on the formwork face and back of formliner. Check edges and corners to be sure adhesive has been applied to these critical areas.
5. When adhesive is tacky, slowly roll the formliner back onto the formwork face. This rolling action eliminates air pockets between surfaces.
6. Position edges and corners, securing them with wood tack strips for dimensional stability.
7. Roll back the other half and apply adhesive to the formwork face and back of the formliner. Check edges, corners, and center adhesive line to be sure adhesive has been applied to these critical areas.
8. When adhesive is tacky, slowly roll the formliner back onto the formwork face. This rolling action eliminates air pockets between surfaces.
9. Position edges and corners, securing them with tack strips for dimensional stability. Allow 48 hours for complete setting.
10. Should joints be required, apply adhesive to formliner edges and butt edges firmly. Compress the joint as tightly as possible without buckling or distorting pattern.
11. Evenly weight down the formliner to assure consistent adhesion to the formwork face.

12. Dress joints and edges with a utility knife or sander to match pattern features as closely as possible.

### Attachment - Plywood

Procedures for attachment to plywood include:

1. If a secondary underlayment is attached to forms, and the formliner attached to it, 1/2" or 3/4" unoled plywood should be used. If the form face sheet is not sacrificial, the best method of attachment is with Tee Nuts (1/4" min.) placed at 1' on center for 1/2" plywood, and at 2' on center for 3/4" plywood. A washer is required on the back side of a plywood face sheet form.
2. Roughen plywood face and back side of formliner to accept adhesive. Clean dust and debris from both surfaces with solvent.

**CAUTION:** Adhesives will not provide adequate attachment if formwork contains residual form release.

3. Allow formliner to overhang edges by 1/32" when joints are required on the gang. Decide on anchoring method to be used for subsequent mounting to formwork.
4. Position the formliners and roll back more than half onto itself. Work with one sheet at a time.
5. Prepare the adhesive according to instructions and spread uniformly on the plywood face and back of formliner. Check edges and corners to be sure adhesive has been applied to these critical areas.
6. When adhesive is tacky, slowly roll the formliner back onto the plywood face. This rolling action eliminates air pockets between surfaces.
7. Position edges and corners, securing them with tack strips for dimensional stability.
8. Roll back the other half and apply adhesive to the plywood face and back of the formliner. Check edges, corners, and center adhesive line to be sure adhesive has been applied to these critical areas.
9. When adhesive is tacky, slowly roll the formliner back onto the plywood face.

10. Position edges and corners, securing them with tack strips for dimensional stability. Allow 48 hours for complete setting.

11. The plywood and formliner is now ready for mounting to formwork.

12. Mark dimensions so that edges, patterns, and joints are square when mounting.

13. Attach the plywood with formliner to the gang-form. Screws should be driven from the back of the form face into the plywood. Screws should be positioned on 12" centers and capture 3/4 of the plywood thickness.

14. Once mounted, dress joints and edges with a utility knife or sander to match pattern features as closely as possible.

### Attachment - Factory Installed

Elasto-Tex<sup>®</sup> formliners can be attached to plywood at the factory according to customer specifications. The process is similar to the plywood attachment outlined above, but it takes place in a controlled factory setting. A choice of bolts, strapping or banding is available for subsequent mounting to formwork. This type of attachment can greatly speed production at the work site.

### Repair

Cuts or tears in Elasto-Tex formliners can often be repaired with the Resi-Chem<sup>®</sup> P-1241 adhesive. Work the adhesive into the edges of the cut or tear and weight the area while the adhesive is setting. After setting, lightly sand residual adhesive to avoid a gloss-producing spot in the concrete.

### Form Release

Elasto-Tex formliners are slightly oil absorbent when new. It is recommended that an initial spray of Liner Kote<sup>™</sup> form release be brushed in to help "season" and clean the pattern. Work the Liner Kote form release into all areas, especially pattern recesses. Magic Kote<sup>®</sup> can be used as a release agent after the liner has been seasoned.

If the concrete contains superplasticisers or micro silica, use Action Kote<sup>™</sup> for preparation work and as the form release.



Spray Elasto-Tex formliners with Liner Kote before each use and within the same day that concrete is placed. A form release sprayer should be used and spraying angle varied to insure complete coverage of all pattern features. Use a brush for deep or rough patterns.

None of the form releases will adversely affect the formliners or concrete. They provide consistent release for easy stripping and prolong the useful life of the formliners. They will not stain concrete, and leaves no residue, virtually eliminating any concrete dusting.

**CAUTION:** Reprocessed oils used as form releases can damage formliners and cause degradation of liner material and stripping difficulties.

### TILT-UP APPLICATIONS

#### Application

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 (skill saw) with a fine tooth, plywood blade such as the type used for cutting fine veneer paneling. Form liner 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. Form liner 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 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.

### CONCRETE CONSIDERATIONS

A properly finished surface not only depends on the formwork and formliners, but on several concrete factors.

#### Concrete Mix

Architectural concrete requires mix designs that can be consolidated with immersion vibrators that provide maximum workability consistent with strength requirements. Further recommendations are contained in ACI 303 (architectural cast-in-place), 211 (sand/aggregate and gradation), 301 (water/cement) and 309 (voids). Consolidation of the architectural concrete mix has a direct relationship to the quality of the finished surface.

Interesting effects can be achieved in architectural concrete by using gap-graded or colored aggregates in the concrete mix.

### Concrete Placement

Place architectural concrete using a pump or conveyor, with a drop chute, to avoid separation of the concrete mix. If not controlled, rock pockets, "honey comb" and spatter marks may be evident in the finished surface.

Place architectural concrete in two foot continuous lifts, and do not move concrete horizontally. If horizontal movement is employed, flow lines and sand streaking will be evident in the finished surface. Do not stop concrete placement part way up the pattern, the resulting cold joint will be very apparent in the finished surface.

**CAUTION:** The setting of concrete is an exothermic reaction and considerable heat can be generated. This heat, together with the effects of sun shining on the formwork, can cause temperatures in excess of 140° F that may damage formliner.

### Vibration

Proper consolidation is critical to architectural concrete and is normally accomplished by internal vibration. Recommended practice calls for vibrating one lift at a time, extending the vibrator 6" to 12" into the preceding lift. After a momentary pause, withdraw the vibrator slowly, at a rate of 1" to 2" per second. For deeply textured patterns, the rate of withdrawal should be proportionately decreased. Vibrate at intervals of 12" to 18", depending on the properties of the concrete mix and the radius of influence of the vibrator. The area affected by the vibrator should overlap the previously vibrated area by a few inches. To avoid variations in concrete color and texture, maintain a consistent interval from time of placement to time of vibration, throughout the entire project.

**CAUTION:** Architectural concrete requires extensive vibration. Design formwork and sealing procedures to resist the stresses caused by vibration of this type.

### Stripping Formwork

Strip formwork with formliners at right angles to the form. The force required to strip a form will

depend on the surface area of the pattern and on the percentage of the pattern at right angles to the direction of stripping. A shallow profile pattern will be easier to strip than a deep profile pattern.

The material resiliency of Elasto-Tex<sup>®</sup> formliners can be used to allow the formwork to strip itself. Use a hydraulic jack to separate (push) the top of the formwork from the concrete. Allow the jack to remain in place for approximately 15 minutes. The formwork will slowly resume its original shape and strip itself away from the finished surface. If jacking is not possible, a stripping force can be used on the back side of the form to separate (pull) the top of the formwork from the concrete. The stripping angle should always be as perpendicular to the form as possible.

**CAUTION:** Excessive stripping force and formwork pivoting can cause damage the finished surface.

Strip formwork with formliners within 24 hours of concrete placement. To avoid variations in concrete color, it is important to maintain consistent interval from time of placement to time of stripping, throughout the entire project.

### Curing

Concrete will usually require a membrane forming, curing compound according to project specification. Resi-Chem<sup>®</sup> or Spec-Cure<sup>™</sup> curing compounds from Dayton Superior may be appropriate.

### Patching

Patching can be accomplished with epoxy mortars or specially mixed grouts. Do not use grout from subsequent placements because it will not match the original water/cement ratios, evaporation rate and hydration time. Recess patches slightly and avoid smearing fill material on the surrounding finished surface.

	<p style="text-align: center;"><b>⚠ WARNING</b></p> <p style="text-align: center;"><b>Improper Use of Concrete Accessories Can Cause Severe Injury or Death</b></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. See back cover for your nearest location.</p>
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Dayton Superior products are intended for use by trained, qualified and experienced workmen 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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## DAYTON SUPERIOR BRANDS

### CONCRETE ACCESSORIES

Accubrace<sup>®</sup>  
Aztec<sup>®</sup>  
Bar Lock<sup>®</sup>  
Corewall<sup>®</sup>  
Fleet-Lift<sup>™</sup>  
Swift Lift<sup>®</sup>  
Taper-Lock<sup>®</sup>

### CONSTRUCTION CHEMICALS

Unitex<sup>®</sup>

### FORMING PRODUCTS

Symons<sup>®</sup>  
Max-A-Form<sup>®</sup>  
Steel-Ply<sup>®</sup>  
Sym-Ply<sup>®</sup>

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## DAYTON SUPERIOR PRODUCTS

### BRIDGE DECK FORMING

Adjustable Joist Hangers  
Bridge Overhang Brackets  
Haunch and Fillet Forming  
Pres-Steel, Coil Rod and Con-Beam  
Hangers  
Screed Supports

### CHEMICALS

Bond Breakers  
Cleaners / Strippers  
Concrete Repair/Restoration  
Curing Compounds / Sealers  
Epoxies  
Floor Levelers  
Form Release Agents  
Grout  
Hardeners / Industrial Toppings  
Liquid Densifiers  
Surface Retarders

### FORMING AND SHORING

Aluminum Shoring  
Ganged Formwork  
Garage Beam System  
Handset Formwork  
Highway Forms  
Jump Forms  
Modular Deck Shoring  
One Sided Frames  
Self Spanning Forms  
Steel Frame Shoring

### FORMLINERS

ABS Plastic  
Polystyrene Plastic

### PAVING

Dowel Bar Expansion Caps  
Dowel Bar Retrofit System  
Elastomeric and Hot Pour Joint Seal  
Metal Keyway Form Systems  
Tie Bar Assemblies  
Transverse Bar Assemblies  
Welded Dowel Assemblies  
Wire Baskets without Dowels

### PRECAST

Anchors and Lift Systems  
Coil / Ferrule Inserts  
Core Plugs  
Magnets  
Precast Forms  
Rustications/Chamfers  
Sandwich Panel Connector  
Shear Connectors  
Slotted Inserts

### REBAR SPLICING

Forged Dowel Bar Couplers  
Lockshear Bolt Couplers  
Shear Resistance Products  
Straight Thread Couplers  
Taper Thread Couplers

### REBAR SUPPORTS

Concrete Dobies  
Continuous Plastic and Steel  
Bar Supports  
Individual Plastic and Steel  
Bar Supports  
Mesh Chairs  
Paving Chairs  
Side Form Spacers

### TIES AND ACCESSORIES

Modular Form Ties  
Single Waler System  
Ties and Accessories

### TILT-UP

Braces and Brace Anchors  
Helical Ground Anchors  
Setting Plugs  
Strongback System  
Tilt-Up Anchors and Lifting Systems

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