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## **Thermoform Installation/Application Guide**

Thermoform Formliners are available either in Single-Use, High Impact Polystyrene (HIPS) or Multi-Use, Acrylonitrile Butadiene Styrene (ABS) Plastic. HIPS can be used to provide a textured concrete surface in a limited application at an affordable price. ABS exhibits excellent impact resistance and contains an ultraviolet shielding compound which reduced the damaging effects of sunlight. Both are rigid plastic liners, which are ideal for tilt-up or cast-in-place concrete.

### Materials

The basic materials needed to attach and modify HIPS and ABS Plastic Formliners include:

- ✓ Staples (9/16" or 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
- ✓ Form Release

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

### Tools

The basic tools needed to attach and modify HIPS and 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

### Trimming

Most Thermoform Formliners are shipped in 4' x 10' sheets. Because of the nature of plastic to expand and contract, it is often necessary for the material to be trimmed. The easiest way to cut plastic 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. A blade with around 200 teeth is recommended. If the liner is to be butted against a rustication strip or reveal, the blade angle should be set so that the liner is cut at the same angle as the reveal.

*Caution: Cutting can create dust and rough edges. The rough edges created by cutting can be dressed with a sander and/or hand planer. Remember to remove all dust and debris from the surface. Sanding can create dust that might be inhaled. Long-term exposure to this dust may be harmful. Workers should wear appropriate safety equipment.*

Formliners with not much relief may be trimmed by scoring with a sharp knife and then breaking off the excess prior to trimming. The effects of temperature must also be considered.

*Caution: Temperatures in excess of 140°F (60°C) will cause permanent damage to the elasticity of the material in both the HIPS and the ABS Formliners. Most plastics degrade when exposed to intense sunlight or extreme weather conditions for extended periods of time. Formliners should be stored either indoors or under black polyethylene whenever it is not in use.*

Thermal expansion and contraction is another consideration. The size of the liner will expand or contract approximately 1/16" in 1' with each 10° temperature change. Formliners should be installed at about the same ambient temperature as expected during the placement of concrete, early morning is recommended.

### [Attachment to Formwork](#)

Thermoform Formliners can be used in tilt-up or cast-in-place applications. Single-use HIPS is most frequently used for tilt-up applications and can be installed in many ways. ABS is most commonly used for cast-in-place and can be attached with mechanical fasteners or adhesives. Before attaching the formliner, first identify the side to be poured against. The side facing the formwork has a smooth, shiny surface; the concrete side has a roughened "hair cell" appearance. Listed below are recommended procedures for installation.

- ✓ Screws or nails should be spaced approximately 6" to 12" on center around the perimeter and 18" to 24" in the center. Tek drywall screws work very well, they are self-drilling and are easy to install.
- ✓ Pneumatic staplers are easy to install. However, they do not hold as well as screws or nails and should be spaced closer together.
- ✓ The recommended method for tilt-up jobs is to use wooden dowels inserted in the casting slab. Drill a 1/8" to 1/4" hole through the formliner and slab and then insert a 1/8" wooden dowel. Secure the slab with a roofing nail. The dowels are drilled out and the holes are patched after the job is complete.
- ✓ Double-sided form tape may be used for tilt-up jobs. Make sure the casting slab and formliner are clean of all dust and are dry.
- ✓ When adhering plastic liners to metal forms, use "Formica Top" adhesive or an adhesive for bonding ABS plastic to metal. As a rule, glues and adhesives are not recommended. Some have excellent holding power, but are difficult to work on the jobsite.
- ✓ Heavy Duct Tape can be applied to the formliner at joints on the formwork side. This is the recommended method for per-assembling large liners for pre-cast or tilt-up beds. The liner is assembled upside-down and alongside the bed then rolled into the formwork.
- ✓ Some patterns may require additional backing depending on the depth and/or width of the design. Prior to concrete placement, foam and/or wooden strips can be used.

### [Rustication](#)

Reveals or rustications are recommended at butted joints so that it will not allow the features of the liner to appear continuous. It is very difficult to match patterns such as ribbed or vertical patterns if the joints are not made along the patterns main features. They should be made at the valley of the concrete, as that joint is less visible. All butted joints should be taped and/or caulked to reduce grout leakage.

### [Placing Concrete](#)

Cast-in-place architectural concrete usually requires a mix, which has very good workability. A workable mix combined with proper vibration will reduce the risk of air bubbles, honeycombing and surface blemishes. Architectural concrete should be placed using a pump and an elephant truck to avoid mix separation, splatter and trapped air. Some formliners can withstand very heavy form pressures, but most cannot withstand a rate of pour in excess of 4 to 5 feet per hour. Generally, the more texture of relief on the formliner, the slower the concrete must be placed. If a plasticizer is used, the rate of pour may have to be reduced to limit form pressures.

In placing concrete for tilt-ups, make sure that all joints are sealed and/or taped and avoid stepping on the formliner as much as possible. All dirt, debris, and water should be removed before placing concrete.

Internal vibrations are the most common method of consolidated architectural concrete. Proper vibration will reduce air voids, lit lines and surface blemishes. Avoid contact between the grout leakage at joints, damage to the formliner, or dislodgement of the formliner. Follow ACI recommendations for the vibration of concrete.

## Form Release

Formliners should be sprayed with a Form Release before each use and within the same day that concrete is placed. A form release sprayer should be used and the spraying angle varied to insure complete coverage of all pattern features.

## Stripping Formliner

It is essential that all formliners be stripped with an equal time interval from concrete placement to stripping. Different time intervals will result in inconsistent coloring from different levels of moisture loss. If possible, forms should be stripped within twenty-four (24) hours of concrete placements. Formwork should be stripped at 90° angles to the form if possible. Ribbed fractured textures will require special care to avoid breaking off fins from both concrete and formliner.

Tilt-up panels should not be lifted until the concrete has reached the specified concrete compressive strength. In most cases, the formliner will remain on the slab. Single-use formliner may be discarded after stripping. Multi-use formliner needs to be cleaned with a mild detergent and scrub brush.

Although all Thermoform Formliners can be stripped without bonding to the concrete, a neutral, non-staining and no-reactive agent can be used to aid in stripping and to ease clean up of formliner for additional pours. Release agents should be sprayed on formliners as close as possible before concrete placement time. For best results, the liner should be cleaned after each use and a new coat of release agent applied before each concrete placement.

## Care and Storage of Formliner

All Formliners are sensitive to the effects of the sunlight, ultraviolet rays and extreme weather conditions. Formliners should never be stored outside in direct or indirect sunlight. When not in use or being cleaned, formliners should be stored either indoors or under black polyethylene. Ultraviolet rays may cause the formliner to become brittle or may cause discoloration, which could be translated to concrete surfaces. Formliners should never be exposed to temperatures in excess of 140°F (60°C). Excessive temperatures could cause permanent deformation.

## Limited Warranty

Scott Systems warrants that Thermoform products will be free from defects, and will perform as represented, provided that the application of the product and the concrete construction practices used are in accordance with the manufacturer's recommendations, installation and instructions. Scott Systems will refund the purchase price of any formliner proven defective, but in no way be liable for indirect, consequential, special, or resultant damages, whether due to breach of warranty or negligence. Scott Systems makes no other warranty, expressed or implied, including, without limitation, warranties of fitness of marketability, with respect to the products.

*Recommendation: Before actual construction, a mock-up using the select material should be poured to demonstrate the results on the finished concrete surface. The test pour should simulate the actual job site conditions and should be the height of the maximum wall to be produced.*

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