

# Action Bullet Resistant, Inc.

## CLEANING INSTRUCTIONS FOR ALL LAMINATES OF GLASS, GLASS/POLYCARBONATE, ALL POLYCARBONATE OR DUPONT SPALLSHIELD®

Security laminates are comprised of multiple layers of glass and various plastic materials that can be adversely affected by different chemicals and solvents. The following techniques are for cleaning the surfaces of Security Glass, Glass/Polycarbonate and Dupont Spallshield® Products. Care should be taken to not expose the laminate edges to any moisture or chemicals. The following guidelines are based on standard industry practices, to ensure acceptable results, always test a sample of the material with the cleaner and technique to be used.

### **STEP #1**

Wash with a mild soap or detergent (see recommended cleaners) and lukewarm water using a clean sponge or soft cloth. Rinse well with water. Dry thoroughly with chamois or moist cellulose sponge. (Do not use a squeegee on polycarbonate, Spallshield® or any plastic surface.)

### **STEP #2**

Remove masking adhesives, glazing compound, grease and paint splashes with compatible cleaning agents (see Instructions below). NEVER USE CLEANING AGENTS IN DIRECT SUN LIGHT OR AT ELEVATED TEMPERATURES. NEVER LEAVE CLEANERS ON SURFACE FOR LONG PERIOD OF TIME. DO NOT USE GASOLINE.

#### **To Remove Masking Adhesive and Glazing Compound:**

Isopropyl Alcohol, Naphtha VM&P grade or Kerosene will help lift stickers and other adhesive backed labels. Apply with clean soft cloth, wash immediately with soap and lukewarm water and rinse thoroughly with clean water.

#### **To Remove Graffiti:**

Naphtha VM&P grade, Isopropyl Alcohol or Butyl Cellosolve removes paint, marker ink. (Do not use in direct Sunlight).

### **STEP #3**

Final Wash with a mild soap or detergent (see recommended cleaners) and lukewarm water using a clean sponge or soft cloth. Rinse well with water. Dry thoroughly with chamois or moist cellulose sponge. (Do not use a squeegee on polycarbonate Spallshield® or any plastic surface.)

### **TO MINIMIZE FINE OR HAIRLINE SCRATCHES ON POLYCARBONATE**

Fine scratches and minor abrasions can be minimized by using a mild polish (see compatible list). Plastic Polishes applied and removed per manufacturer instructions.

#### **Suggested Polishes:**

Mirror Glaze Clear Plastic Polish, Cleaner & Detailer (by Meguiars 800-347-5700 or Meguiars.com)  
Novus Plastics Polish #1, #2 (by Novus Inc. 800-NOVUS60 or noscratch.com)  
Plexus Plastic Cleaner and Polish (by BTI Chemical Co. PlexusPlasticCleaner.com)

### **GENERAL GUIDELINES:**

- ALWAYS use clean soft clothes or sponges for
- ALWAYS follow application with warm water rinse.
- DONOT use abrasives or high alkaline cleaners.
- DONOT leave cleaners on surface for long periods of time, wash immediately.
- DONOT use cleaners in direct sunlight or at elevated temperatures.
- DONOT use scrapers or razors.
- DONOT use squeegee on Polycarbonate Spallshield® or any plastic surface.
- DONOT use Benzene, Gasoline, Acetone, Carbon Tetrachloride or other detrimental chemicals. (See attached list)

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- DO NOT expose the edges of laminates with PVB (Polyvinyl Butyral) Interlayers, to organic solvents, which can react with the plastic interlayer. This includes but is not limited to, Naphtha VM&P Grade, Isopropyl Alcohol, Kerosene, Petroleum Spirits, or any Aliphatic Hydrocarbons.

## RECOMMENDED CLEANERS AND DETERGENTS:

Joy, Windex with Ammonia D, Palmolive, Naphtha VM&P Grade, Isopropyl Alcohol, Kerosene  
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## ADDITIONAL INFORMATION ON ENVIRONMENTAL RESISTANCE OF POLYCARBONATE:

Polycarbonate sheet may be used in a diverse range of environmental conditions. However, as with any thermoplastic, some environmental conditions have proven to be detrimental to polycarbonate. Varying degrees of stress, strain and temperature may also alter the resistance of polycarbonate sheet; consequently fabricated parts should be tested thoroughly under actual in-service conditions prior to final design.

## POLYCARBONATE IS RESISTANT AT 70°F AND 0% STRAIN TO:

### Chemicals:

Amyl Alcohol  
Aluminum Chloride  
Aluminum Sulphate  
Ammonium Chloride  
Ammonium Nitrate  
Ammonium Sulphate  
Antimony Trichloride  
Arsenic Acid 20%  
Butyl Alcohol  
Calcium Nitrate  
Chlorinated Lime Paste  
Chrome Alum  
Chromic Acid 20%  
Citric Acid 40%  
Copper Chloride  
Copper Sulphate  
Cuprous Chloride  
Formic Acid 10%  
Formalin 30%  
Glycerine  
Heptane  
Hydrochloric Acid 10%  
Hydrogen Peroxide 30%  
Hydrofluoric Acid 10%  
Isopropanol  
Lactic Acid 20%  
Magnesium Chloride  
Magnesium Sulphate  
Manganese Sulphate  
Mercuric Chloride  
Nickel Sulphate  
Nitric Acid 10%  
Nitric Acid 20%  
Oleic Acid  
Oxalic Acid  
Pentane  
Phosphoric Acid 10%  
Potassium Bromate

Potassium Bromide  
Potassium Nitrate  
Potassium Perchlorate  
Potassium Permanganate  
Potassium Persulphate  
Potassium Sulphate  
Silicone Oil  
Silver Nitrate  
Sodium Bicarbonate  
Sodium Bisulphate  
Sodium Carbonate  
Sodium Chlorate  
Sodium Hypochlorite  
Sodium Sulphate  
Sodium Chloride  
Sulfur  
Sulfuric Acid 10%  
Sulfuric Acid 50%  
Tartaric Acid 30%  
Zinc Chloride  
Zinc Sulphate

### Industrial Petroleum Products:

Axle Oil  
Compressor Oil  
Diesel Oil  
Kerosene  
Refined Oil  
Spindle Oil  
Transformer Oil  
Vacuum Pump Oil

**Note: Elevated temperatures and/or strain significantly alters resistance to industrial petroleum products**

### Common Household Materials:

Beer  
Borax

Cocoa  
Cement  
Chocolate  
Cod Liver Oil  
Cognac  
Coffee  
Detergents  
Fish Oil  
Fruit Syrup  
Grapefruit Juice  
Gypsum  
Joy Liquid Detergent  
Insulating Tape  
Linseed Oil  
Liquor  
Milk  
Mineral Water  
Mustard  
Onions  
Orange Juice  
Paraffin Oil  
Rapeseed Oil  
Rum  
Salad Oil  
Salt Solution 10%  
Soap  
Table Vinegar  
Tincture of Iodine 5%  
Tomato Juice  
Vodka  
Washing Soap  
Water  
Wine

**Sulfuric Acid 1% attacks polycarbonates**

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## Polycarbonate has limited resistance at 70 deg. F and 0% strain to:

Anti-freeze	Ethylene Glycol	Milk of Lime (CaOH)
Calcium Chloride	Hydrochloric Acid	Nitric Acid (concentrate)
Cyclohexanol		Sulfuric Acid (concentrate)

## POLYCARBONATE IS NOT RESISTANT TO:

Acetaldehyde	Caustic Soda Solution 5%	Nitrobenzene
Acetic Acid (concentrate)	Chloroethene	Nitrocellulose Lacquer
Acetone	Chlorobenzene	Ozone
Acrylonitrile	Cutting Oils	Phenol
Ammonia	Cyclo Hexanone	Phosphorous Hydroxy Chloride
Ammonium Fluoride	Cyclohexene	Phosphorous Trichloride
Ammonium Hydroxide	Dimethyl Formamide	Propionic Acid
Ammonium Sulfide	Ethane Tetrachloride	Sodium Sulfide
Benzene	Ethylamine	Sodium Hydroxide
Benzoic Acid	Ethyl Ether	Sodium Nitrate
Benzyl Alcohol	Ethylene Chlorohydrin	Tetrahydronaphthalene
Brake Fluid	Formic Acid (concentrate)	Thiophene
Bromobenzene	Freon (refrigerant & propellant)	Toluene
Butyric Acid	Gasoline	Turpentine
Carbon Tetrachloride	Lacquer Thinner	Xylene
Carbon Disulfide	Methyl Alcohol	
Carbonic Acid	Methyl Ethyl Ketone	
Caustic Potash Solution 5%		

## POLYCARBONATE IS DISSOLVED BY:

Chloroform	Dioxane	Methylene Chloride
Cresol	Ethylene Dichloride	Pyridine

In general, polycarbonate sheet has good resistance to water, organic and inorganic acids, neutral and acid salts and aliphatic and cyclic hydrocarbons. Alkalines, amines, ketones, esters and aromatic hydrocarbons attack polycarbonate. Solvents for polycarbonate are: methylene chloride, ethylene dichloride and dioxane.

This chemical and solvent resistant listing is intended to assist designers in determining whether polycarbonate can be used in certain environments. It is very important to test prototype parts under end-use conditions for final verification of performance. All data is based on 70°F and 0% strain.

Polycarbonate sheet has good resistance to water up to approximately 150°F above this temperature, the effect of moisture is time temperature related. Exposing polycarbonate sheet to repeated steam cleaning or dish washing can create hydrolytic crazing. The result can be a clouding of the surface and ultimately a loss of physical strength properties.