

# Sundance Supply® , LLC

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**LEXAN® Thermoclear®**

**Multi-wall  
Polycarbonate Sheet**



## **Technical Manual**

**For polycarbonate pricing, discounts,  
installation systems, project photos,  
tech data sheets, fire & tech reports  
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**LEXAN®**

# Product Availability

**LEXAN® Polycarbonate Resin** LEXAN polycarbonate is a unique engineering thermoplastic which combines a high level of mechanical, optical, thermal and electrical properties. The versatility of this material makes it suitable for many engineering applications. When extruded in sheet form, its optical and impact properties in particular render this material a strong candidate for a wide range of glazing applications.

## LEXAN® Multiwall Sheet

**LEXAN® Thermoclear® Sheet** LEXAN Thermoclear sheet is an impact resistant, energy-saving, multiwall polycarbonate glazing sheet. It features a proprietary surface treatment which provides resistance against degradation caused by UV radiation in sunlight. The entire LEXAN Thermoclear sheet range of products carries a Ten Year Limited Warranty\* against discoloration, loss of light transmission and/or loss of strength due to weathering.

Typical applications include:

- Skylights/Overhead Glazing
- Atriums, Canopies and Walkways
- Industrial Roofs and Sidewalls
- Sunroom, Swimming Pool and Conservatory Roofing
- Shopping Center Roofing
- Railway/Metro Station
- Football Stadium Roofing

**LEXAN® Thermoclear® Drippard Sheet** LEXAN Thermoclear Drippard sheet, in addition to the properties of standard LEXAN Thermoclear sheet, also features a specially developed coating on the inner surface which reduces the formation of condensation droplets. This property is particularly important in helping to prevent crop spoilage in commercial greenhouses, by falling condensation droplets. There is no reduction in light transmission due to condensation water droplets. It is an excellent roof glazing material in any application where water drops are unacceptable. For instance: greenhouses verandas/sunrooms/swimming pool enclosures/industrial roof glazing.

**LEXAN® Profiled Sheet** LEXAN Profiled Sheet has the same construction, physical, mechanical and thermal properties as LEXAN Thermoclear sheet, but it does not feature the latter's proprietary surface protection against UV radiation. It is specifically recommended for internal secondary glazing and other indoor uses such as partitioning, shower stalls and false ceilings.

## Product availability\*

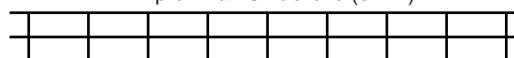
Product Code	Gauge in Inches	Width in Inches
<b>Core Products</b>		
6MM 2-Wall	0.236	48, 72
8MM 2-Wall	0.312	48, 72
10MM 2-Wall	0.395	48, 72
16MM 3-Wall	0.624	48, 72
<b>Value Added Product (ThermoClear Plus)</b>		
8MM 2-Wall	0.312	48, 72
8MM 3-Wall	0.312	48, 71.25
25MM X-Wall	0.984	48
25MM 6-Wall	0.984	48

## LEXAN Multiwall Sheet Structures:

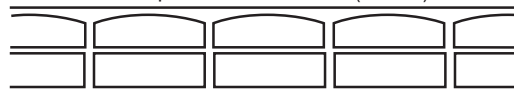
Twin Wall Rectangular Structure (6, 8, 10MM)



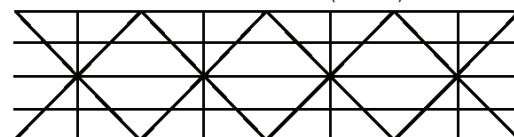
Triple Wall Structure (8MM)



Triple Wall Structure (16MM)



X-Wall Structure (25MM)



Six Wall Rectangular Structure (25MM)



\* See limited warranty for details

# Property Profile

## LEXAN® Multiwall Sheet

Typical property values for LEXAN ThermoClear Sheet, and LEXAN ThermoClear Plus are indicated in the following table:

Fig. 1

Typical properties					ThermoClear Plus		
Sheet thickness mm	6	8	10	16	8	25	25
Structures	2-Wall	2-Wall	2-Wall	3-Wall	3-Wall	X-Wall	6-Wall
Approx. weight g/m <sup>2</sup>	1300	1700	2000	2800	3000	3300	3500
Approx. weight lbs/ft <sup>2</sup>	.27	.35	.41	.57	.61	.68	.72
Light transmission %	82	82	80	76	73	58	58
Solar transmission %	86	86	85	82	76	54	54
Bronze							
Light transmission %	50	50	50	50	NA	28	28
Opal							
Light transmission %	40	40	40	40	NA	49	49
U.Value Btu/Hr x Ft <sup>2</sup> x °F	0.61	0.58	0.52	0.42	0.50	0.27	0.27

	ASTM	UNITS	
VICAT VST/B/120		°F	293
HDT@264 PSI	D648	°F	275
Thermal conductivity	C177	BTU/HR x Ft <sup>2</sup> x °F	1.35
Coefficient of linear thermal expansion	D696	In/In °F	3.75 x 10 <sup>-5</sup>
Refractive index	D542	-	1.586

# Mechanical Properties

**Impact Strength** LEXAN Thermoclear sheet has outstanding impact performance over a wide temperature range, -40°F to +248°F, and also after prolonged outdoor exposure.

**Gardner Impact** The principle of the modified Gardner falling dart impact test is as follows: The specimen is placed over a hole of 1 inch diameter in a die mounted on the anvil. The round nosed dart, .5 inch diameter, is placed upon the specimen. The dart with a mass of 8.8 pounds is raised to the desired height in a 3.3 foot calibrated tube, and dropped. The maximum applied impact energy is given as:

$$M \times h = 8.8 \times 3.3 = 29 \text{ foot-pounds}$$

The test specimen is considered to have passed the test if the sample shows no visible signs of surface cracks around the impact area.

Fig. 2 Gardner impact tester

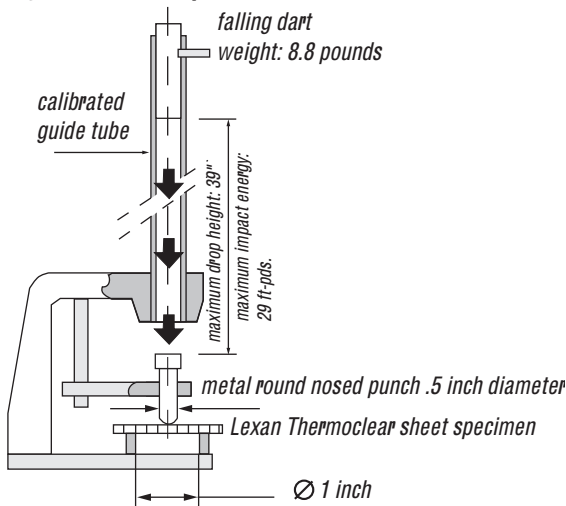
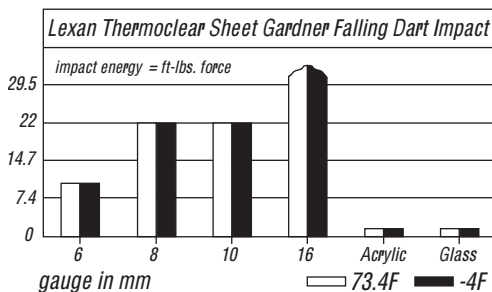


Fig. 3



**Hail Simulation** As a roofing material, LEXAN Thermoclear sheet is subjected to the extremes of weather; storms, hailstones, wind, snowfalls and ice formation. Under these conditions, the product is exceptionally tough and is able to accommodate the subsequent temperature change to sunny conditions without breaking or buckling.

In a test developed by the Dutch Testing Institute TNO, samples of LEXAN Thermoclear sheet have been subjected to simulated hail stones of varying diameters of up to 1.2 inches without significant damage. A test sample is clamped into a metal frame 10 ft x 13 ft and polyamide balls of varying diameters are fired at the surface of the sample using a pressurized air gun. The ball diameter and velocity are varied during the test.

In practice, hailstones with diameter of 3/4 inch can reach a terminal velocity of some 47 mph. Under these conditions materials such as glass and acrylic typically fail.

Table 4 lists the results of a series of tests on three materials. The values indicated relate to the failure velocities versus ball diameter for the different materials tested.

It should be noted that when the glass and the acrylic are tested their failure characteristics are typically brittle, while the LEXAN Thermoclear sheet shows a ductile deformation zone, i.e. small indentations. A Ten Year Limited Warranty on LEXAN Thermoclear sheet covers loss of strength or impact due to weathering.

Fig. 4

Hail Simulation Test Results			
Material	Ball diameter		
	.39 in.	.78 in.	1.18 in.
Acrylic multiwall sheet 16 mm	36-45 mph	16-31 mph	9-22 mph
Float glass 4 mm	67 mph	22 mph	18 mph
LEXAN Thermoclear sheet 10 mm	>111 mph	98 mph	63 mph
LEXAN Thermoclear sheet 16 mm	>111 mph	98 mph	63 mph
Equilibrium velocity hail	31 mph	47 mph	56 mph

**Sports Ball Impact -DIN 18032 (part 3)** Glazing materials in sports halls are often subjected to impacts caused by a variety of balls used in many different games. A sample of LEXAN Thermoclear sheet, 78 x 78 inches and thickness 16 mm, tested according to German DIN Standard 18032, has been clamped on all four sides and exposed to severe impacts from numerous hand and hockey balls. The balls were fired at the test sample at different angles and velocities.

The LEXAN Thermoclear sheet sample showed no visible damage and easily passed the test.

\*See limited warranty for details

# Physical Properties

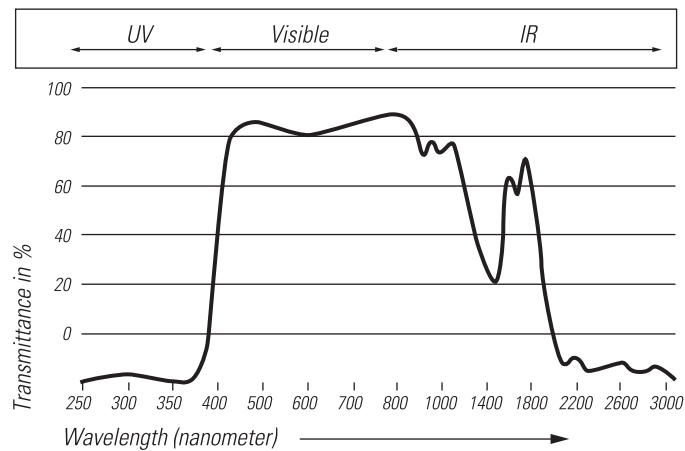
**Light transmission** The sunlight which reaches the surface of the earth has a wavelength that ranges between 295 - 2140 nanometers ( $10^{-9}$  meters). This optical window is divided into the following sections:

UV-B Middle ultra-violet region	280 - 315 nm
UV-A Near ultra-violet region	315 - 380 nm
Visible light region	380 - 780 nm
Near infra-red region	780 - 1400 nm
Middle infra-red region	1400 - 3000 nm

As shown in Figure below LEXAN Thermoclear sheet has the maximum transmission in the visible light region.

Despite transmitting visible light very well, LEXAN Thermoclear sheet is almost opaque to radiation in the UV and far infra-red region. This useful shielding property can prevent discoloration of sensitive materials such as fabrics or other organic materials placed under or behind LEXAN Thermoclear sheet glazing in, for example, a factory warehouse, museum or shopping center.

Fig. 5



**Temperature Increase Inside the Building** The same properties, in combination with the insulating multiwall structure, contribute to a temperature increase inside the building.

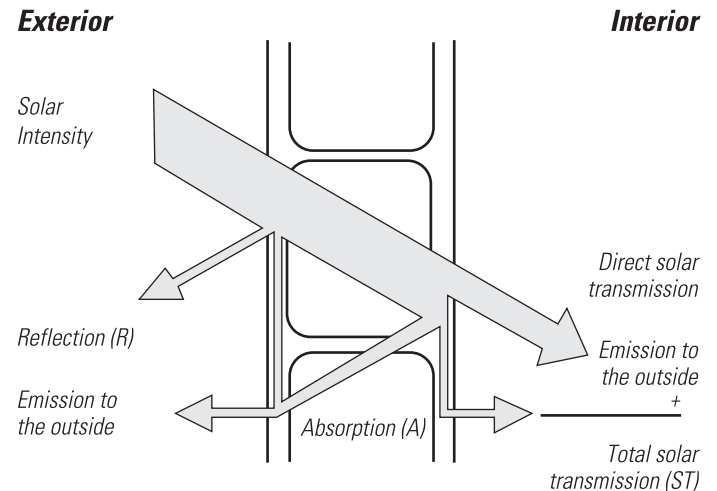
Sunlight entering the building heats the air both directly and through absorption by framework, furniture etc., and is released as infra-red energy. The insulating properties of LEXAN Thermoclear sheet prevent this heat escaping faster than it is created, causing a temperature increase—the so-called 'greenhouse effect'. The temperature can be controlled by venting often in combination with specially tinted LEXAN Thermoclear sheet.

**Solar Control** Transparent grades of LEXAN Thermoclear sheet have excellent light transmission, between 64 and 82% depending upon thickness. However, for buildings in hot climates or with south facing aspects. LEXAN Thermoclear sheet is available in translucent grades of bronze, grey, blue, green and opal white. These grades significantly reduce solar heat build up, helping to maintain comfortable interior temperatures.

The specially tinted sheet cuts down the brightness of sunlight to a pleasing level and reduces air conditioning costs in the summer.

**Solar Heat Gain** The solar radiation reaching the sheet is reflected, absorbed and transmitted as shown in Figure 6. The greatest proportion is transmitted and the total solar transmission (ST) is the sum of the direct transmission (DT) and the inwardly released part of the absorbed energy (A). Table 7 outlines the overall solar control properties of LEXAN Thermoclear sheet.

Fig. 6



# Outdoor Weathering Performance

## UV Protection

Solar radiation has a particularly harmful effect upon polymeric materials initiating degradation by causing superficial surface crazing. These crazes become sites for further erosion from water, dust, chemicals etc. The degree to which these conditions affect the polymer depend largely upon environmental parameters such as geographical location, altitude, seasonal variations, etc.

LEXAN Thermoclear sheet has a UV-protected surface, giving durability to outdoor weathering. The unique technology applied to LEXAN Thermoclear sheet helps to ensure long term optical quality under intensive UV exposure, and maintain the superior toughness of the polycarbonate material in comparison to other thermoplastic glazing.

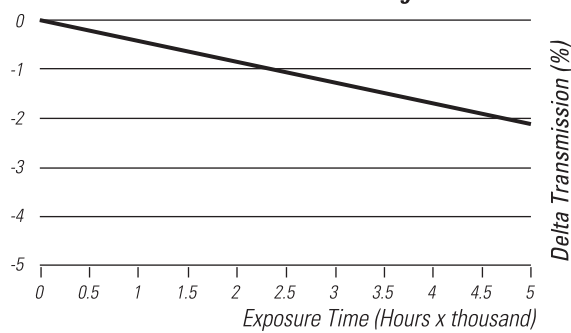
## Typical Values of Thermoclear Sheet

Research into the long term effects of weathering on glazing materials is basically focused upon measuring product performance through material property changes, typically mechanical strength, impact resistance, color retention, transparency, etc.

A test was developed using high intensity xenon lamps to simulate natural sunlight. Together with other suitable UV filters and programmable rain cycles the test is able to simulate natural conditions.

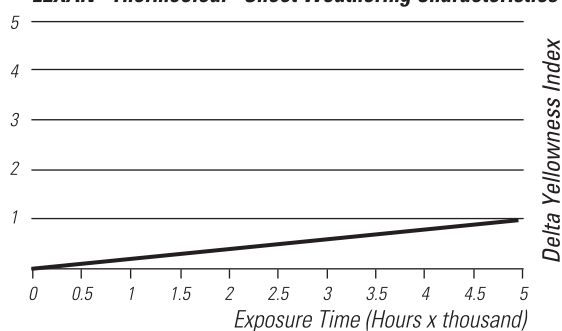
Accelerated weathering tests were carried out in the Xenon 1200 apparatus to ISO 4892, however with a higher UV part in the xenon light during 1/6 of the carousel cycle. Placed within this environment, LEXAN Thermoclear sheet was exposed to 5000 hours. Experience with the Xenon test equipment indicates this relates to approximately 15 years natural exposure in a moderate European climate. Following the test the optical properties of light transmission and yellowness index were measured and compared with an un-aged sample. Figures 8 and 9 indicate the changes in the values over the simulated 15 year period of LEXAN Thermoclear sheet (standard Clear grade).

Fig. 8  
LEXAN® Thermoclear® Sheet Weathering Characteristics\*



## Decrease of Light Transmission

Fig. 9  
LEXAN® Thermoclear® Sheet Weathering Characteristics\*



## Delta Yellowness Index (ASTM D1925)

\*Test performed on 20mm Thermoclear®

## Temperature Resistance

The heat build-up of glazing materials can be seen as a function of the absorption of the glazing material and the solar intensity.

In countries with intense sun radiation, and when high energy absorbing tinted glazing is installed, heat build-up of the glazing can be considerable. Calculations and actual measurements on installed LEXAN Thermoclear sheet in several projects throughout Europe have shown that sheet surface temperatures of 212°F can exist.

LEXAN Thermoclear sheet is characterized by its retention of impact strength and stiffness at elevated temperatures, even over an extended period.

LEXAN Thermoclear sheet retains 85% of its room temperature flexural modulus at 176°F. The Vicat softening temperature and the Deflection Temperature Under Load of LEXAN polycarbonate are both around 284°F.

LEXAN Thermoclear sheet has a continuous-use temperature of 212°F\*. At the other end of the scale the minimum continuous-use temperature has been set at -40°F. Using LEXAN Thermoclear sheet at lower temperatures is possible since the embrittlement temperature can be as low as -80°F.

## WARRANTY

*Ten Year Limited Warranty on LEXAN Thermoclear sheet covering discoloration, loss of light transmission and loss of strength due to weathering.*

\*As rated by UL.

# Various Properties

## UL Ratings

The U.S.A. Underwriters Laboratories continuous-use temperature rating can be considered as a reliable indicator of a thermoplastic's long-term high temperature performance. Important properties of the thermoplastic are tested at various temperatures. Test results are extrapolated over a period of 10 years and no property may lose more than 50% of its original value. Figure 10 outlines the UL-continuous-use temperatures of typical thermoplastic glazing materials.

Fig. 10

U.L. Temperature Ratings UL746B	
Underwriters Laboratories Continuous-use Temperature Rating	
LEXAN Polycarbonate	212°F
Acrylic	122°F
P.V.C.	122°F

## Fire Performance

LEXAN<sup>®</sup> Thermoclear<sup>®</sup> sheet has good fire behavior characteristics, and receives high ratings in several major European fire performance tests. As a thermoplastic, LEXAN Thermoclear sheet will typically melt under the intense heat of a fire.

Fig. 11

LEXAN Thermoclear Fire Classification*		
Country	Norm	Classification
USA	Model Bldg. Codes	Approved Light Transmitting Plastics
Germany	DIN 4102 part 1	B1 (to 10 mm) B2 (16 mm)
United-Kingdom	BS 476 part 7 Building Regulations (1991)	Class 1 Class 0 Tp (a)
France	NF-P-92-507	M1-M2
Netherlands	NEN 6065	Class 1-2

\*dependent on thickness and color

## Weight Factors

LEXAN Thermoclear sheet can be an ideal replacement for the more traditional glazing materials. It is safe and easy to handle, cut and install and is extremely tough. Its light weight offers significant savings in terms of transportation, handling and installation. When compared with 6 mm wired glass, 10 mm LEXAN Thermoclear sheet offers weight savings of more than 85%.

LEXAN Thermoclear sheet has shown in many applications that its lightness and ease of handling have contributed to significant savings in overall installation cost.

Fig. 12

Weight		
Material	Thickness mm	Weight lbs/ft <sup>2</sup>
LEXAN Thermoclear Sheet	6	.27
LEXAN Thermoclear Sheet	8	.35
LEXAN Thermoclear Sheet	10	.41
LEXAN Thermoclear Sheet	16	.57
LEXAN Thermoclear Sheet	25 X-Wall	.70
LEXAN Thermoclear Sheet	25 6-Wall	.72

## Sound Insulation

The sound insulation characteristics of a material are largely predetermined by its stiffness, mass and physical construction. The maximum obtainable sound transmission class for LEXAN Thermoclear sheet is:

Fig. 13

Sound Reduction Values		
Material	Thickness mm	STC Rating
LEXAN Thermoclear Sheet	6	17
LEXAN Thermoclear Sheet	8	19
LEXAN Thermoclear Sheet	10	21
LEXAN Thermoclear Sheet	16	22

# Thermal properties

**Thermal Insulation** The multiwall structure of LEXAN® Thermoclear® sheet offers significant advantages where thermal insulation is a major consideration. The hollow form provides insulation characteristics with heat losses significantly lower than mono-wall glazing materials. Heat loss is normally referred to as the U-value, which is the amount of energy transmitted through a material per square foot of glazing area and per degree temperature difference. It is expressed in terms of Btu/Hr x ft<sup>2</sup> x °F.

Fig. 14

Material u-values		(Btu/Hr x ft <sup>2</sup> x °F)
Materials	Thickness mm	U-value
LEXAN Thermoclear	6	0.61
LEXAN Thermoclear	8	0.58
LEXAN Thermoclear	10	0.52
LEXAN Thermoclear	16	0.42
LEXAN Thermoclear 3-Wall	16	0.50
LEXAN Thermoclear X-Wall	25	0.27
LEXAN Thermoclear 6-Wall	25	0.27

**Overglazing** Installing LEXAN Thermoclear sheet in front or LEXAN profiled sheet behind the existing glazed window provide additional energy savings. For effective insulation, the best results are typically obtained leaving a .75 - 2 inch air gap between the existing glazing and the LEXAN multiwall sheet.

Fig. 15

Overglazing			
Glass Thickness	Air space inches	Thermoclear Thickness	U-value Btu/Hr x ft <sup>2</sup> x °F.
4	1-2	6 MM	0.38
4	1-2	8 MM	0.37
4	1-2	10 MM	0.35
4	1-2	16 MM	0.30

**Double LEXAN Multiwall Sheet Units** Extremely low U-values can be obtained by double-glazed multiwall LEXAN sheet units. A combination of LEXAN Thermoclear sheet outside and LEXAN profiled sheet inside, with an air gap of .75 - 2 inches can dramatically reduce the heat loss factor in applications such as curved and pitched roof lights.

Fig. 16

Double LEXAN Multiwall Sheet Units			
Thermoclear sheet Outside	Air gap inches	Profiled sheet Inside	u-value Btu/Hr x ft <sup>2</sup> x °F
6 MM	.75 - 2	4.5(2R)	0.32
8 MM	.75 - 2	4.5(2R)	0.31
10 MM	.75 - 2	6(2R)	0.28
16 MM	.75 - 2	6(2R)	0.25
16 MM	.75 - 2	10(2R)	0.22

**Energy Loss Calculations** The need to reduce energy consumption, and therefore energy costs, is one of the highest priorities in any business today. Substantial savings in the order of more than 50% are possible when installing LEXAN Thermoclear sheet instead of mono-layer glass. When calculating according to the guidelines outlined in the DIN standard 4701, an average annual saving between .2 - .3 gal. of oil or 35.3 - 53 ft<sup>3</sup> of gas per 10 ft<sup>2</sup> of glazing area is obtained by decreasing the U-value by 0.018 Btu/Hr x ft<sup>2</sup> x °F.

Table 17 shows the minimum and maximum expected amount of savings of fuel consumption per 10 ft<sup>2</sup> glazing area at various U-value differences.

**Expected calculation example**  
Annual fuel saving when glass is replaced by LEXAN Thermoclear sheet.

Data:

4 mm Glass, U-value - 1.02 Btu/Hr x ft <sup>2</sup> x °F
10 mm LEXAN Thermoclear sheet, U-value - 0.52 Btu/Hr x ft <sup>2</sup> x °F

U-value difference: 1.02 - 0.52 = 0.50 Btu/Hr x ft<sup>2</sup> x °F, acc. table 17 minimum and maximum expected amount of annual fuel saving per 10. ft<sup>2</sup> glazing area.

6.7	-	Gallon of oil of annual savings
989	-	Cubic ft of gas of annual savings

# Thermal properties

Fig. 17

U-value difference Btu/Hr x ft <sup>2</sup> x °F	Expected annual saving per 10.0 ft <sup>2</sup> glazing area	
	Oil - gallon	Gas - ft <sup>3</sup>
0.02	.02 - .3	35 - 53
0.04	.48 - .67	71 - 106
0.05	.71 - 1.0	106 - 159
0.07	.95 - 1.4	141 - 212
0.09	1.2 - 1.7	176.5 - 265
0.11	1.4 - 2.1	212 - 318
0.12	1.7 - 2.4	247 - 371
0.14	1.9 - 2.7	282.5 - 424
0.16	2.1 - 3.1	318 - 477
0.18	2.4 - 3.4	353 - 530
0.21	2.9 - 4.1	424 - 635.5
0.25	3.3 - 4.8	494 - 741.5
0.28	3.8 - 5.5	565 - 847.5
0.32	4.3 - 6.2	635.5 - 953.5
0.35	4.8 - 6.9	706 - 1059.5
0.39	5.2 - 7.6	777 - 1165
0.42	5.7 - 8.2	847.5 - 1271
0.46	6.2 - 8.9	918 - 1377
0.49	6.7 - 9.6	989 - 1483
0.53	7.1 - 10.3	1059.5 - 1589
0.56	7.6 - 11	1130 - 1695
0.60	8.1 - 11.7	1200.5 - 1801
0.63	8.6 - 12.4	1271 - 1907
0.67	9 - 13.1	1342 - 2013
0.70	9.5 - 13.7	1412.5 - 2119

**Note:**

The exact amount of annual fuel savings are strongly dependent upon building type, location and regional environment conditions. Local authority engineering departments usually have official data relating to average temperature differences during the heating time necessary.

**Cold Emission**

The insulation properties of LEXAN<sup>®</sup> Thermoclear<sup>®</sup> sheet will also contribute to lesser cold emission

towards the building. The lower the U-value the higher the inner sheet surface will be maintained during the winter season.

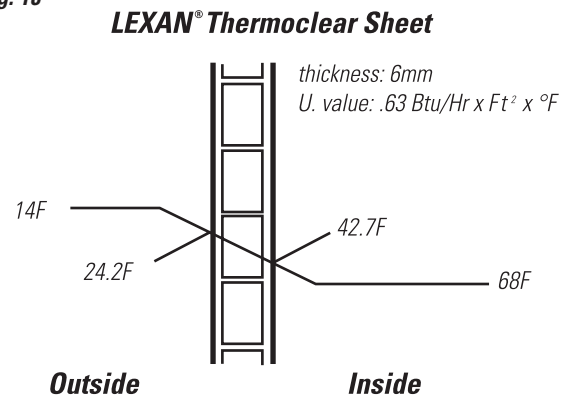
Here is an example of the temperature profile through LEXAN Thermoclear 6 mm sheet when the outside temperature is 14°F and the inside building temperature is 68°F.

The multiwall construction creates an airspace which results in a moderate sheet surface temperature difference.

During the conditions indicated the inner sheet surface remains far above freezing temperature so that there is no cold radiation to the inside of the building.

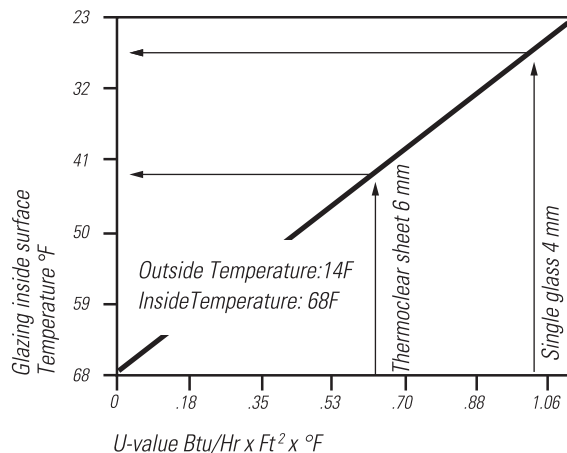
Temperature process through Thermoclear sheet at low outside temperature.

Fig. 18



Compared to single glazed glass, in the same conditions, the inside glass surface will be far below freezing temperature. Cold radiation will negatively influence the overall building temperature and will affect the comfort level near the windows.

Fig. 19



# Condensation/Cleaning

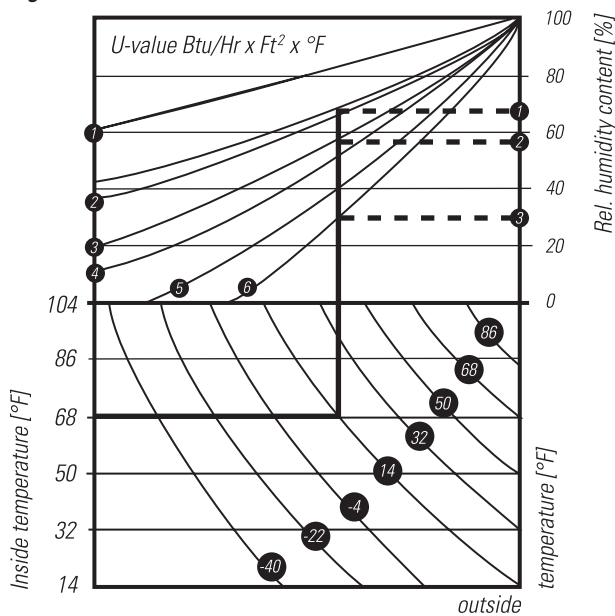
**Condensation** Condensation is formed when moisture in the atmosphere changes back to water as it comes into contact with a surface at a temperature below the 'dewpoint' of the surrounding air.

Water droplets on the surface of the glazing reduce light transmission, and, if they fall, can spoil plants or damage sensitive goods and equipment beneath. LEXAN® Thermoclear® Dripgard sheet has a special one-side coating that inhibits the formation of condensation droplets. The coating lowers the surface tension and the drops form a thin layer of water over the whole surface of the sheet.

When the sheet is correctly installed, this thin, transparent water film runs off the sheet surface into the profile drainage system without falling to the ground and without significantly affecting the light transmission values of the glazing.

Figure 20 shows a typical condensation prediction chart showing the relationships between internal and external temperature, relative humidity and the U-value. The dotted lines on the chart illustrate clearly how glass with a high U-value is more prone to condensation than the LEXAN Thermoclear sheet.

Fig. 20



**Condensation Prediction Chart**

**Example:**

Inside temperature: 68°F  
 Outside temperature: 14°F  
 Condensation will occur on:

1. LTC 20 mm at a humidity content of:	68%
2. LTC 6 mm at a humidity content of:	50%
3. Glass at a humidity content of:	32%

**Cleaning** Periodic cleaning using correct procedures with compatible household cleaners is recommended to prolong service life.

For general cleaning, it is recommended that the following instructions be adhered to.

Fig. 21

Cleaning Agents Which Have Been Found to be Compatible with LEXAN Thermoclear Sheet Under Laboratory Conditions	
Joy <sup>1</sup>	various
Palmolive Liquid <sup>2</sup>	various
Top Job <sup>1</sup>	various
VM&P grade Naptha	various

**Procedure 1 - Small Areas**

1. Rinse sheet with lukewarm water.
2. Wash sheet with a solution of mild soap or household detergent and lukewarm water, using a soft cloth or sponge to loosen any dirt and grime.
3. Rinse with cold water and dry with a soft cloth to prevent water spotting.

**Procedure 2 - Large Areas**

1. Clean surface with a high pressure water and/or steam cleaner.
2. Use of additives to the water should be restricted to those compatible with LEXAN Thermoclear sheet.

**IMPORTANT**

Never use an abrasive or highly alkaline cleaner on LEXAN Thermoclear sheet.

- Cleaners and solvents generally recommended for use on polycarbonate are not necessarily compatible with the UV-protected surface of LEXAN Thermoclear sheet.
- DO NOT USE either BUTYL CELLOSOLVE or ISOPROPANOL on the UV-protected surface of LEXAN Thermoclear sheet.
- Never scrub with brushes, steel wool or other abrasive materials.

# Chemical Resistance

**Chemical Resistance** Thermoclear sheet has been successfully used in combination with many building materials and glazing compounds. Taking into account the complexity of chemical compatibility, all chemicals which come into contact with the polycarbonate should always be tested. For sheet products the most common materials are sealants, gaskets and the various cleaning media. Chemical compatibility testing is an ongoing process at GE Structured Products and many standard products have already been tested. A complete list of recommended cleaners, gaskets and sealants is available; however, a shortened list of some of the more common compounds is outlined in these sections.

When using glazing compounds it is essential that the sealant system accepts a certain amount of movement, to allow for thermal expansion, without loss of adhesion to the frame or sheet. Silicone sealants are generally recommended for use with LEXAN Thermoclear sheet, see Figure 22, but it is strongly advised when using non GE sealing compounds to check compatibility before use.

Compatible Neoprene, EPT or EPDM rubbers with an approximate Shore Hardness of the A65 are generally acceptable and compatibility reports for different rubber types are available upon request.

In case of doubt about any aspect of the chemical compatibility of the LEXAN Thermoclear sheet range, always consult your nearest GE Structured Products Sales Office for further advice.

**Fig. 22**

Recommended Sealants, Gaskets and Tapes		
Type	Manufacturer	Product Name
Silicone	Dow Chemical Company	DOW-999-A
Silicone	General Electric Company Waterford, NY (800) 255-8886	Silipruf® Sealant
Silicone	General Electric Company Waterford, NY (800) 255-8886	CONSTRUCTION 1200® Sealant
Silicone	General Electric Company Waterford, NY (800) 255-8886	CONSTRUCTION 1000® Sealant
Gasket/Tape	Norton Company Granville, NY (800) 724-0883	<ul style="list-style-type: none"> <li>• NORRENE* Foam</li> <li>• V-2100 Urethane Series</li> </ul>
Gasket	Tremco Columbus, OH (800) 321-6357	<ul style="list-style-type: none"> <li>• Silicone (70 Durometer)</li> <li>• EPDM (60, 70 Durometer)</li> </ul>
Tape	Tremco Cleveland, OH (800) 321-6357	440 Tape
Butyl Tape	PTI Dayton, OH (800) 543-7570	303, 606
Butyl Tape	Schnee-Morehead Irving, TX (214) 438-9111	Isocryl 5600 Series

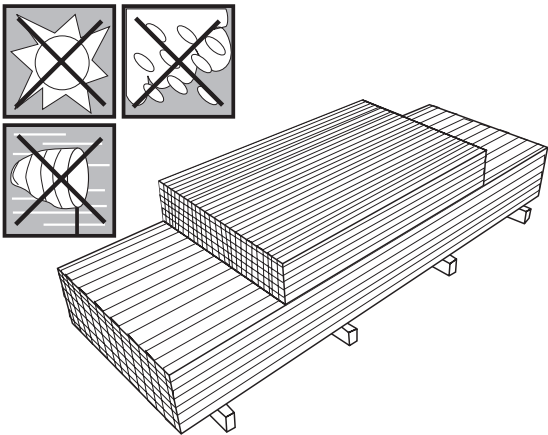
\* Registered trademark of Norton Company.

# General guidelines

## Storage

LEXAN® Thermoclear® sheet should be stored and protected against atmospheric influence like sun, rain etc. LEXAN Thermoclear sheets of the same length should be stacked together horizontally or, if different length, graded with the longest sheet at the bottom of the stack in order to avoid unsupported overhang. The stacks should be supported on timber bearers. Do not stack where they can be walked on or driven into.

Fig. 24



## Handling

As with all glazing materials, care should be exercised when handling and transporting LEXAN Thermoclear sheet in order to prevent scratches and damage to sheet edges. Each sheet is packaged as follows to minimize the risk of these problems.

- Top face covered with a printed masking. This is the UV protected side and should face outwards.
- Bottom face with a plain white masking.
- Edges with a colored protective edge tape, retain in packed condition until immediately prior to installation.

## Sawing

LEXAN Thermoclear sheet can usually be cut easily and accurately with standard workshop equipment. This includes common circular, hand and hacksaws. Saw dust should be blown out of the channels using clean compressed air. Circular saw blades should be fine-toothed panel blades. When hand or power hacksaws are used, the sheet should be clamped to the worktable to avoid undesirable vibration. When finished the edges of LEXAN Thermoclear sheet should be free of notches and swarf build-up.

With the smaller wall section LEXAN Thermoclear sheet grades (up to 10 mm) it is possible to cut the sheet with a knife. However, it is important that the knife is sharp.

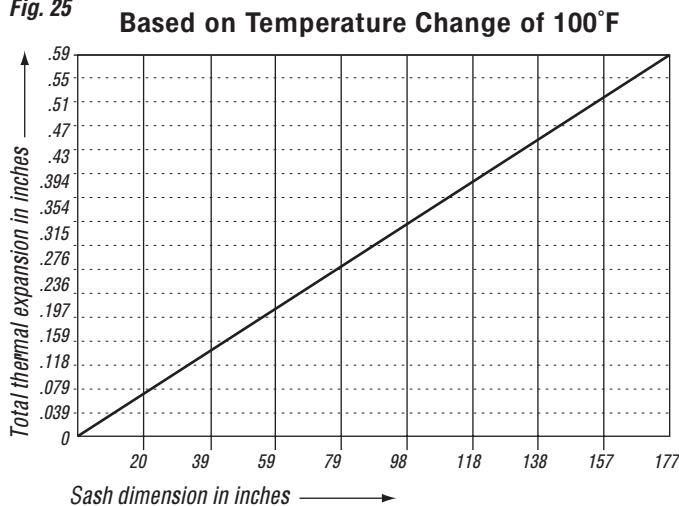
## Drilling

Holes should be drilled either by a hand or power drill using a metal working bit. When drilling, support should be given immediately beneath the drill to avoid vibration. Very clean holes are easily obtained. The use of liquid cooling media is not recommended.

## Pre-installation Thermal Expansion Allowance

Since LEXAN Thermoclear sheet has a greater linear thermal expansion coefficient than traditional glazing materials, care should be taken to allow for free expansion of the sheet to prevent bowing and internal thermal stress:

Fig. 25



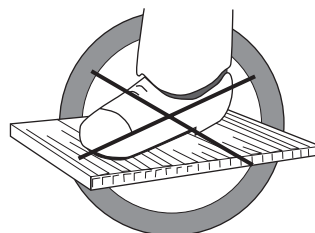
Thermal expansion allowance must be made for both the length and width of the LEXAN Thermoclear sheet. The recommended allowances for various sheet dimensions are outlined in the graph. The sheet must be trimmed at least as much as the indicated thermal expansion.

In general: Thermal expansion of the sheet is approximately .140 inch per linear 39 inches.

## Site Safety

On roof constructions LEXAN Thermoclear sheet should not be used to support a person's weight during installation or cleaning. A temporary wooden beam or other device, supported by the roof members, should always be used.

Fig. 26



# Wind & Snow Loading

## Dynamic Wind Pressure

The wind speed is used to determine the actual loading upon the glazing panels. In mathematical terms, the pressure loading is calculated by multiplying the square of the design wind speed by 0.002531

$$q = KV^2$$

where  $q$  = dynamic wind pressure in lb - force/ft<sup>2</sup>  
 $K = 0.002531$   
 $V$  = design wind speed in mph

Fig. 38

Values of $q$ in SI units (lb-force/ft <sup>2</sup> )			
windspeed mph	windpress lb-f/ft <sup>2</sup>	windspeed mph	windpress lb-f/ft <sup>2</sup>
20	1.04	150	56
30	2.50	170	72
50	6.00		
70	12.00		
100	25.00		
120	36.00		

## Pressure Coefficient

To allow for local fluctuations in the acceleration/deceleration of the wind by building or glazing geometry, it is necessary to include an appropriate pressure coefficient. The wind loading is obtained by multiplying the dynamic wind pressure by the pressure coefficient. Detailed pressure coefficient values can be found in the appropriate National Building Norms.

## Snow Loading

Snow loadings on roof glazings shall be considered equivalent to a vertically, uniformly distributed load, acting per ft<sup>2</sup> of the horizontal projection of the glazing. Snow loading factors can be obtained from the appropriate local building norm.

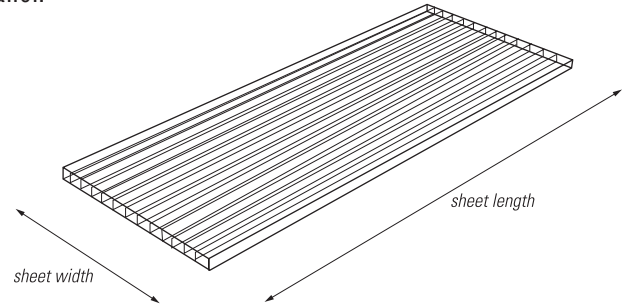
## Computer aided Sheet Engineering

A computer aided design program has been developed especially for large glazing projects, or projects with an uncommon shape or unusual loading conditions. The program creates the finite element model of a particular glazing design, applies the specified loads and edge condition and runs the deflection analysis. Consult your nearest GE Structured Products Technical Service Center for further advice.

## Sheet Thickness Criteria and Table Interpretation

### Support Conditions

Note: Regardless of support configuration selected, the sheet should always be installed so that the rib structure channels are sloping downwards. Sheet "width" is the dimension perpendicular to the rib structure, "length" the dimension parallel.

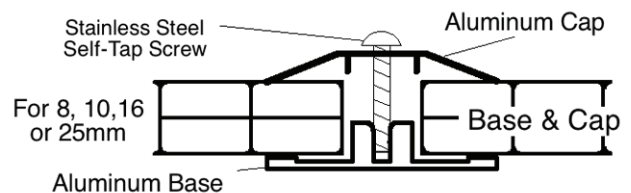


### Safety factor

The tables indicate the maximum allowable sheet at a specified loading which results into an acceptable sheet deflection behavior while minimizing the RISK of sheet buckling or pop-out effect calculated with a safety factor of 1.5.

*N.B. The values indicated in the tables are applicable for a LEXAN Thermoclear sheet edge engagement in the glazing frame of at least .75 inches.*

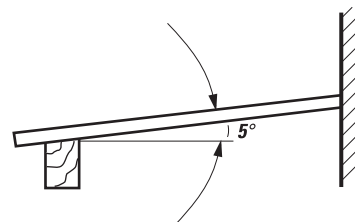
Fig. 39



### General Comments

For sloped glazing applications a minimum slope of 5° (1 in/1 ft sheet length) is advised to allow for rainwater drainage.

Fig. 40



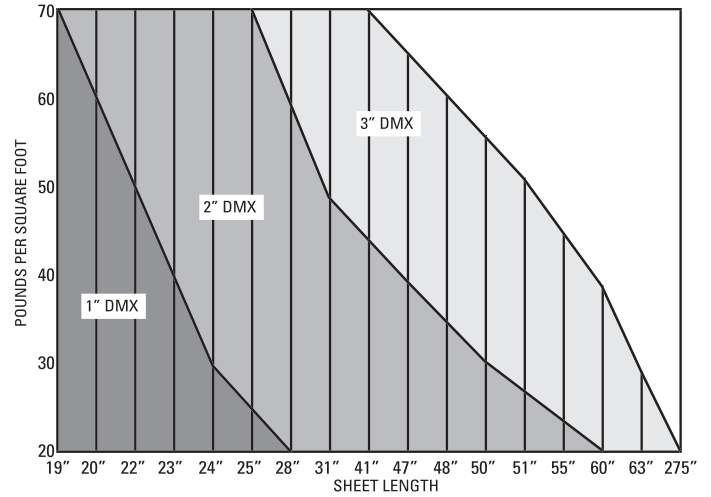
# Thickness Selection For Flat Glazing

Because of LEXAN® ThermoClear® sheet's exceptional stiffness to weight ratio, it is ideally suited for load bearing applications such as vertically installed or sloped glazing.

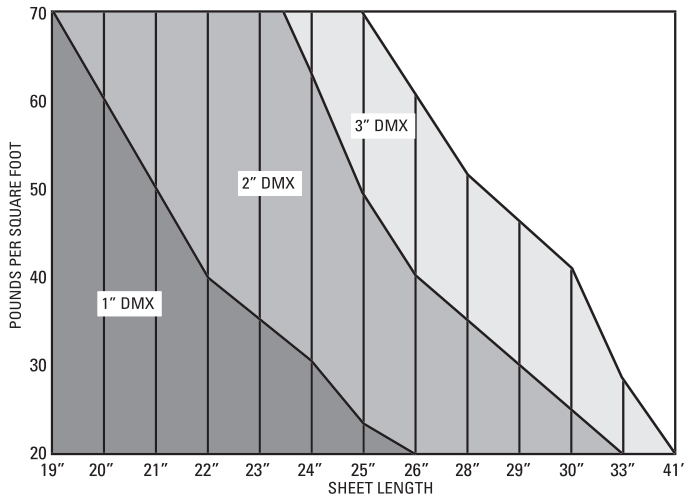
The following information has been generated to assist the designer in selecting the proper gauge, sheet size and support spacing for their applications.

The design information has been organized in graph form based on fixed widths of 24", 36", 48" and 72". In all cases, the ribs are running perpendicular to the width. The data has been further organized according to allowable deflection limits. Select the maximum design deflection and choose the graph having the proper width dimension. Then plot, starting from the specified design load (PSF) across the Y axis to the maximum deflection desired. The recommended maximum unsupported sheet length is located at the intersection.

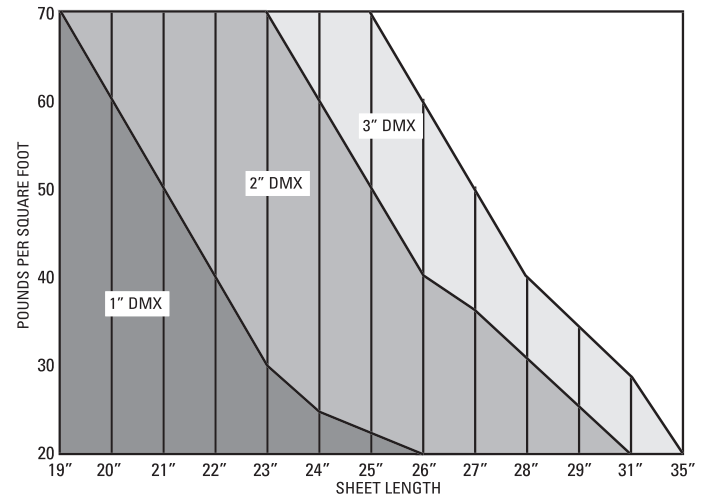
24" Sheet Width  
6mm 2-Wall



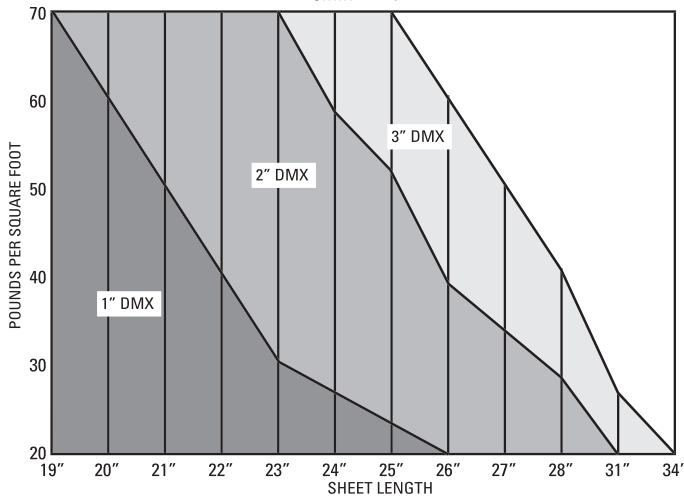
36" Sheet Width  
6mm 2-Wall

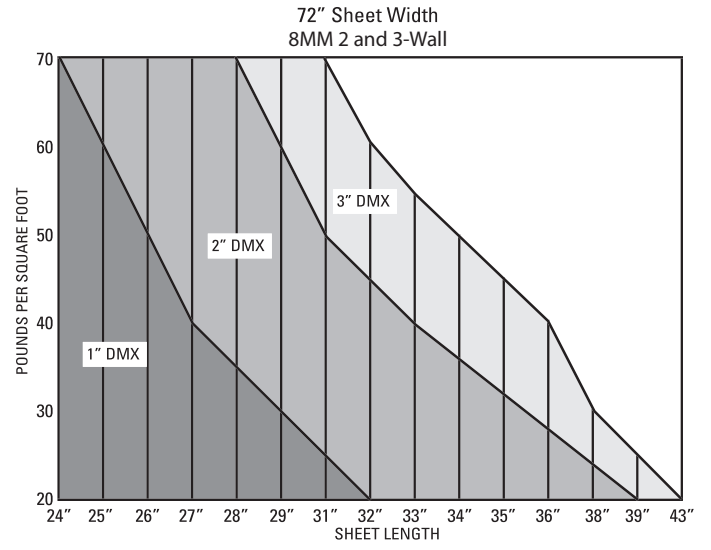
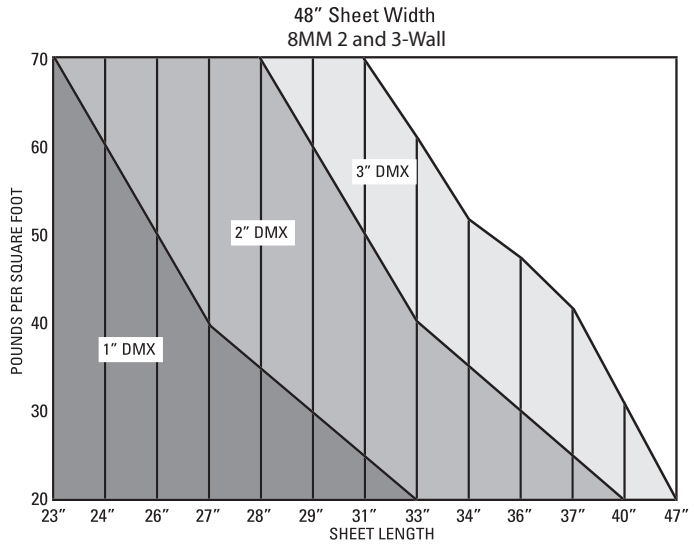
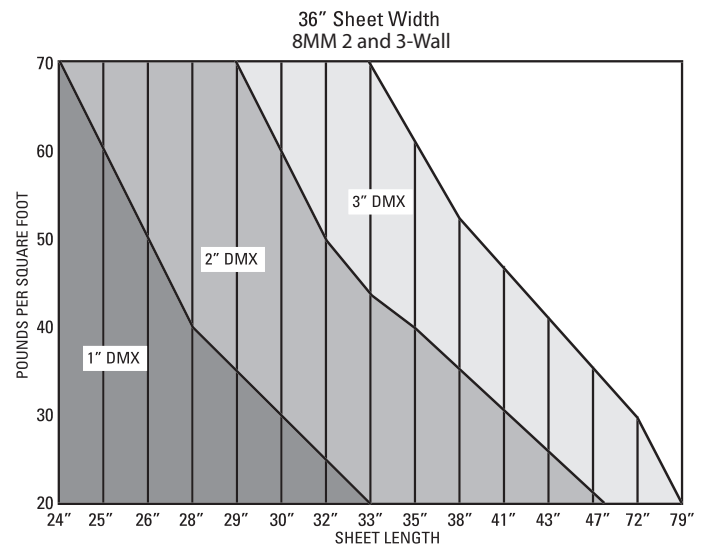
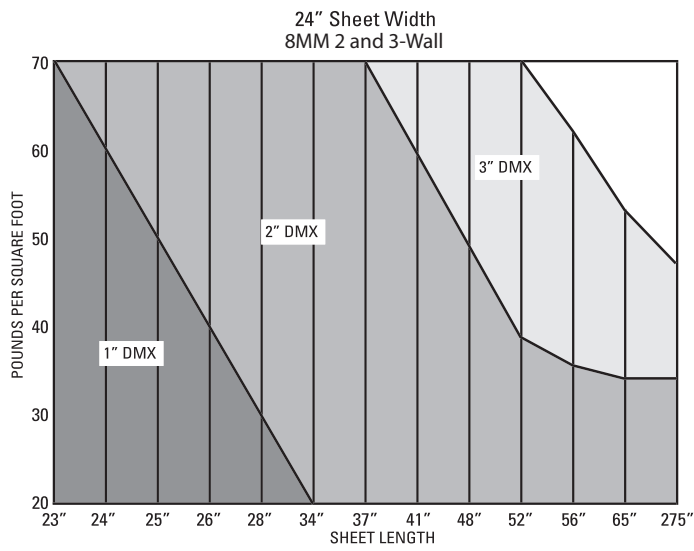


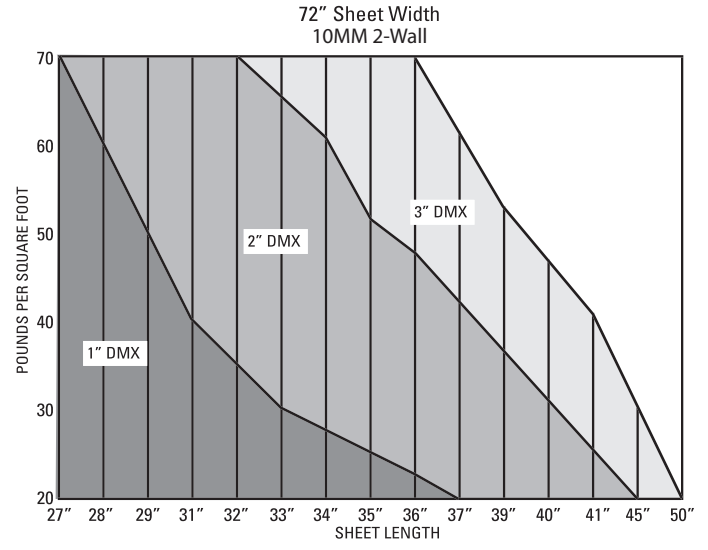
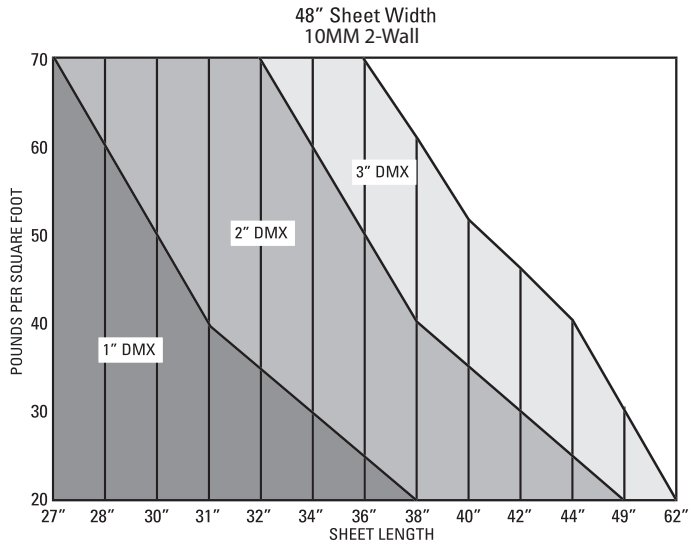
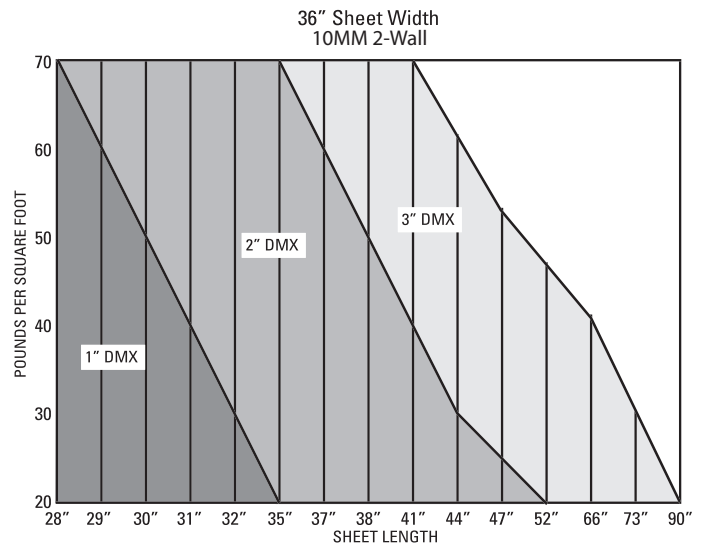
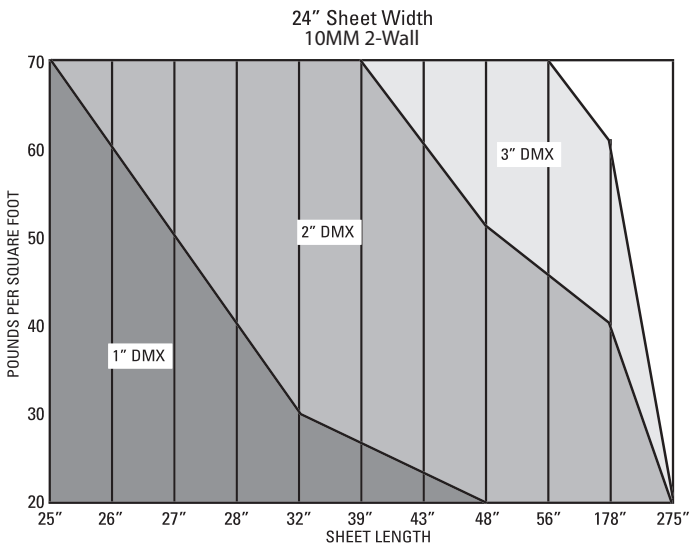
48" Sheet Width  
6mm 2-Wall

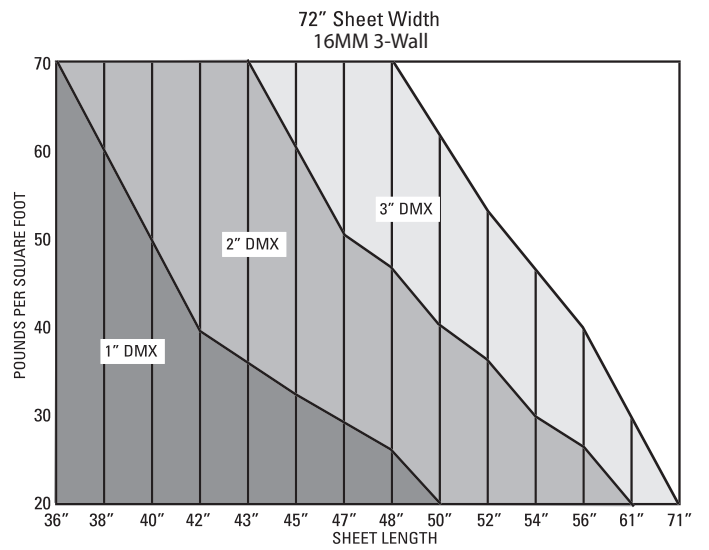
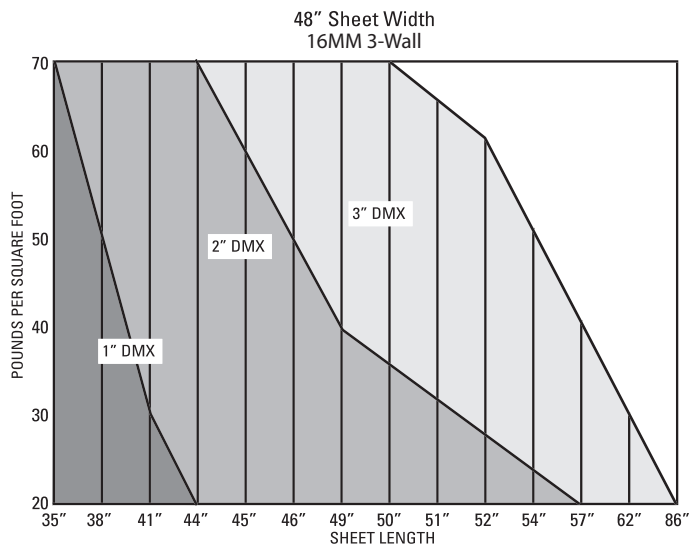
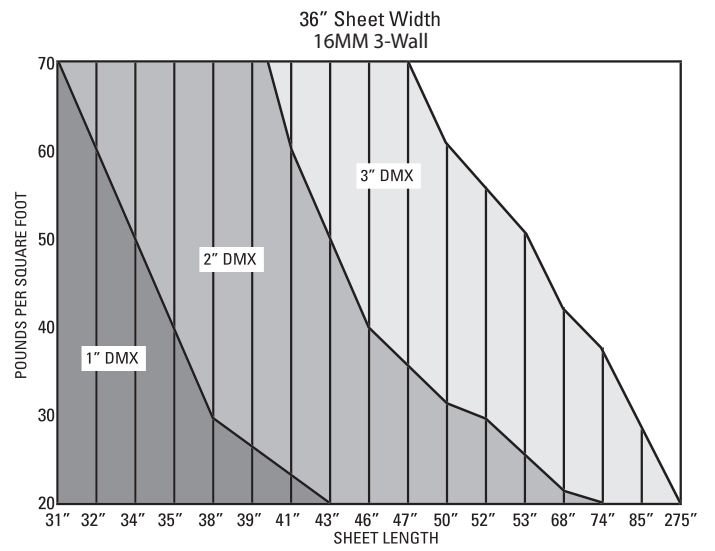
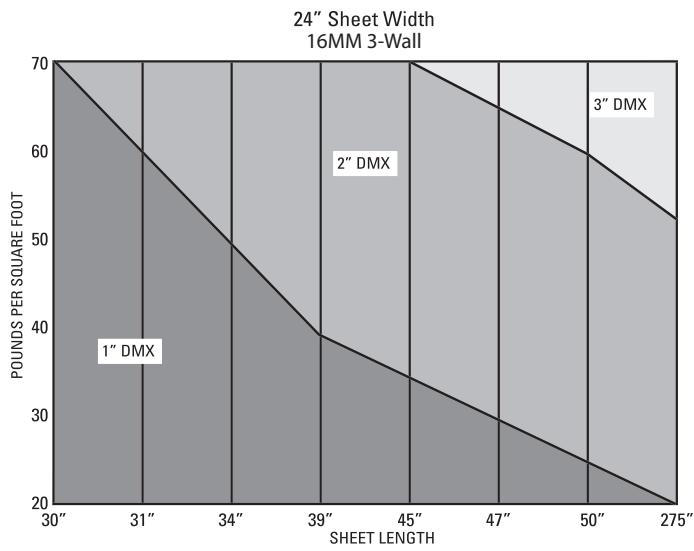


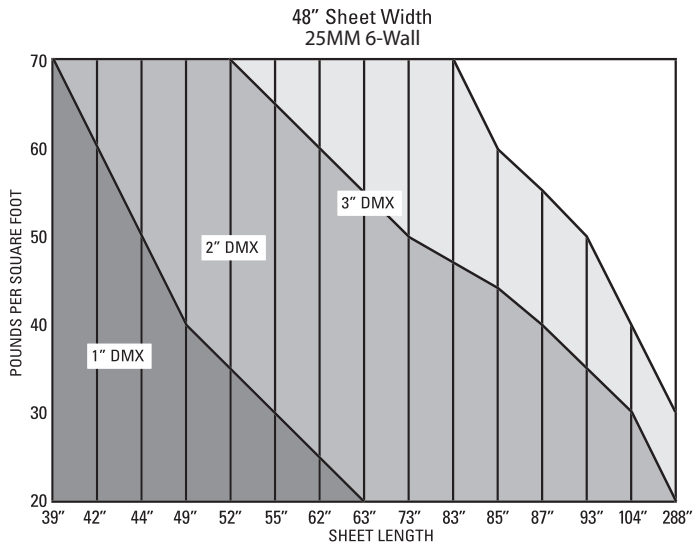
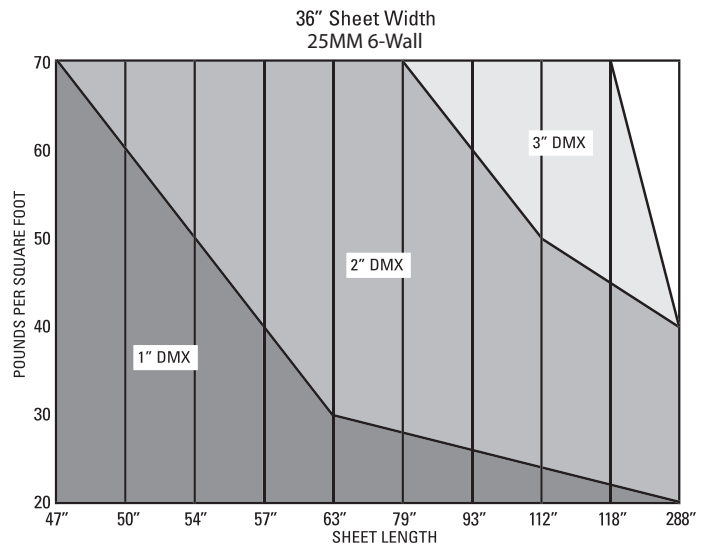
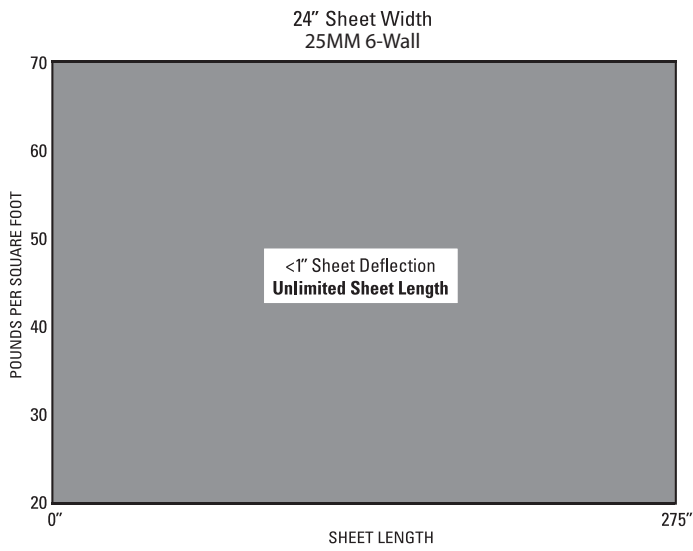
72" Sheet Width  
6mm 2-Wall











For 25MM X-Wall load charts, Please see web site:  
<http://www.sundancesupply.com>  
 (Refer to Load Charts on "Cap Only" or "Base & Cap" Install System web pages)

# Curved Glazing Systems/Sheet Thickness Selection

LEXAN Thermoclear sheet can be successfully cold curved over curved support glazing profiles, to suit many glazing applications, e.g. domes, rooflights etc. Providing the radius is not below the minimum recommended value of 175 times the thickness, then the introduced stress by cold curving 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.

The minimum radius values are outlined below in fig. 51.

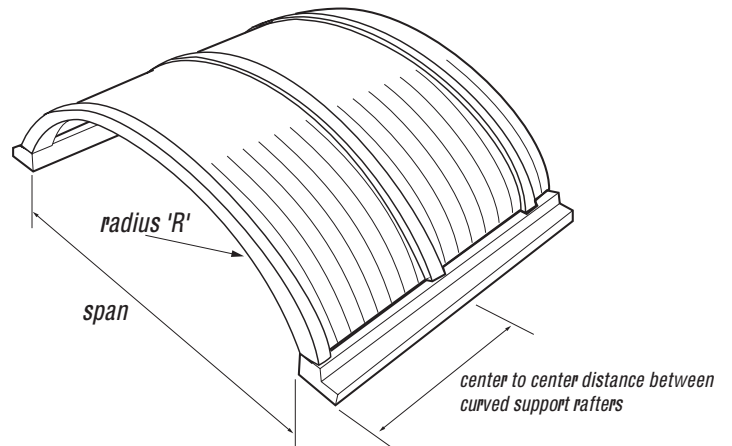
Fig. 51

LEXAN Thermoclear sheet thickness	Min. Radius inches
6	41
8	55
10	69
16	110
25 X-Wall	DO NOT BEND
25 6-Wall	173

The following load charts are based upon curved glazing applications clamped on all four edges. The charts show linear buckling load values (calculated with a safety factor of 2.0) against installation radii.

Sheet length 'L' needs to be greater than sheet width 'W' to facilitate curvature; in practice, a ratio of 1:2 or less is virtually never contemplated because of the practicalities of installation geometry.

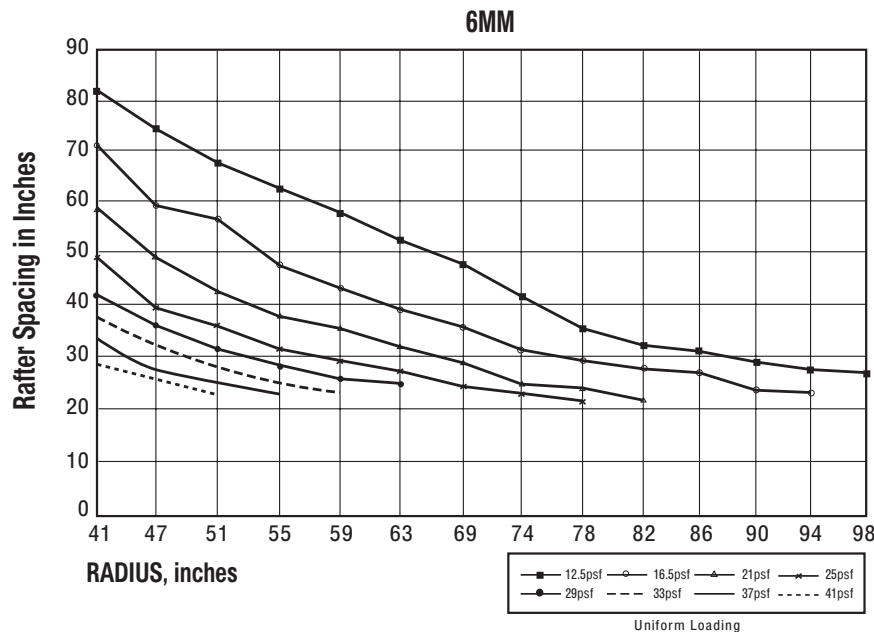
Fig. 50



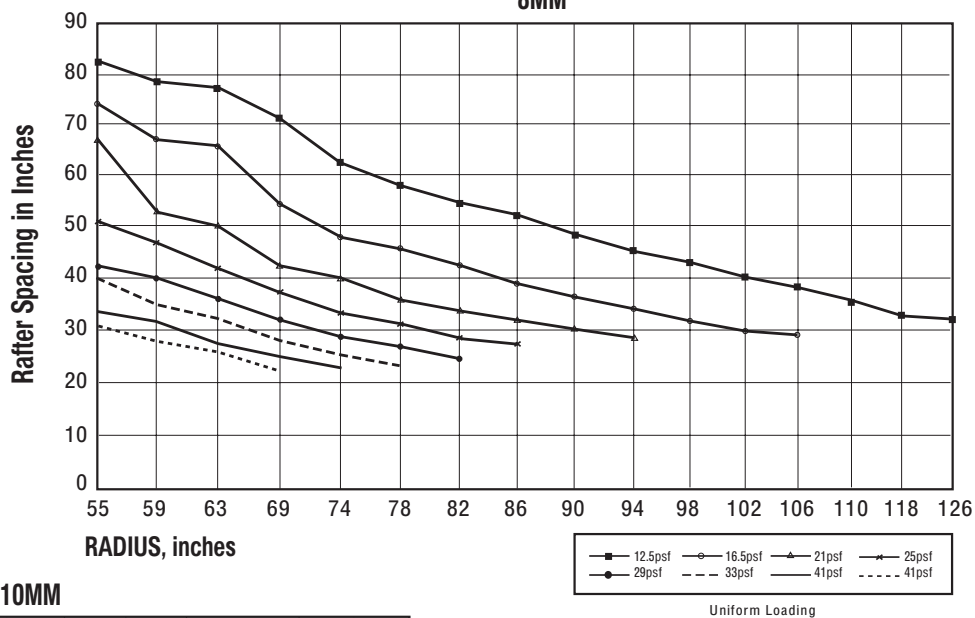
How to read the charts.

## Curved Glazing

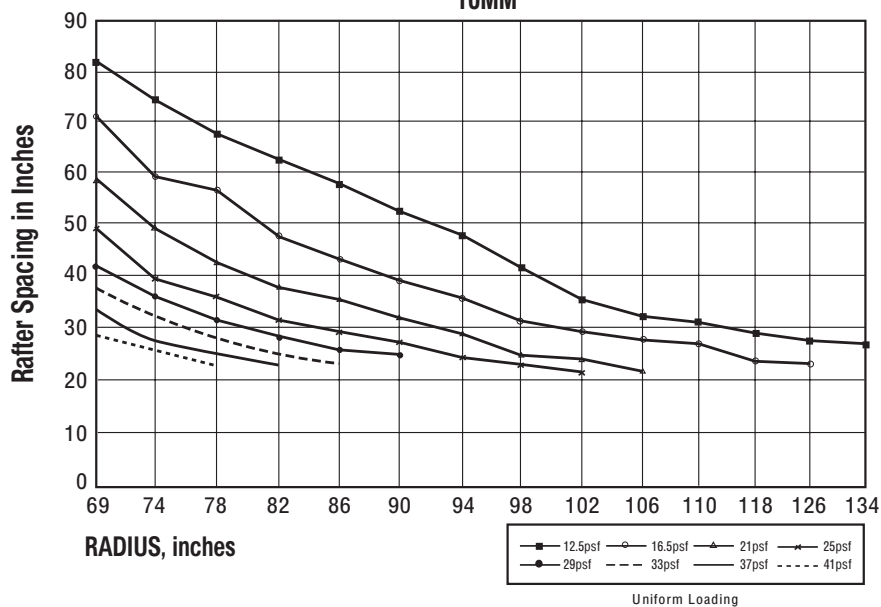
The design information in the following pages is organized in graph form for each thickness of Thermoclear and is based on the cold formed glazing radius and the specified design load. To determine the required rafter spacing, find the graph that represents the desired sheet thickness and locate the line on the graph that represents your loading requirement starting from the design radius fixed on the X axis, plot up to the line that represents the specified loading and locate your maximum rafter spacing on the Y axis.



### 8MM



### 10MM



### 16MM

