



# Fiberglass Reinforced Polymer Panels

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## Technical Data

### FRP Panel Design

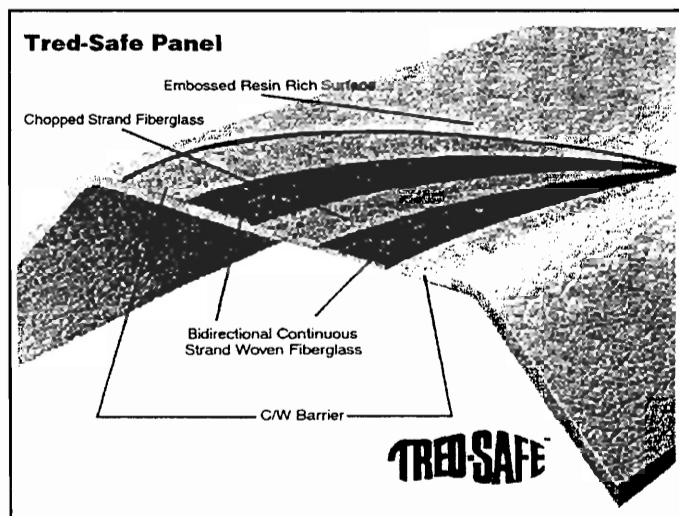
#### FRP PANEL DESIGN CONSIDERATIONS

Resolite FRP panels are designed to meet a wide spectrum of structural and aesthetic considerations. While heavier glass reinforcement permits stronger panels with greater span capabilities, light transmission and aesthetic appearance will be affected in translucent panels. Conversely, FRP panels incorporating only chopped strand glass provide excellent clarity and durability but do not have the longer spanning capability achieved with multiple glass compositions.

With over 45 years as the leader in supplying superior solutions to the industrial construction and corrosion resistant markets, Resolite realizes the need to have alternatives in FRP panel design. Therefore, Resolite offers a variety of resin/glass reinforcement product compositions to meet virtually any requirement.

#### TRED-SAFE

Resolite Tred-Safe, type 1645, utilizes a five layer combination of reinforcement including C/W Barriers, bidirectional continuous strand woven and chopped strand glass. Tred-Safe is Resolite's toughest roofing or siding panel with a nominal weight of 16 oz./sq.ft. and approximately 45% glass reinforcement. This heavy combination of fiberglass reinforcement coupled with Resolite's resilient resin provides a panel that is strong, flexible, and truly walkable.



#### '40' SERIES

Resolite's high strength '40' Series panels are available in fire-rated CRFS25A opaque and FS25A translucent systems and in many types - 1440 thru 840. These panels incorporate approximately 40% glass reinforcement and have nominal weights of 14 oz. thru 8 oz. per square foot respectively. '40' Series panels utilize a combination of glass reinforcement including bidirectional continuous strand woven and chopped strand glass providing an excellent blend of strength and resiliency.

#### '30' SERIES

Resolite's '30' Series panels are available in CRFS25A opaque and FS25A translucent systems and in many types - 1430 thru 830. These panels incorporate approximately 30% glass reinforcement and have nominal weights of 14 oz. thru 8 oz. per square foot respectively. '30' Series panels utilize Resolite's traditional chopped strand glass reinforcement providing a resilient panel with a long history of good performance. They also provide the best clarity in a translucent panel. In addition, '30' Series panels are available in non-fire retardant Acryloy translucent and CR-Acryloy opaque systems.

#### FRP IS NOT STEEL

FRP panels do not perform the same as steel panels and therefore should not be designed to the same requirements. Steel panels are generally 20 times stiffer than an equivalent FRP panel of the same profile. Since steel panels are commonly designed to deflection limits as restrictive as  $L/360$ , a proportional deflection for FRP panels would be  $L/18$  or less. Coincidentally, this deflection limitation is in line with the widely recognized and accepted deflection criteria specified in ASTM D 3841, "Standard Specification for Glass-fiber Reinforced Polyester Plastic Panels". This deflection limit is  $L/20$  for wall panel and  $L/40$  for roof panel applications. Resolite's over 45 years of experience in the production of FRP panels, combined with actual on the job performance, validates the ASTM D 3841 deflection limits for these naturally resilient panels.

# FRP Panel Design

(continued)

## THE RESIN/GLASS COMPOSITE MATRIX

All Resolite products are constructed with a matrix of thermoset polymer resin and fiberglass reinforcement forming a fiberglass reinforced polymer composite panel. The resin system surrounds the glass fiber and under heat and pressure a chemical reaction locks the material into a composite unit. In the finished panel, the resin provides fire resistance, weatherability, and corrosion resistance as well as color and aesthetic properties. The fiberglass reinforcement provides impact resistance, strength and stability which are the qualities that determine the structural capabilities of the panel.

## RESILIENCY - A KEY TO FRP PERFORMANCE

An FRP panel's ability to absorb forces without damage to its structural integrity is critical to long term performance. In order to achieve desired characteristics, Resolite has studied various combinations of fiberglass reinforcements. Straight continuous glass provides stiffer and longer spanning panels which are susceptible to fracturing along the linear glass under continuous cycling and especially foot traffic. Chopped strand glass reinforced panels span less but provide more resiliency. Over 45 years of field performance have proven that this flexibility allows Resolite '30' Series FRP panels to perform over the long term.

When higher strength, longer spanning panels are required, a combination of glass reinforcement including bidirectional continuous strand woven and chopped strand glass is the ideal solution. The bidirectional continuous strand woven glass reinforcement provides added strength for longer spans. In addition, the woven pattern combined with the chopped strand more evenly distributes stress from cyclic and impact loadings thus allowing an FRP panel to maintain its resiliency. This combination provides excellent performance characteristics in all Resolite '40' Series FRP panels. And, in Tred-Safe, a multi layered woven construction allows walkability in opaque or translucent roof panels.

## THE L/D LIMIT

All Resolite panels are designed in accordance with the L/D limits specified in ASTM D 3841. This standard recognizes the performance capabilities of flexible fiberglass reinforced polyester polymer panels. The natural resiliency of FRP panels accommodates large deflections due to temporary wind loads. When the load is removed, the panels return to their original position with no fastener hole elongation taking place. This phenomenon has been verified by extensive full scale testing and Resolite's over 45 years of field performance.

## TESTING

Since FRP is a composite material, a number of tests are performed in order to determine the performance characteristics of Resolite panels. The published physical properties are determined from small scale coupon testing. However, these properties can not be simply extrapolated into Load/Span Tables due to the composite nature of FRP. Therefore, Resolite performs full scale tests by the vacuum box method, ASTM E 72, in order to simulate actual field conditions.

Resolite Load/Span Tables are based on the results of the described full-scale tests. The allowable span is limited by panel stress, fastener pullover and deflection limitations. The results are further limited by factors of safety. All Resolite wall and roof panel Load/Span Tables incorporate a factor of safety of 1.88 for wind loads and 2.5 for live loads.

Resolite Load/Span Tables do not consider the effects of elevated temperature or corrosive environments. Over the long term, some reduction in properties is possible and should be factored into the selection of allowable spans, especially when safety is a consideration.