3form® struttura® | duo®

Product Description

3form Duo is our first design-forward twin-layer panel offering great colors and textures without sacrificing performance. Produced from polycarbonate resin, the inner structure allows for added structural integrity to make a lightweight but extremely tough sheet. Combining a sleek hammered glass texture with Color Portfolio colors, 3form Duo is well-suited for a variety of functional and decorative applications.

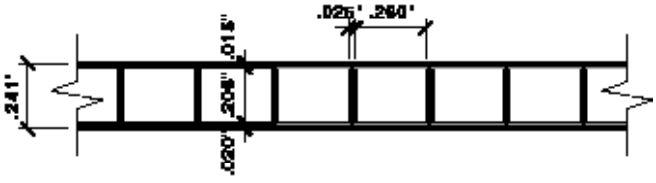
FEATURES AND BENEFITS

- Superior durability and strength combine with color and texture to unite design and performance
- Lightweight - up to 87% lighter than glass for easy installation and transport
- 40% better insulative efficiency than single paneled glass for maxi mum energy conservation
- Class A fire rating (6 mm) provides design options for strict build ing environments
- Excellent material for cold-bending applications – save money on forming costs

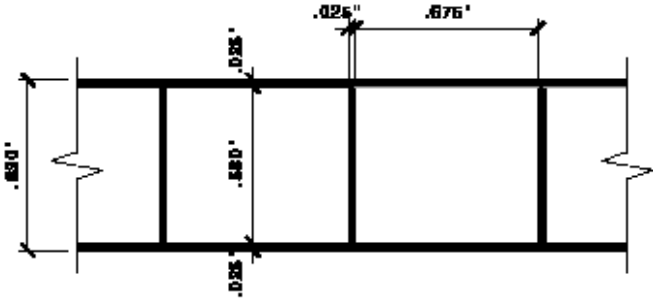
TEXTURES/PATTERN/FINISHES

A durable finish is standard on both sides and has a hammered appearance.

6 MM DUAL WALL STRUCTURE



16 MM DUAL WALL STRUCTURE



PANEL SIZES AND TOLERANCES

Standard 3form Duo panels are offered in 4′ x 8′ (1.2 m x 2.4 m) and 4′ x 10′ (1.2 m x 3 m). C3 colors are offered in 4′ x 8′ (1.2 m x 2.4 m) only. Custom sizes and gauges are also available (extended lead time will apply). All dimensions and squareness (standard or custom) are subject to a +/- 1/8" (3.1 mm) cut tolerance.

Specifications

FLAMMABILITY & SMOKE TEST RESULTS – BUILDING CODE APPROVALS

3form Duo conforms to the 2009 International Building Code® for interior finishes and light transmitting plastics. The provisions of these codes provide adequate regulation for most applications of 3form Duo.

TEST	3FORM DUO	RESULT
ASTM D 2843 Smoke Density	20.5%	PASS Less than 75
ASTM D 635 Flame Spread	Self-extinguishes	PASS CC1
ASTM D 1929 Self-ignition Temperature	Greater than 850ºF	PASS
ASTM E 84-03 Flame Spread (6 mm) Smoke Developed (6 mm)	 10 300	 PASS: Class A PASS: Class A
ASTM E 84-03 Flame Spread (16 mm) Smoke Developed (16 mm)	 65 125	 PASS: Class B PASS: Class B

PANEL WEIGHT

THICKNESS (INCHES)	WEIGHT FLUX (LB/FT²)
1/4" (6 mm)	0.27
5/8" (16 mm)	0.54

Duo can be an ideal replacement for the more traditional glazing materials. It is safe and easy to handle, cut, install and is extremely tough. Its low weight offers significant savings in terms of transportation, handling and installation. When compared with 1/4" (6.1 mm) glass, 1/4" (6.1 mm) Duo offers weight savings of more than 90% at just 0.27 lb/ft^2.

Duo has shown in many applications that its light weight and ease of handling have contributed to significant savings in overall installation cost.

EXPANSION/CONTRACTION ALLOWANCES

Like all resin products, 3form Duo will expand and contract nominally with fluctuations in temperature. As such, care should be taken to allow for free expansion of the sheet to prevent bowing and internal thermal stress

• Longest length of panel (inches) x temperature change of the sheet (°F) x 0.00004 = Amount of Linear Expansion/Contraction (inches)

example:

• 48" x 96" panel that experiences a 50°F temperature change will expand/contract: 96 inches x 50 degrees°F x 0.00004 in/in °F = 0.192 inches (expansion)

Be sure that allowance for thermal expansion is made for both the length and width of Duo. Remember, the sheet must be trimmed at least as much as the indicated thermal expansion.
Thermal expansion considerations should also be made in the following situations:

- Fastening points
- Holes for standoffs and other hardware
- Channel depths in frames
- Meeting points for multiple sheets of 3form Duo

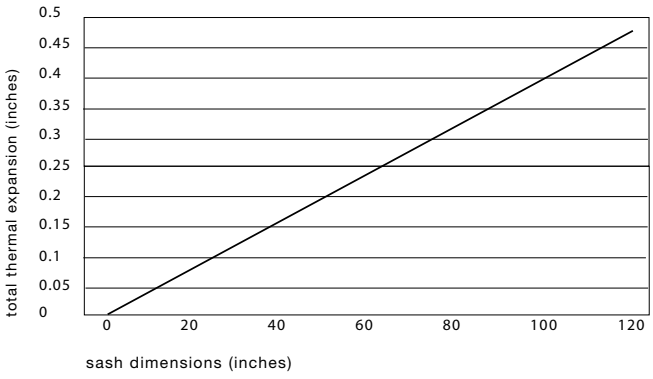
ULTRAVIOLET EXPOSURE AND EXTERIOR PERFORMANCE

***3form Duo Color Portfolio are not to be used for exterior applications.**

Standard 3form Duo has UV-protected surfaces to ensure long term optical quality under intensive UV exposure, and maintain the superior toughness of the material in comparison to other thermoplastic glazing materials.

COLOR STABILITY

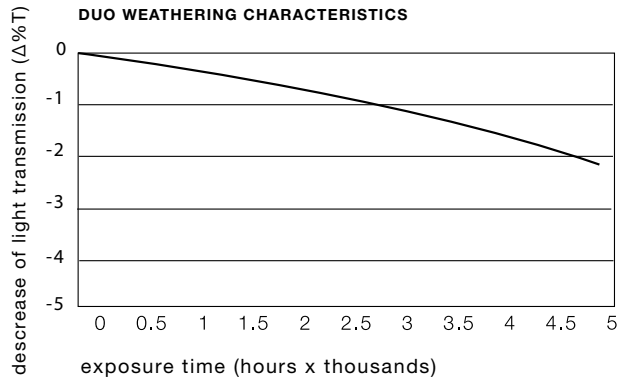
Accelerated weathering tests that simulate natural sunlight and

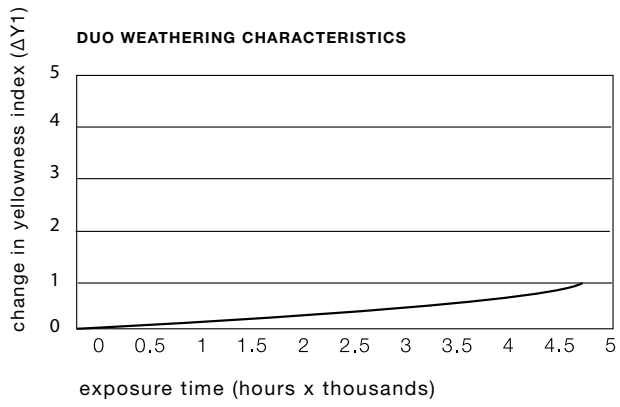


weathering conditions were carried out in a Xenon Arc 1200 apparatus to ISO 4892. Placed within this environment, Standard Duo was exposed to 5000 hours. Experience with the Xenon Arc test equipment indicates this relates to approximately 10 years natural exposure in a moderate Northern Hemisphere climate. Following the test the optical properties of light transmission and yellowness index were measured and compared with a non-exposed sample. The following charts indicate the changes in the light transmission and YI (yellowness) values over the simulated 10 year period of Standard Duo.

SEALING

3form Duo should be mounted with the ribs running downwards in order to properly drain condensation formed inside the panel. Edge sealing is very important because moisture build-up and dust contamination can be a problem. Seal both ends of the Duo with an impermeable sealant tape in extremely dusty interior environments, low humidity/dry condition interior environments. It is possible to have some condensation and algae growth with the impermeable sealant tape on both sides.

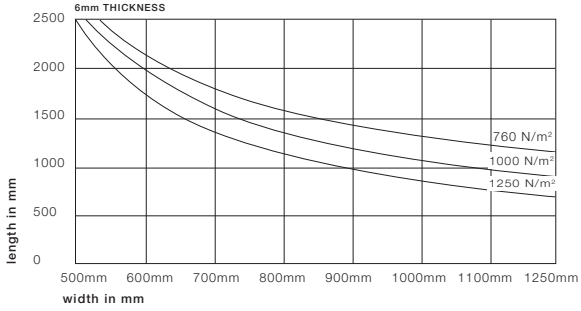


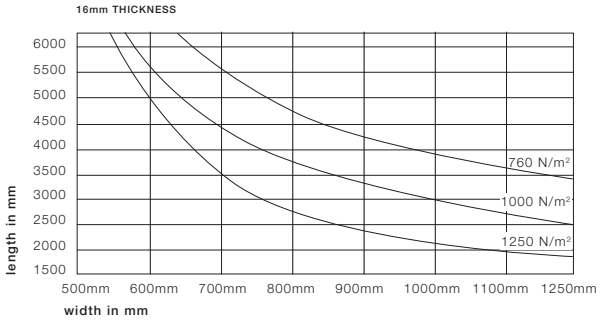


The most common and recommended sealing is using an impermeable tape on the top end channel and using a perforated filter tape on the bottom of the channel. The perforated tape allows the condensation to drain, and the ventilation reduces condensation. An integrated filter can minimize dust or insect penetration.

DEFLECTION

3form Duo will exhibit different amounts of deflection given a variety of factors: fastening techniques, loads, and panel dimensions to list a few. The 3form Technical Help desk can assist you with general deflection guidelines for your application. If your application has specific engineering requirements, please contact the 3form technical team for additional direction. The following charts indicate the maximum dimensions for Duo at a given load.





HEAT FORMING/COLD BENDING

Duo can be successfully cold bent over curved support glazing profiles, to suit many glazing applications, e.g. vaults, skylights, canopies, etc. Provided that the radius is not below the minimum recommended value of 175 times the thickness, cold bending is not expected to have any adverse effect upon the mechanical performance of the sheet. Sheets must always be bent longitudinally, never across the width of the sheet.

DUO THICKNESS	MINIMUM COLD BEND RADII
1/4" (6 mm)	41" (1041 mm)
5/8" (16 mm)	111" (2819 mm)

Sheet length 'L' needs to be greater than sheet width 'W' to facilitate curvature; in practice, a L:W ratio of 1:2 or less is not recommended.

Selected Properties for 3form Duo

PROPERTY	ASTM METHOD	SI	U.S.
GENERAL			
Density	D1505	1,200 kg/m³	0.043 lb/in³
Water Absorption	D 570 23° C (73° F), 24h immersion	0.15%	0.15%
THERMAL			
Continuous Use Temperature		100 °C	212 °F
Heat Deflection Temperature	D648	135 °C	275 °F
Thermal Conductivity	C177	0.195 W/(m*K)	1.35 BTU/hr x ft² x °F
Coefficient of Thermal Expansion	D696	.000072 cm/cm°C	.00004 in/in°F

SOUND TRANSMISSION CLASS (STC) VALUES FOR DUO

Measurement protocol: ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

DUO THICKNESS	STC VALUES
1/4" (6 mm)	17
5/8" (16 mm)	18

Chemical Resistance of 3form Duo to Select Compounds

6 DAY FULL IMMERSION TESTING @ 73ºF (23ºC)

Polymer materials are affected by chemicals in different ways. Changes in performance or appearance can be attributed to fabrication methods, exposure conditions, concentration of chemical substances or exposure duration of certain substances. Such factors can even influence the final effect of substances that 3form Duo is considered "Resistant" to under test conditions. Further details are explained below:

FABRICATION

Stresses generated from sanding, grinding, drilling, polishing, machining, sawing and/or forming (hot or cold).

EXPOSURE

Exposure duration, stresses imparted during the application life-cycle due to loads, temperature changes, heat, environments, etc.

APPLICATION OF CHEMICALS

Application from contact, rubbing, wiping, spraying, soaking, etc. Also having an effect is the relative concentration of the chemical in question.

The following data is based on complete immersion of Duo in the chemical or reagent shown. Samples remained immersed and were stored at 23ºC (73ºF) for different periods of time. Following the test period the samples were removed from immersion and inspected. This table represents the changes in appearance of the immersed samples over the testing period.

The following table provides indicative performance of the chemical resistance characteristics of Duo. The following codes are used to describe the chemical resistance characteristics:

R = RESISTANT

3form Duo is able to withstand the identified compound for long exposure periods (6 days, full immersion).

LR = LIMITED RESISTANCE

3form Duo is only resistant when in contact with this compound for short periods at room temperature. It is advised that further determination of the effect of the substance be further tested in your particular application.

NR = NOT RESISTANT

3form Duo is not resistant to the compound. The material will swell, craze, haze, dissolve or experience some physical change when exposed to this substance.

REAGENT	RESULT	REAGENT	RESULT
Acetic Acid, 10% in water	R	Acetone	NR
Ammonia, 0.1% in water	NR	Ammonium nitrate, 10% in water	R
Benzene	NR	Benzine (no aromatic hydrocarbons)	R
Butyl Acetate	NR	Carbon tetrachloride	NR
Chloroform	NR	Citric Acid, 10% in water	R
Dibutyl phthalate	NR	Diethyl ether	NR
Dimethyl formamide	NR	Dioctyl phthalate	NR
Dioxane	NR	Ethanol, 100%	R
Ethyl Acetate	NR	Ethylene chloride	NR
Ethylene glycol, 1:1 with water	R	Glycerin	NR
Hexane	R	Hydrochloric Acid, 10% in water	R
Hydrogen Peroxide, 30% in water	R	Iron (III) chloride, saturated solution	R
Isooctate (2,2,4-trimethyl pentane)	R	Isopropanol (pure)	R
Methanol	NR	Methyl Ethyl Ketone	NR
Methylamine	NR	Methylene chloride	NR
Nitric Acid, 10% in water	R	n-propanol	NR
Ozone, 1% in air	NR	Paraffin, paraffin oil, free from aromatic hydrocarbons	R

REAGENT	RESULT	REAGENT	RESULT
Phosphoric acid, 1% in water	R	Propane	R
Silicone Oil	R	Sodium Carbonate, 10% in water	R
Sodium Chloride, 10%	R	Sodium Hydroxide, 1%	NR
Sodium Nitrate, 10% in water	R	Styrene	NR
Sulfuric Acid, 10% in water	R	Tetrachloroethane	NR
Tetrachloroethylene	NR	Trichloroethylene	NR
Tricresyl Phosphate	NR	Triethylene Glycol	R
Xylene	NR		

Cleaning Instructions

3form Duo, like all thermoplastic resin materials, should be cleaned periodically. A regular, quarterly cleaning program will dramatically help prevent noticeable weathering and dirt build-up.

Rinse the sheets with lukewarm water. Remove dust and dirt from Duo with a soft cloth or sponge and a solution of mild soap and/or liquid detergent in water. A 50:50 solution of isopropyl alcohol and water also works well. Rinse thoroughly with lukewarm water.

Always use a soft, damp cloth to blot dry. Rubbing with a dry cloth can scratch the material and create a static charge. Never use scrapers or squeegees on Duo. Also avoid scouring compounds, gasoline, benzene, acetone, carbon tetrachloride, certain deicing fluids, gasoline, lacquer thinner or other strong solvents.

DO NOT:

- Use a squeegee
- Strong solvents, highly alkaline or abrasive cleaning agents
- Clean in hot sun or elevated temperatures
- Rub with a dry cloth

IMPORTANT

If a cleaning material is found to be incompatible in a short-term test, it will usually be found to be incompatible in the field. The converse, however, is not always true. Favorable performance is no guarantee that actual end-use conditions have been duplicated. Therefore, these results should be used as a guide only and it is recommended that the user test the products under actual end-use conditions.

For more information, please visit 3-form.com or call 877-649-2670.