P-24 Delta Tie

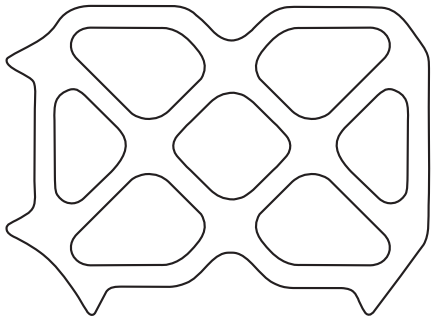
The Dayton Superior P-24 Delta Tie is a unique insulated precast concrete panel connector. It allows the precaster to fabricate a highly energy-efficient, insulated precast concrete sandwich wall panel using the insulating foam of his choice.

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 precast concrete sandwich wall panel. The three wythes are tied together using P-24 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.

Patent Pending



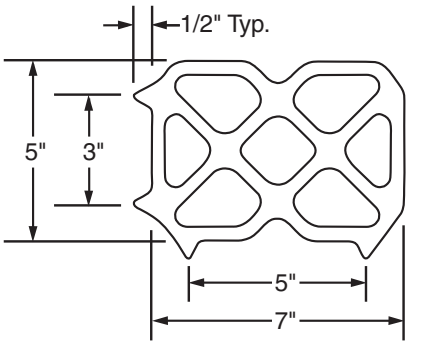
P-24 Delta Tie

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.**

P-24 Delta Tie

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 the thickness of the panel. For example, the 5" x 7" size can be used on its side in a six-inch panel or on end for thicker panels. 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.

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.

Cost Savings

The Delta Tie design provides a fast and easy installation to save labor. It produces stiffer panels to lessen handling, storage and transportation concerns. 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 precaster to provide the foam insulation of his 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.

Applicable to All Brands of Foam Panel Insulation

The Delta Tie is not sold as part of a package. It is sold separately and can be used with any brand of foam insulation supplied by the precaster.

The many Delta Tie advantages open up a wide area of possibilities for the precaster/designer/producer to improve production, efficiency and costs at his precasting operation.

The P-24 Delta Tie has the following ultimate capacities:

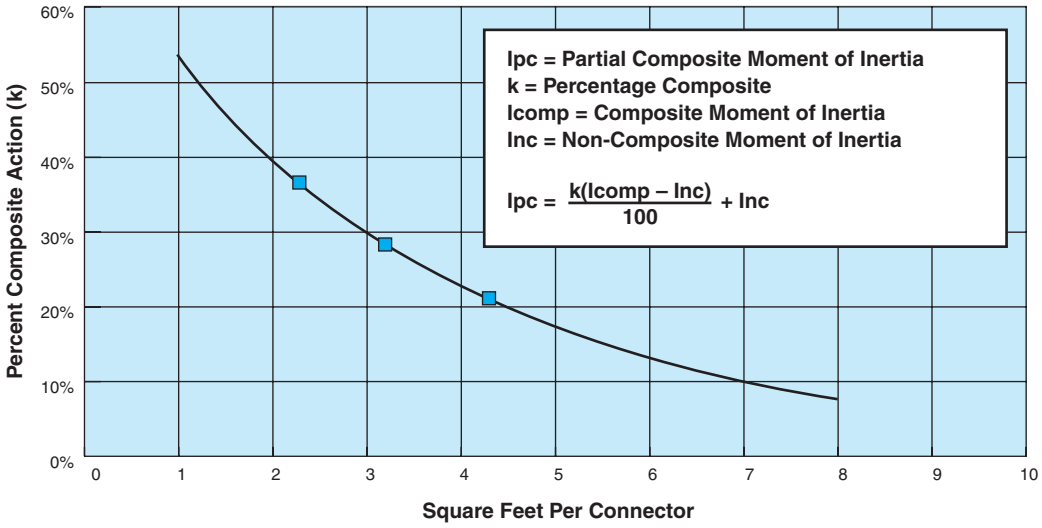
- 3,220 lbs. in shear.
- 3,100 lbs. in tension.

Maximum recommended spacing is 8 square feet of panel per panel connector. For spacing in excess of 8 square feet of panel per connector, contact a Dayton Superior Technical Service Center.

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

Example:
500, P-24 Delta Ties.

P-24 Delta Tie Design Chart

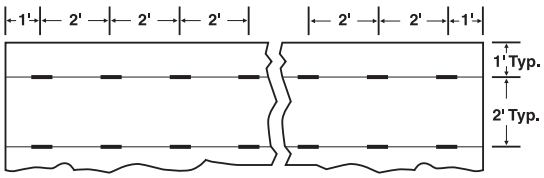


Notes:
When composite action is not required, maximum connector spacing for a 3"-2"-3" panel is 8 sq. ft. per connector.

Test reports are available on request.

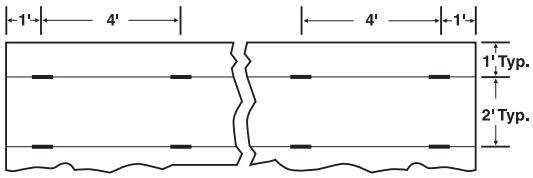
Typical Delta Tie Placement

25% Composite Action



4 sq. ft. per connector

No Composite Action



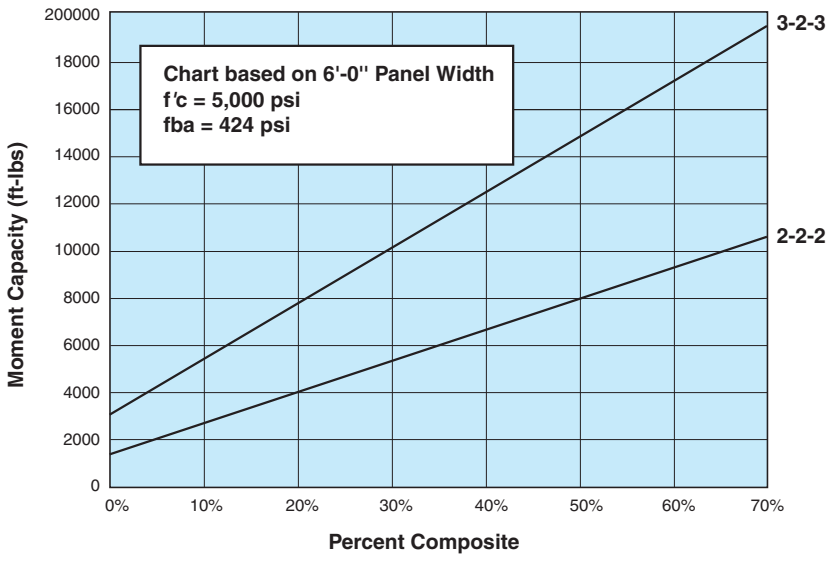
8 sq. ft. per connector

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.

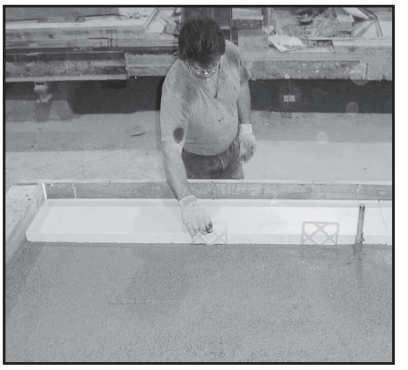
1. A panel measuring 37'-0" long by 6'-0" wide, with a 3-2-3 wythe pattern, must have a 5% composite action to achieve a flat lift with 4x2 rigging.
2. A 2-2-2 panel of same size requires a 10% composite action for the same rigging.

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.

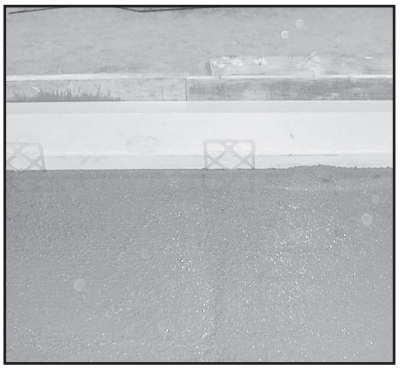


P-24 Delta Tie Insulated Panel Installation Sequence

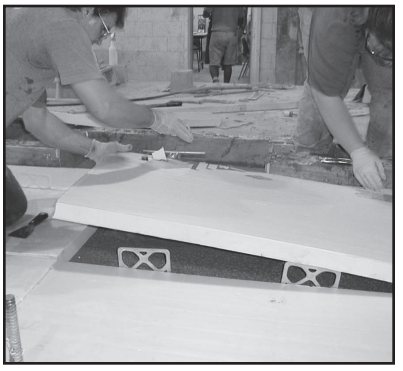
1. Construct form, place reinforcing mesh, lifting inserts, etc. Place and screed the concrete for the bottom wythe.



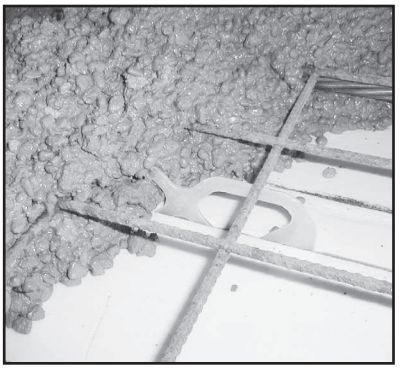
2. While the bottom wythe concrete is still pliable, lay the first course of insulating foam flush against the form. Typically, the first course of foam will be 12" running the length of the panel. Utilize the edge of the foam as a template and push each Delta Tie down into the bottom wythe.



3. Continue to place the connectors in their proper positions along the first course of insulation.



4. Add the remaining courses of insulation and connectors.*



5. When all of the foam sections and connectors have been placed, the top concrete wythe is poured and screeded as necessary.

6. After proper concrete set, the panel may be removed from the form and the process repeated.

* Foam-back tape is available for sealing the insulation joints, if necessary.