

Products covered: Polyarmor series powder coatings

Polyarmor Series products have outstanding resistance to physical and chemical attack and excellent resistance to liquid permeation. Some aromatic, cyclic and higher aliphatic hydrocarbon solvents can cause swelling and permeation. POLYARMOR Series products should be used with caution in environments containing these types of products. Chemical effects on Protech products may be divided into three categories: oxidation, stress cracking and plasticization. Only oxidation is true chemical degradation; the other two involve changing the physical properties of the polymers.

Oxidizers

Are capable of chemically degrading POLYARMOR products. The effects of strong oxidizers may not be noticeable in the short-term. For this reason, long-term evaluation should always be used to accurately gauge the effect of the chemical in question on the coating. Oxidizers typically cause surface cracking, crazing or discoloration. Examples of strong oxidizers include:

- Nitric acid, fuming
- Sulfuric acid, fuming (oleum)
- Aqua regia
- Chlorine (wet gas)
- Bromine (liquid)

Stress crack agents

Certain surface-active materials, though they have no chemical effect on POLYARMOR products, can accelerate cracking of these products under stress. Stress may be physically induced by bending or temperature changes. The following materials are example of stress cracking agents, which are unsuitable for long-term exposure.

- Methyl Alcohol
- Ethyl Alcohol
- N-Propyl Alcohol
- Isopropyl Alcohol
- Ethylene Glycol

Plasticizers

Certain types of non-aqueous chemicals are absorbed to varying degrees causing swelling, weight gain, softening and some loss of yield strength. These plasticizers cause no real chemical degradation of the coating. Some organic solvents like aliphatic hydrocarbons, chlorinated hydrocarbons, aromatics and heterocyclic compounds have a strong plasticizing effect and up to 20% solubility in the polymer. Most of these solvents are sufficiently volatile to allow the coating to "dry out" (when removed from contact with the coating) and return to its original condition with no impairment of properties. For this reason, intermittent or "splash zone" performance of these products will be much different than continuous, immersion service in these environments. Typical plasticizers include:

- Gasoline
- Aromatic Hydrocarbons
- Methane Jet Fuel

TESTING IS IMPORTANT!

The Chemical Resistance Data Table is intended to be used only as a general guideline. Because so many variables are involved, it must be recognized that standard laboratory tests may not give results that are comparable to actual field applications. The success of any coating in a particular chemical environment must be determined by testing carried out under conditions, which approximate as closely as possible, those expected in service.

The following procedure is recommended to determine the suitability of Protech products to resist a specific chemical exposure:

1. Immerse a weighed Protech sample in the chemical. The test environment should duplicate, as closely as possible, the actual service conditions.
2. At the end of the test period, the Protech sample should be weighed to determine if there has been any weight gain or loss. Any change in surface hardness should be noted.
3. Check the sample for chemical degradation or surface crazing, cracking or discoloration. General coating integrity should be evaluated based on cohesive strength or adhesion loss.

Any significant swelling, weight change, cracking or discoloration indicates a problem. ASTM D543 – "Resistance of Plastics to Chemical Reagents" may be used as a guideline to resistance evaluation.

The Chemical Resistance Data Table is intended only as a preliminary, general guide to resistance of certain Protech products to various chemicals. It should not be used by the industry as the basis for final decisions because specific application, design and/or conditions of use may have added effects on performance in a particular chemical environment. It is recommended that testing of the specific application be conducted under expected service conditions.

Polyarmor general guide to chemical resistance chart

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|--|-------------------------------|
| E = EXCELLENT The plastic was unaffected in any way throughout the duration of the test. | 1 – Cracked |
| G = GOOD A very slight clouding or discoloration took place. | 2 – Surface Distortion |
| F = FAIR A slight clouding or discoloration took place. | 3 – Color Change |
| M = MODERATE Some discoloration and surface effects took place. | |
| P = POOR Considerable changes in appearance. | |
| N = NOT RECOMMENDED Severe chemical attack rendered the sample unusable by the end of the test. | |
| S = SOLVENT The sample dissolved completely by the end of the test. | |

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|-------------------------|--------------|---------------------------|--------------|
| Initial E | E | 10% Nitric Acid E-2 | E-2 |
| Water E | E | 95% Ethyl Alcohol F | F |
| Methyl Alcohol G | G | Turpentine P-1-2 | P-1-2 |
| Bleach E | E | 3% Hydrogen Peroxide E-2 | E-2 |
| Peanut Oil E | E | 2% Sodium Carbonate M-2 | M-2 |
| Heptane N-1 | N-1 | 30% Hydrogen Peroxide G-2 | G-2 |
| 5% Acetic Acid M | M | 20% Sodium Carbonate G | G |
| 10% NaOH G | G | Oleic Acid G | G |
| Perchloroethylene N-1 | N-1 | Carbon Tetrachloride N-1 | N-1 |
| 10 % HCl G | G | Conc. Ammonia F | F |
| 3% Sulfuric Acid G-2 | G-2 | Conc. HCl G | G |
| 10% Ammonia G-2 | G-2 | 50% NaOH G | G |
| Ethylene Glycol G | G | Non-detergent 30W Oil G | G |
| Acetone P-1 | P-1 | Detergent 20W-50 Oil F | F |
| Naphtha P-1 | P-1 | 1% NaOH F | F |
| Mineral Oil F | F | Ethyl Acetate M | M |
| 10% Igepal F | F | Conc. Sulfuric Acid M | M |
| 1% Citric Acid G-2 | G-2 | Diethyl Ether P | P |
| 10% NaCl E-2 | E-2 | 40% Nitric Acid E | E |
| Conc. Nitric Acid F-3 | F-3 | 40% Chromic Acid P | P |
| Glacial Acetic Acid M-2 | M-2 | Isooctane P | P |
| Kerosene M-1-3 | M-1-3 | Dichloroethane P | P |
| DMF P-1 | P-1 | 50% Ethyl Alcohol M-2 | M-2 |
| 1% Soap E-2 | E-2 | 30% Sulfuric Acid G-2 | G-2 |
| Toluene N-1 | N-1 | | |

The technical data contained in the "Chemical Resistance Data" are guides to the use of Protech products listed. The advice herein is based upon tests and information believed to be reliable, BUT users should not rely upon it absolutely for specific applications. It is given and accepted at the user's risk and confirmation of its validity and suitability in particular cases should be obtained independently. Protech makes no guarantee of results and assumes no obligation or liability in connection with its advice. This presentation is not to be taken as a license to operate under, or recommendation to infringe any patents.

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