

Custom DuraTherm[®] Pattern Design Guidelines

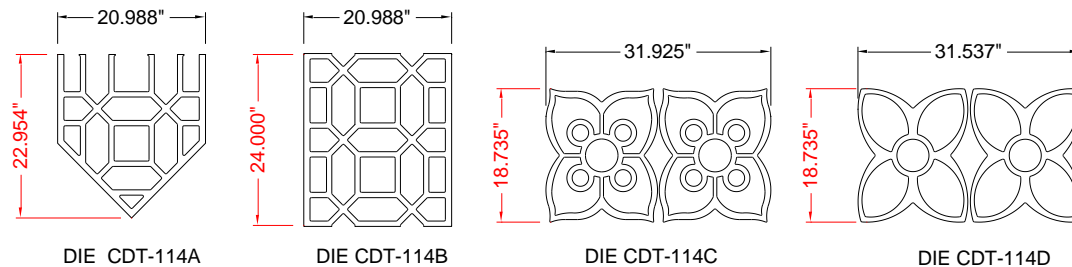
Custom DuraTherm pattern production requires a minimum material purchase of 5,000 sq. ft. (465m²)

Definitions

- DuraTherm[®] Thermoplastic Component(s) – The individual thermoplastic pieces used as ‘building blocks’ in various combinations to create the layout. The maximum size of each piece of thermoplastic is 2’ wide x 3’ long (.6m x .91m).
- Stamping Template – The thick, patterned, plastic sheet used to create the impression in the pavement. Whenever possible, the stamping template size should be optimized to fit within the heating area of the SR-60 or SR-120 reciprocating infrared heaters (see page 3).
- Layout – The final pattern resulting from the combination of one or more pieces of DuraTherm thermoplastic and stamping templates to create a large scale effect.

DuraTherm Thermoplastic Component Design and Colors

- Material Yield – The maximum width of the thermoplastic sheet used in production is 2 ft. (.6m), and the maximum length is 3 ft (.91m). The shape of each component should be designed to maximize these dimensions, in order to create the best material yield and keep waste to a minimum.



Above are examples of thermoplastic piece dimensions. Note the floral dies (C and D) are an example of poor material yield, as they do not maximize the material available from a 2’x3’ (.6m x .91m) sheet.

- Larger design elements can be broken up into smaller parts using multiple sheets of material. Again, the maximum individual component dimensions are 2’ x 3’ (.6m x .91m) which is ideal for production and handling.
- DuraTherm material is one sided; meaning the material must be installed face up. Symmetrical shapes are best, because during the installation, the stamping templates need to be flipped after each print. By keeping the thermoplastic components symmetrical, the mirror image is the same. This eliminates the need for “lefts” and “rights” of one geometric shape, which will help keep the material and production costs lower with fewer thermoplastic piece designs and fewer stamping templates. This will also simplify the installation.
- There are 17 standard and 14 premium colors available for DuraTherm markings. (Premium colors cost more than standard colors.)
- Custom colors are not available.
- Gradient shading design coloration is not possible in DuraTherm preformed thermoplastic material.
- Depending on the design and complexity, we reserve the right to alter the material or template designs for any custom designed pattern, where necessary to facilitate manufacturing or application of the DuraTherm system.

To get a better understanding of the material, design capabilities and the application process, it will be helpful to watch the video and review the photo gallery and Design Manual on our DuraTherm webpage at:

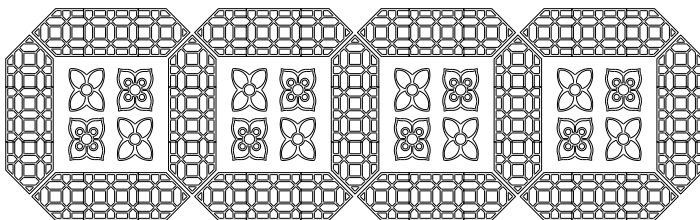
<http://www.ennisflint.com/Products/TrafficScapes/DuraTherm>

The video is available on the "Video" tab in the middle of the page, the "Documents" tab contains the Design Manual, and the photo gallery of some of our past markings is available at the link in the upper right hand corner.

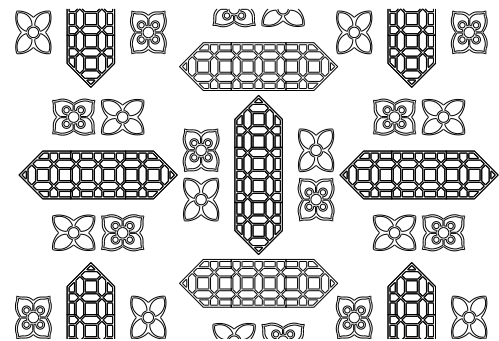
DuraTherm Stamping Template Designs

-Along with the thermoplastic components, the stamping template used for installation must also be designed. There are two approaches to the layout design:

- Continuous: One or two template designs that are able to be flipped and rotated in various ways, which will work together with interlocking designs to create an overall continuous layout. This is ideal for lineal applications such as crosswalks and medians.
- Floating: Random layouts of panels as far apart or as close together as you wish, without the need to be interlocked together. This allows more freedom with the pattern layout, but will complicate the installation. This may be more suited for pedestrian courtyard areas and parking lots.

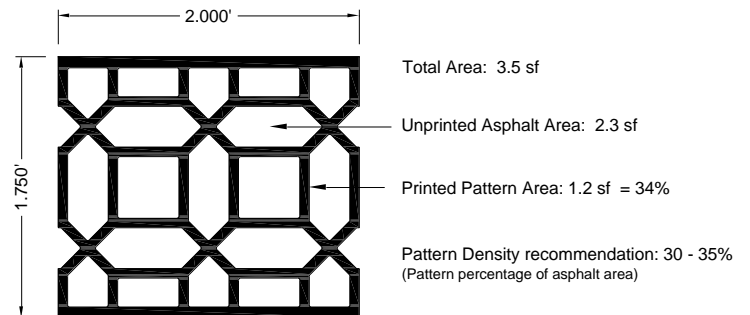


Example of Continuous

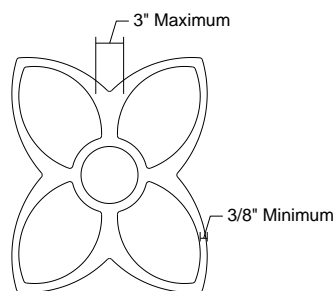


Example of Floating

-Pattern Density – The stamping template makes an impression of the pattern into the asphalt. DuraTherm thermoplastic pieces are then laid and melted into these impressions. After extensive product testing, the best print density range on well compacted asphalt is around 30% - 35%. (This means you are displacing & covering 30% - 35% of the asphalt surface area with DuraTherm.)



-Line Width – This refers to the actual width of the DuraTherm thermoplastic component (such as a grout line or other design element) and is very important in design creation. The maximum line width is 1-1/4" (3.2 cm), though a wider line up to 3" (7.62cm) is possible in small localized areas (see graphic below). The minimum width is 3/8" (9.6 mm). The preferred average is around 1" (2.5cm).



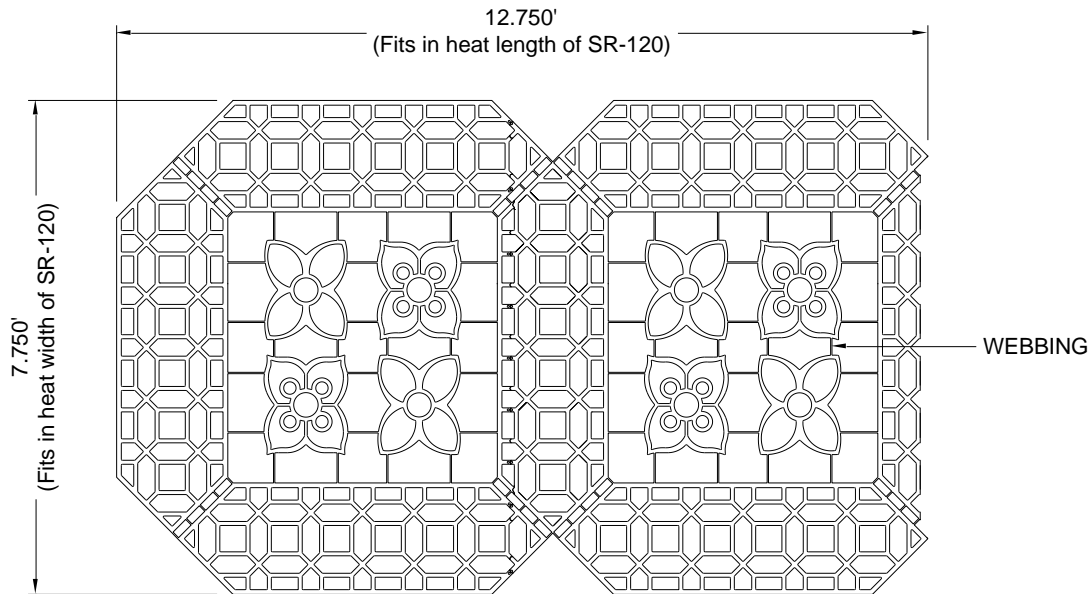
Acceptable Variable Linewidths

-Depending on the design and complexity, we reserve the right to alter the material or template designs for any custom designed pattern, where necessary to facilitate manufacturing or application of the DuraTherm system.

-Template Size – The stamping templates are light-weight and must be held in place firmly during imprinting to avoid shifting from side to side. Maximum template dimensions are 6' x 10' (1.8m x 3m) for the SR-60 and 8'8" x 13'4" (2.6m x 4m) for the SR-120. Narrow templates are printable but must be at least 3' (.9m) long so they can be held in place while being imprinted.

-Heating Area – The heating area of the reciprocating infrared heaters should be an important consideration in conceptual DuraTherm layouts. It is recommended to design templates that fit within the heating areas to increase productivity during installation. These areas are:

5'8" x 8'8" (1.73m x 2.64m) for the SR-60 and 8'6" x 12'8" (2.59m x 3.86m) for the SR-120*
(The graphic below is a template designed for the SR-120 heater.)



***Please consult your local Ennis-Flint Representative or Certified Applicator to advise which heater is available in your project area.**

-Template Webbing – Small, stand alone elements are not printable, unless they are “webbed” or connected to other parts in the design (as shown above). The result is narrow ¼” (6.4mm) connectors that will be imprinted lines, but are not filled with DuraTherm. The length of the connectors can range from 1” to 3” (2.5cm-7.6cm). This means you can have shapes of DuraTherm spaced 1” to 3” (2.5cm-7.6cm) apart. The narrow ¼” (6.4mm) connectors cannot exceed 3” (7.6cm) in length. If connectors of a longer length are needed, they will be 3/8” (9.5mm) wide.

-Template Flipping Ability – As the template is stamped, asphalt will build up on the underside of the template. This continues with each successive stamp. To avoid this, it is recommended that a symmetrical template be flipped over after each stamp, so the plate compactor can remove this buildup while imprinting. Designers should keep this in mind, as this method allows for up to 10 prints on a single template. Template designs that are asymmetrical and unable to be flipped can only be stamped 4 or 5 times before being discarded, which can dramatically increase the template costs for a project. To avoid this, keep shapes symmetrical if at all possible.

Intellectual Property

Ennis-Flint makes every effort to respect others’ intellectual property, so any trademarked or copy written pattern, logo, symbol, or brand name that we are to replicate must have a letter of permission from the brand owner or authorized representative.

Pricing

Custom DuraTherm pattern pricing is based upon design complexity/intricacy, the number of thermoplastic components necessary to create the specified pattern, number/type of colors, pattern repetition, number of template designs, and the overall amount of materials needed to complete a project.

Details needed to quote pricing for a custom pattern:

Design: (Emailed drawing file, image, sketch, etc.)

The image should be of high resolution and print quality, so that it can be evaluated properly. Vector design files using solid colors are ideal when available. We can accept CAD files (.DWG or .DXF), .PDF, .JPG, .TIF and .AI file types.

Description/Notes: (Only if any deviations from image submitted)

Dimensions: (Very Important)

Colors: (If not clear on the image submitted)

Quantity (Area): (If an exact area or material amount is not known, please indicate an approximate amount.)

Remember: If there are many different elements in a design, the quantity and cost of thermoplastic pieces and stamping templates will be higher, and the finished DuraTherm job will be more complex and costly to install. It is most economical to maximize the repeatability of the pattern and limit the number of components.

Submittal Drawings

-Once the price has been accepted and an order placed for the material, Ennis-Flint will prepare a submittal drawing for approval by the customer. The drawing will include the overall pattern, the DuraTherm components, the template design, and the layout showing how all are positioned to create the pattern.

-No production will begin until the submittal drawing is approved in writing.

-Should a submittal drawing be required before the order is placed, Ennis-Flint reserves the right to charge an up-front design fee for submittal drawing creation. This amount will be applied toward the invoice for the material when it's ordered, so it is not an additional charge above the quoted material price.

Application

- The pavement is stamped with the template to create the pattern impression in the pavement.

-DuraTherm material must be heated until molten in the stamped impression in the pavement.

-The marking material's colors may change slightly when heated to a molten state during application.

-Any browning of the material from heating should wear away within a week or so of being opened to traffic.

Marking Functionality

TrafficScapes™ products (including DuraTherm) are functional pavement markings designed to provide streetscape enhancement, promote safety awareness and calm traffic. The initial aesthetic properties of applied markings will be affected by traffic, weather, chemicals, and other environmental factors over time.