

KYDEX® 6200 LTR: Thermoforming and Fabrication Guidelines

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Introduction

KYDEX® 6200 LTR sheet is a specially formulated for the mass transit industry for interior applications where SMP800C compliance is required in addition to FRA flame and smoke requirements outlined in 49 CFR 238 Appendix B/ NFPA 130.

For a toxicity compliant sheet, KYDEX® 6200 LTR has excellent forming and fabrication properties, which results in uniform wall thicknesses and crisp detail. KYDEX® 6200 LTR is capable of forming to deep draws while maintaining a relatively high resistance to hot tearing. KYDEX® 6200 LTR can be easily trimmed, cut and machined with conventional woodworking and sheet metal shop tools.

Forming Guidelines

- Typical heater settings (percentage timers) are 30% – 50% top heaters and 50% - 70% bottom heaters.
- Two sided (sandwich) heaters are recommended for forming KYDEX® 6200 LTR.
- The most frequent problem is trying to heat the sheet too quickly, particularly on the primary surface.
- Cycle times will vary depending on the oven conditions, type of heating elements, and cooling efficiency.
- Initially, it is better to rely on the sheet appearance during heating than on fixed cycle times.
- Forming temperatures – Guidelines: (Try not exceed 400°F (204°C) surface temperature).
360 - 385°F (182 - 196°C) for 0.080" to 0.125" (1.5mm to 3.2mm).
385 - 400°F (196 - 204°C) for > 0.125" (3.2mm)
- Ideally, the core sheet temperature should be within 10°F of the surface temperature.

Approximate Heating Times	
Sheet Thickness	Time (seconds)
1.5mm (0.060")	70 - 80
2.0mm (0.080")	90 - 100
2.4mm (0.093")	100 - 110
3.2mm (0.125")	135 - 145
4.0mm (0.156")	165 - 180
4.7mm (0.187")	195 - 210
5.59 mm (0.220")	230 - 245

- Heating times will vary with heater type and heater set percentages.
- Due to the increased density, KYDEX® 6200 LTR will take about 10% longer to heat than typical KYDEX® sheet grades.
- Drying is generally not required for KYDEX® 6200 LTR except if stored in high humidity conditions or if the material is older than 3 months. Material not stored in original moisture proof packaging may have to be dried sooner than three months. If the material needs to be dried, dry at 150°F (65°C) using the following guidelines:
2.0mm (0.080") - 10 hours
3.2mm (0.125") - 16 hours
5.6mm (0.220") – 20-24 hours
- For additional thermoforming information and troubleshooting guidelines see Technical Briefs 116 and 117.
- *Pressure forming is an alternative technique to standard thermoforming, which allows for tighter radii, better detail, and more uniform wall thickness.*

SEKISUI SPI

ISO 9001 and 14001 Certified

Customer Service

6685 Low St, Bloomsburg, PA 17815 USA
Phone: 800.325.5133, +1.570.389.5810
Outside the US: +1.570.389.5814
Fax: 800.452.0155, +1.570.387.7786
Email: info@sekisui-spi.com

Technical Service

Phone: 800.682.8758
Fax: +1.570.387.8722
Outside the US: +1.570.387.6997
techservice@sekisui-spi.com

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Design Criteria

- The minimum recommended radius for simple vacuum forming is generally equal to the thickness of the starting sheet. In addition, an easy to form radius is 4 times the thickness of the starting sheet.
- Mold Shrinkage for male molds is 0.4% - 0.6% and female molds, 0.5% - 0.7%.
- It is recommended that mold design be reviewed in areas where typically thin areas are present.
- As with any decorative surface, thermoforming will distort the design so draw depths will be limited.

Storage Recommendations

KYDEX recommends that for long-term storage of KYDEX® 6200 LTR, following the instructions on Technical Brief 151 will help protect the sheets during handling, minimize moisture absorption and help in keeping the sheets clean.

Fabrication Guidelines

KYDEX® 6200 LTR Sheet can easily be cut and machined with conventional woodworking and sheet metal shop tools; special tools designed for plastic fabrication are not necessary but would result in cleaner edges.

Cracking or stress whitening of the material is a result of inducing too much stress into the part during the routing or cutting process. Ramping in slowly will ease the cutter in and prevent the part from stress fracturing or stress whitening. If stress whitening occurs; it can be removed easily by applying a slight amount of heat from a heat gun. Cold forming or bending is not recommended.

Gluing Guidelines

An adhesive should not be selected solely based on bond strength information. Factors such as the environmental resistance, cure speed, thermal resistance, and substrate types will play a critical role in determining the best adhesive for a specific application.

KYDEX® 6200 LTR can be adhered to itself and other thermoplastics using some of the more popular adhesives: 2-part acrylics, cyanoacrylates, and solvent cements. Although surface treatment is not necessary for a good bond, surface roughening is a simple, low cost method of increasing the bondability of KYDEX® 6200 LTR. All surfaces should be cleaned with isopropyl alcohol prior to bonding regardless of adhesive used.

2-part Acrylics like Devcon Plastic Welder, Lord 406/19, or 3M DP 8010 will offer best overall adhesion to the most substrates.

Cyanoacrylates, and solvent cements (standard PVC cements) will work best in small, smooth surface areas where a structural adhesive is not needed. These adhesive are very poor gap fillers. These also tend to flash off quickly and have a very rapid cure rate so working time is very limited.

**As with any application, contact the adhesive manufacturer for additional adhesive recommendations, technical information and application directions. Always test for suitability.*

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Mechanically Fastening

If bonding is not practical for a specific application, KYDEX® 6200 LTR can also be mechanically fastened following a few simple guidelines.

To minimize cracking and stress whitening, the use of nylon or rubber washers is recommended in combination with oversized holes. Oversized holes, by 1/16" (1.5 mm) will also help prevent part buckling from expansion and contraction due to temperature changes. In addition, large headed fasteners are recommended to prevent the fastener heads from pulling through the sheet in higher stress areas.

Cleaning

Cleaning the primary side of KYDEX® 6200 LTR, which is the glossier/textured side, is very similar to cleaning standard KYDEX® sheet grades therefore the suggestions found on Technical Brief 114 can be followed.

In Addition:

- Do not use cloths containing grit or abrasive particles, or kitchen scouring compounds to clean KYDEX® 6200 LTR primary surface.
- Strong solvent-based graffiti removers may leave a slightly dull finish if left on the surface too long, if multiple applications are required, or if considerable scrubbing is needed.
- As with any decorative surface, thermoforming will distort the design so draw depths will be limited.

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6685 Low St, Bloomsburg, PA 17815 USA

Phone: 800.325.3133, +1.570.389.5810

Outside the US: +1.570.389.5814

Fax: 800.452.0155, +1.570.387.7786

Email: info@sekisui-spi.com

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Phone: 800.682.8758

Fax: +1.570.387.8722

Outside the US: +1.570.387.6997

techservice@sekisui-spi.com

sekisui-spi.com

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