Technical Paper

Rittal Foamed-In-Place Gasket

The robotically applied gasket is a thixotropic, two component modified polyurethane resin system. The gasket's closed cell design is excellent where very low water absorption is required.

- It is evident the type of gasket that is used on an enclosure is very important to the environmental rating of the enclosure. The quality of the application and the sustained durability of Rittal's foamed-in-place gasket is second to none.

Application of the Foamed-In-Place Gasket

- Following the paint process, each enclosure or enclosure skin is brought to a fully automated gasketing machine. This machine applies the gasket, which is a mixture of Polyol and Isocyanate, to the enclosure part with remarkable precision and speed. The gasket is applied in a number of different widths and thicknesses depending upon the specific enclosure. The newly gasketed part now goes to a curing station where it will be safe to touch after 20 minutes and fully cured in two hours.

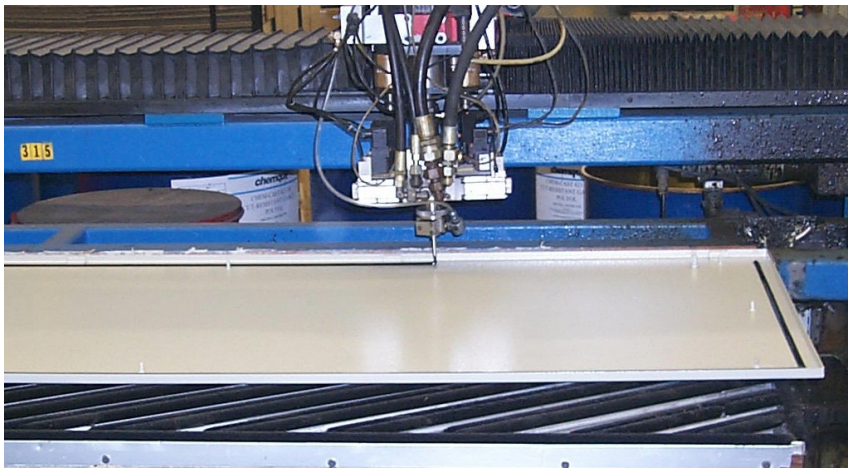

Figure 1 - Gasketing Machine

Characteristics of the Foamed-In-Place Gasket

- High Memory Retention
  - The gasket will return to its original form no matter how long it has been compressed.
- Seamless
  - There are no cracks or seams to allow dust, dirt or liquids into the enclosure.
- Broad Operating Temperature
  - The recommended operating temperature range for the foamed-in-place gasket is -40°F to 140°F.

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- Extreme Heat Resistance
  - The foamed-in-place gasket will withstand 350°F for a maximum of 30 minutes.
- Paintable
  - The gasket is paintable, which allows the customer to paint the enclosure without masking off the gasket. The gasket will maintain all of its original properties.
- Chemical Resistance
  - Rittal's foamed-in-place gasketing was exposed to the following chemicals. Each chemical and substrate has three rating numbers. These numbers represent 30, 60, and 120 days of total submersion of the substrate in the chemical at 72F (22C). The definition of these numbers is as follows:
    1. Recommended - Unaffected by chemical, no deterioration
    2. Satisfactory - Very little effect, reduced aesthetics probable over time
    3. Limited Use - Chemical attack probable with slow deterioration
    4. Not Recommended - Severe attack is imminent; rapid deterioration
  - For example, potassium hydroxide's test results yield a 1-2-3 rating. These results tell us that after 30 days of submersion, the gasket will not be affected, after 60 days, the gasket performs satisfactorily and is affected very little and after 120 days the gasket will begin to slowly deteriorate and should used in limited situations with the chemical.

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Gasketing Exposure Test Results	30 Days	60 Days	120 Days
#1 Fuel Oil (Kerosene)	1	2	2
#2 Fuel Oil	1	2	2
Acetic Acid (10% sol.)	1	2	2
Acetone	4	4	4
Aluminum Chloride (10% sol.)	1	1	1
Aluminum Sulfate (10% sol.)	1	1	1
Ammonium Chloride (10% sol.)	1	1	1
Ammonium Hydroxide (25% sol.)	1	1	1
Ammonium Nitrate (10% sol.)	1	1	1
Ammonium Phosphate (10% sol.)	1	1	1
ASTM #1 Oil	1	1	1
ASTM #3 Oil	1	1	1
Axle Grease	1	1	1
Bromine Water	1	2	2
Calcium Chloride (10% sol.)	1	1	1
Calcium Hydroxide (10% sol.)	1	1	1
Calcium Hypochlorite	4	4	4
Calcium Sulfate (10% sol.)	1	1	1
Carbolic Acid (25% sol.)	2	2	3
Carbon Tetrachloride	4	4	4
Citric Acid (10% sol.)	1	1	1
Cutting Fluid - Dark	2	2	2
Cutting Fluid 5 Star (10% sol.)	2	2	2
Cutting Fluid Castrol (580H)	1	1	1
Cutting Fluid Rustilick (10% sol.)	2	2	2
Distilled Water	1	1	1
Ethyl Alcohol	2	3	3
Ethylene Glycol	1	1	1

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Gasketing Exposure Test Results	30 Days	60 Days	120 Days
Ferric Chloride (10% sol.)	1	2	2
Formic Acid (10% sol.)	2	2	2
Hydraulic Brake Fluid	2	2	3
Hydraulic Oil	1	1	1
Hydrochloric Acid (25% sol.)	1	1	1
Hydrofluoric Acid (40% sol.)	2	2	2
Isopropyl Alcohol	2	2	3
Liquid Dish Soap (10% sol.)	1	1	1
Magnesium Chloride (10% sol.)	1	1	1
Magnesium Hydroxide (10% sol.)	1	1	1
Mercuric Chloride (10% sol.)	1	2	3
Methylene Chloride (10% sol.)	4	4	4
Mineral Spirits	1	1	1
Motor Oil (10 wt.)	1	1	1
Nitric Acid (25% sol.)	4	4	4
Oxalic Acid (10% sol.)	1	1	1
Perchlorethylene	4	4	4
Phosphoric Acid (25% sol.)	1	1	1
Phosphoric Acid (50% sol.)	2	2	2
Pickling Solution	1	1	1
Potassium carbonate (10% sol.)	1	1	1
Potassium Chloride (25% sol.)	1	1	1
Potassium Hydroxide (25% sol.)	1	2	3
Potassium Nitrate (10% sol.)	1	1	1
Potassium Sulfate (10% sol.)	1	1	1
Sea Water	1	1	1
Soap Igopal (10% sol.)	3	3	3
Sodium Bicarbonate (10% sol.)	1	1	1
Sodium Bisulfate (10% sol.)	1	1	1
Sodium Chloride (25% sol.)	1	1	1
Sodium Hydroxide (25% sol.)	1	1	1
Sodium Hypochlorite	4	4	4
Sodium Nitrate (10% sol.)	1	1	1
Sodium Phosphate (10% sol.)	1	1	1
Sulfuric Acid (25% sol.)	1	1	2
Sulfurous Acid (10% sol.)	1	1	1
Tannic Acid (10% sol.)	2	2	3
Tetrahydroluren	4	4	4
Toluene	3	3	3
Turpentine	1	2	2
Unleaded Gasoline	1	2	2
Xylene	3	3	3
Zinc Chloride (10% sol.)	1	1	1

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Gasketing Exposure Test Results	30 Days	60 Days	120 Days
Moderate to weak acids & alkali	No effect.		
Aromatic & Alipahtic Hydrocarbons, e.g. Touluene & Heptane	Acceptable, but some swelling occurs.		
Alcohols, e.g. Methanol & Ethanol	Acceptable, but some swelling occurs.		
Ketones, esters, & Chlorinated Hydrocarbons	Considerable swelling occurs.		
Glycols & Glycol Ethers, e.g. Ethylene Glycol	Acceptable, but some swelling occurs.		

Conclusion

- The wide range of operating temperatures, chemical resistance, and the seamless air and watertight design of our foamed-in-place gasketing gives our customers the flexibility and integrity for a broad range of applications.

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