

INTRODUCTION

General Health and Safety Precautions

Care must be taken whenever fabricating or thermoforming any thermoplastic, including acrylic sheet. The heat of thermoforming, cutting, machining, finishing, annealing, or otherwise processing Acrylic sheet may result in the release of vapors or gases, including methyl methacrylate (MMA) monomer. Additionally, cementing Acrylic sheet introduces other vapors related to the formulation of the adhesives. However, thermoforming Acrylic sheet, in accordance with recommended techniques at recommended temperatures and with adequate ventilation, should not result in harmful concentrations of vapors or gases in the workplace.

Concentration Levels and Ventilation Standards

High concentrations of MMA vapors can cause eye and respiratory irritation, headache and nausea. The OSHA Air Contaminant Standard for MMA places the maximum permissible exposure level at a time weighted average (TWA) of 100 ppm. Rohm and Haas and Craftics recommend a TWA for MMA of 50 ppm.

It is always good practice to provide local exhaust ventilation as close to the point of possible generation of vapors as practical. Suggestions for the design of exhaust ventilation systems are provided in Industrial Ventilation Manual of Recommended Practice, published by the American Conference of Governmental Industrial Hygienists (1982) and American National Standards Institute, Fundamentals Governing the Design and Operation of Local Exhaust Systems, Z9.2-1979.

Special Precautions

Each of the segments in this manual contains a section on any special hazards or precautions related to the process and materials under discussion. Fabricators and other users of Acrylic sheet are advised to read all of these

Health and Safety Precautions sections carefully, to become thoroughly familiar with the properties of these materials, and to take all actions recommended for the safe use and processing of the products. Material Safety Data Sheets should be available from the manufacturer for these purposes.

General Fabrication Considerations

Most fabrication and forming techniques for extruded (like Rohm & Haas Plexiglas MC or Optix) sheet are similar to those used for cast sheet (i.e. Rohm & Haas Plexiglas G), although there are some slight differences, which are noted in the appropriate sections.

In order to maximize the beneficial features of each of the sheet products, certain fabrication techniques may differ in working with extruded, continuous cast and cast sheet.

ACRYLIC SHEET PROPERTIES

Strength and Stresses

Although the tensile strength of Acrylic is 10,500 PSI, a stress-crazing can occur due to loads of 1,500 PSI. Localized, concentrated stresses should be avoided. For this reason, and also because of thermal expansion, it is advisable to install Acrylic in frames rather than to fasten a large sheet with bolts.

Rigidity

Acrylic sheet is not as rigid as many other building materials. Under load (wind load) a sheet will bow and foreshorten as a result of deflection. Therefore, on large windows the rabbets (moulding recesses) or channels engaging the edges of Acrylic must be of sufficient depth.

Thermal Expansion

Expansion must be considered because all plastics expand and contract at a far greater rate than metals or glass. Here is a good rule of thumb for outdoor applications: Based on a temperature differential of 100 °F. (maximum difference between summer and winter temperatures), a sheet of Acrylic 24" x 48" will expand and contract almost 1/8" in width and