SuperPlank™ and Flowgrip® Decking Products Installation Manual

A complete guide from the beginning to end of your flooring installation.

CREATIVE PULTRUSIONS, INC.

www.creativepultrusions.com

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Introduction

Creative Pultrusions, Inc. (CPI) has many flooring products available to the market including assembled grating, molded grating, and light and heavy duty flooring panels. CPI can also design custom flooring products for specific customers needs and has done so in the past. This installation manual is for the light and heavy duty flooring panels known as SuperPlank™ and Flowgrip® respectively. The manual references other documents such as the *SuperPlank™ Decking Panels Brochure*, *Flowgrip® Flooring Section Data Sheet*, and *The New and Improved Pultex® Pultrusion Design Manual*. These documents contain load tables that are referenced in this document and can be found on CPI's website at the following location: http://www.creativepultrusions.com/library.html. These documents also include mechanical, physical, and electrical properties of pultruded products, design help and examples, fabrication techniques, environmental considerations including a chemical compatibility guide, standard part tolerances, etc.

Design

Load, Deflection, and Span Criteria

The first step to using these flooring products is to determine the load and deflection requirements for the particular application. After determining these values, refer to the load tables in the SuperPlank™ Decking Panels Brochure or the Flowgrip® Flooring Section Data Sheet for deflection amounts based on predetermined spans and concentrated or uniform loading conditions. These documents can help you determine your beam support locations based on any loading criteria that you have. It is recommended that when using either panel for a pedestrian walkway, the designer select a span for his loading condition so that the deflection of the panel is 0.25" or less. If replacing an existing flooring product, you may use these tables to estimate deflection based on existing load and span information. If additional information is needed, you may contact the Sales Support and Engineering Staff at 1-800-CPI PULL (274-7855).

Support Structure

After determining the support locations, design the support structure for the spans determined. CPI has developed a pultrusion design manual that can help a designer with all aspects of using structural pultruded products as opposed to conventional materials for structural design. This manual is titled The New and Improved Pultex® Pultrusion Design Manual and is offered in an imperial and a metric version. The document can be found at www.creativepultrusions.com.

Installation

Tongue and Groove Connection

For aesthetics, strength of connection, and ease of installation, the Flowgrip® and SuperPlank™ panels were designed with a tongue and groove connection on either side of the panel's width. Before installing flooring panels lay out panels along the width of walkway and ensure that the tongue and groove connections are in the correct orientation so that they will fit together.

Tongue and Groove Connection

Sealing / Bonding joint

To decrease creaking noise between panels, apply an outdoor silicone caulking bead between the tongue and groove connections of the joining panels. This may also be done to seal the panels if they are a solid surface panel to prevent liquids from leaking down through the panel.

A structural adhesive, such as Pliogrip®, may also be used to seal the connection and adhesively bond the connection. If a structural bond is required, the connection must be surface prepped first. To properly surface prep the joint, use a coarse grit sand paper and sand the tongue and groove until any glossy surface is removed. An aluminum oxide coarse or extra coarse paper, disc or belt is recommended. Ensure that the entire inside of the groove or outside of the tongue is a rough texture when finished. The dust should then be cleaned with alcohol, acetone, lacquer thinner or blown off with air before the adhesive is applied.

Typically a glue joint is about 0.030". Squeeze the joint together and fasten to support beam. Check glue manufacturers spec sheet for glue set time and allow glue to fully cure before allowing pedestrian access.

Thermal Expansion of Panel

All materials of construction, with the exception of some aerospace composites, exhibit dimensional changes with variations in temperature. This physical process is called thermal expansion. The common term that reflects the amount of change per degree in temperature change is called the Coefficient of Thermal Expansion (CTE) and is expressed as a change in length per degree change in temperature. Most commonly expressed in terms of inch per inch per degree Fahrenheit change. Composite decking systems exhibit different thermal expansion values in both the lengthwise and crosswise directions. Specifically, the coefficient of thermal expansion in the lengthwise or length of the panel direction is approximately 5.0E-6 in/in/°F. The crosswise direction or perpendicular to the length of the panel CTE is approximately 10E-6 in/in/°F. Caution must be taken to insure that the panels are not placed to tight together during installations in cold temperatures. Therefore, we recommend that calculations be performed to predict the change in dimension of the panel system for your application. Neglecting this calculation and installation procedure could result in panels bowing on hot days.

Thermal Expansion of Panel (cont'd)

To determine the amount of gap to leave between the ends or between the tongue and grooves of the panels, use the following equation:

$$\Delta\ell = \alpha\ell * \Delta T$$

Where,

$\Delta\ell$ = Thermal expansion (in.)
α = Coefficient of Thermal Expansion LW (in./in./°F) =5.0 x 10^{-6} in./in./°F
α = Coefficient of Thermal Expansion CW (in./in./°F) = 10 x 10^{-6} in./in./°F
ℓ = Overall length of part
ΔF = Overall Change in temperature (°F)

An example would be, if the temperature swing over the year varied from 0 to 100°F in the area of the installation, ΔT = 100-0 = 100°F. The part length is 24 ft. or 24 ft. x 12in./ft. = 288in. The Coefficient of Thermal Expansion is given above so,

$\Delta\ell$ = (5.0 x 10^{-6} in./in./°F) * (288 in.) * (100°F) = 0.144"

If installation is occurring somewhere around 70°F and the typical maximum temperature for the area normally only reached 100°F, ΔT = 100-70 = 30°F.

$\Delta\ell$ = (5.0 x 10^{-6} in./in./°F) * (288 in.) * (30°F) = 0.043" or slightly over 1/32".

Therefore, the panel could only expand around another 1/32", but could still shrink about 3/32". To be safe, allow a minimum of an 1/8" gap between panels when installing panels end to end.

Notice that the coefficient of thermal expansion is greater in the crosswise direction, nearly double. Make sure this is taken into account if the panels are tightly fit between columns for example in the crosswise direction.

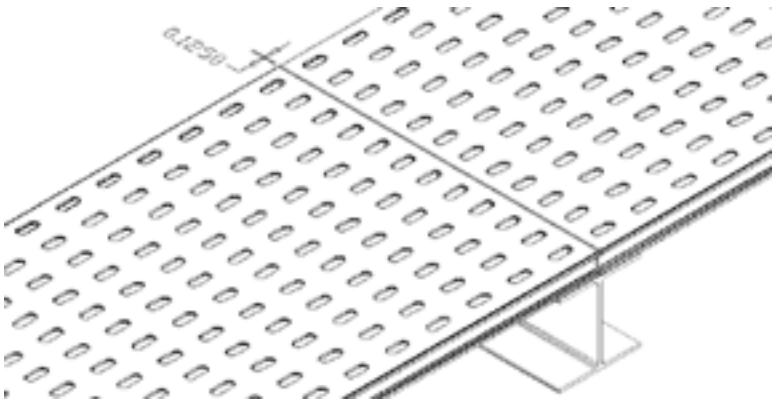


Figure 1

Connection Method

Depending on the particular application, there are different connection methods available for fastening the flooring panels to the primary structure. These methods include using a Deck Screw connection method, a Flat Head Bolt with Top Surface Washer connection method, a SuperPlank™ Heavy Duty Beam Clip connection method, a Flowgrip® Beam Clip connection method, and a Flowgrip® Carriage Bolt and Washer connection method. The type of support structure or the surrounding conditions will determine the connection method. If the application is light duty or the flooring is susceptible to excessive vibration, the Deck Screw mount may be used. If mounting to an I-beam, W-beam, or channel, or in a heavy duty loading condition, the beam clip mount should be used. If mounting through a flange on a support beam, for heavy duty applications, the Flat Head Bolt with Top Surface Washer connection method should be used. This method is also often used with open panels, and the bolt is placed down through one of the slots in the panel. Please note, a open panel is one that slots have been machined through the top surface of the deck to allow for drainage. This may be required for some applications, especially those outdoors. All of the hardware used to fasten the panels is stainless steel to eliminate problems with corrosion and is designed to be a nearly flush installation to eliminate trip hazards.

Deck Screw Connection Method

This method is intended for light duty applications only so that fastener 'pull through' is not a problem. It is also meant for applications where the support beam is a pultruded fiberglass part or wood. When using the Deck Screw connection method, install a minimum of four screws evenly spaced across the width of the panel at each support location. This is done not only to hold down the panel, but also to minimize any convex warp in the part that may be due to changes in temperature. Each screw can hold approximately 100 lbs. of uplift on the panel before pulling through. Use this load to determine if additional screws are required. Set the torque on a power screw gun, drill, or impact driver to ensure that the screw is not driven through the panel. Be sure to countersink the screw head so that there is no trip hazard. This method is depicted in Figure 2.

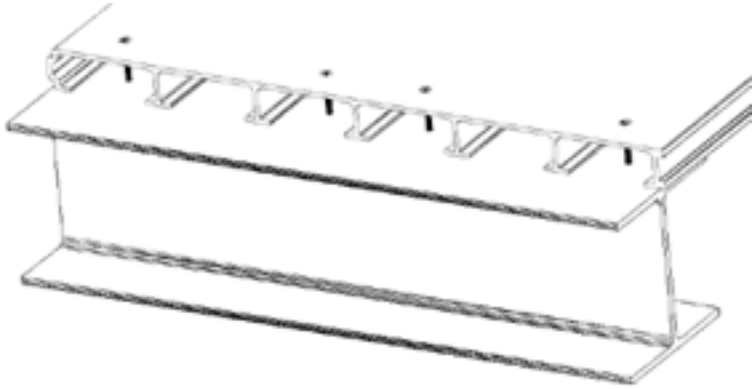


Figure 2

Connection Method (cont'd)

Flat Head Bolt with Top Surface Washer Connection Method

When using the Flat Head Bolt with Top Surface Washer connection method, install a minimum of two sets evenly spaced from the center of each panel at each support location. This is done not only to hold down the panel, but also to minimize any convex warp in the part that may be due to changes in temperature. This method may thread into a tapped hole in an underlying support beam flange. It could also be used with a nut to bolt through a clearance hole in the top flange of the support beam. This method is depicted in Figure 3.

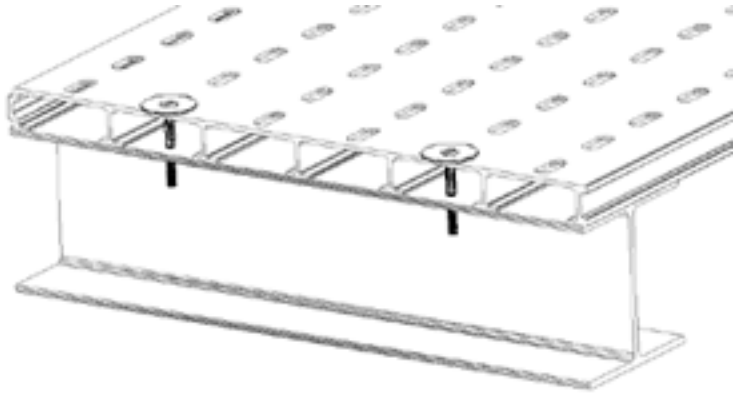


Figure 3

SuperPlank™ Heavy Duty Beam Clip Connection Method

When using the Heavy Duty Beam Clip connection method, install a minimum of two beam clips evenly spaced from the center of each panel at each support location. This is done not only to hold down the panel, but also to minimize any convex warp in the part that may be due to changes in temperature. This method is the best method to use for SuperPlank™ in terms of trip hazards. There is no hardware exposed on the top of the deck. It utilizes the bottom flanges of the panels to hold down the flooring panel. This method is depicted in Figure 4. The beam clip is inserted between two of the bottom flanges of the panel and then rotated 90 degrees so that the flanges of the beam clip are resting on top of the bottom flanges of the SuperPlank™ panel. The inside of the C-section on the clip is then slid over a flange on a beam, and the bolt on the beam clip is tightened down. This compresses the flooring panel against the support beam. A jam nut is then tightened down on the bolt so that the bolt and beam clip do not loosen up over time. This method described is for the SuperPlank™ panel only.

Connection Method (cont'd)

SuperPlank™ Heavy Duty Beam Clip Connection Method (cont'd)

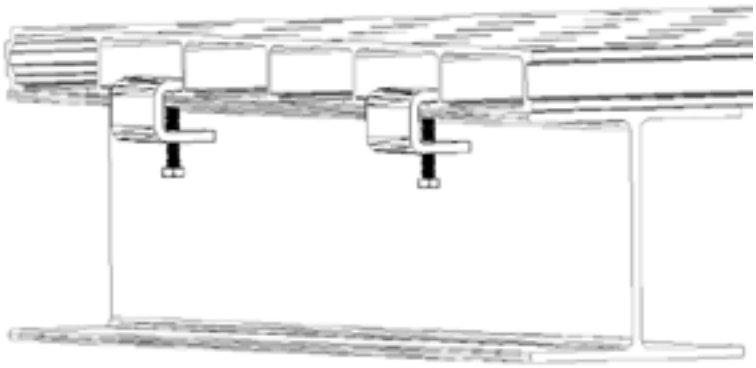
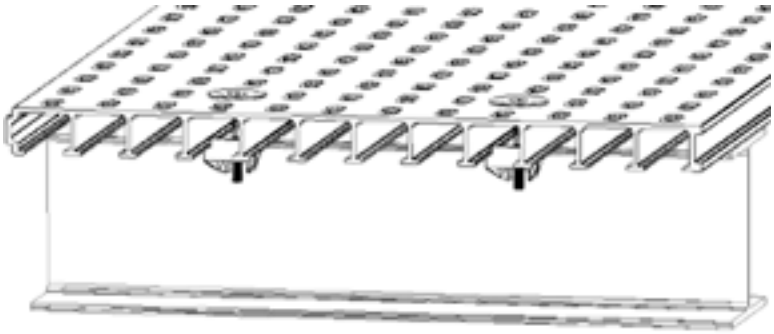


Figure 4

Flowgrip® Beam Clip Connection Method

When using the Flowgrip Beam Clip Connection Method, install a minimum of two beam clips evenly spaced from the center of each panel at each support location. This is done not only to hold down the panel, but also to minimize any convex warp in the part that may be due to changes in temperature. This method utilizes the Flat Head Bolt with Top Surface Washer Connection Method. Both of these parts are used as in that method, but instead of screwing into a threaded hole or going through a clearance hole in a support beam, they go down through a slot in a beam clip and thread into a nut on the other side. When the bolt is tightened, the beam clip is drawn up tight to the underside of the top flange on the support beam. The beam clip is designed to keep a square nut (provided) from rotating so a wrench is not needed for the nut. This method described is for the Flowgrip panel only.



Connection Method (cont'd)

Flowgrip® Carriage Bolt and Washer Connection Method

This method utilizes a square metal washer, a carriage bolt and nut to hold the flooring panel down to a support beam. The carriage bolt is inserted down through a square hole in a square washer. The hole is sized so that the square nub on the underside of the bolt head fits tightly in the hole. Thus, the bolt will not rotate within the hole. The plate is then inserted between two vertical webs of the flooring panel. This plate is sized such that it will not rotate inside the vertical webs. The carriage bolt is then placed down through a clearance hole in the support beam and a nut and washer are placed on the other side and tightened down. This method utilizes the bottom flanges of the panels to hold down the flooring panel and is depicted in Figure 6. This method is the best method to use for Flowgrip® in terms of trip hazards. There is no hardware exposed on the top of the deck.

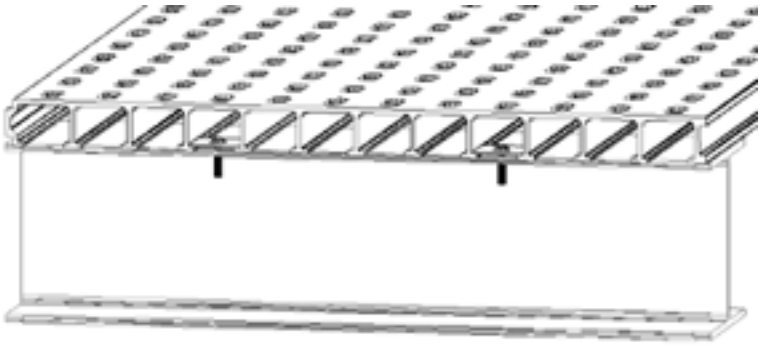


Figure 6

On Site Fabrication

If modifications need to be made to the panels in the field such as cutting or routing of the panels, certain tools are recommended over others. For cutting the parts, a continuous rim diamond blade or masonary blade for a circular saw, or a diamond coated blade for a jig saw or a reciprocating saw are recommended. Fiberglass dulls standard wood cutting blades and even carbide tipped blades extremely fast. A carbide blade may be dulled to the point it cannot be used within a few cuts. A toothed blade for a circular saw is not recommended because it will have a tendency to bind in the parts. For any routing operation, a diamond coated router bit is recommended. For any drilling operation, a carbide tipped drill bit is recommended for extended use. A standard high speed steel drill bit may be used, but may require sharpening often.

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