

Plastic Materials

• Acrylic (Plexiglas)

- Durable;
- Shatter resistant (compared to glass);
- Can be machined to close tolerances.
- Uses include windows, displays, and lab fixtures.
- Glueable using Methylene Chloride as a solvent or Weld-On 4 (solvent), Weld-On 16 (thickened), cyanoacrylic super-glues do not work well.

• Polycarbonate (Lexan)

- Durable;
- 30x more shatter resistant (compared to Acrylic);
- Easy to fabricate.
- Uses include windows and transparent shields.
- Gluing with Methylene Chloride does not work well but Weld-On 55 (two-part) and some cyanoacrylic super-glues do.

• Poly Vinyl Chloride -- PVC

- High-impact and chemical resistant;
- Toxic and corrosive when heated or laser cut.
- Uses include casings and water pipes (white).
- Glue with plumbing PVC cement, Oatey 30875 Flexible Clear Cement, or Weld-On 780, 781, 782.
- Acetone works as a solvent.

• Acrylonitrile Butadiene Styrene -- ABS

- High-impact and chemical resistant;
- Laser cuttable and 3D printable.
- Uses include casings and waste water pipes (black).
- Glue with plumbing ABS cement, Weld-On 773, 778, or 2354, or Oatey - 30818 - All-Purpose Medium Bodied Cement.
- MEK or Methylene Chloride work as solvents.

• Acetal (Delrin)

- Machines as well as brass and aluminum;
- Properties:
 - High degree of toughness
 - Impact strength
 - Dimensional stability
 - Low coefficient of friction
 - Fair chemical resistance;
- Uses include gears, bearings, pump and valve components.
- To glue, Loctite Epoxy Plastic Bonder or Poly-Zap Multi-Purpose Formula may be used.

• Nylon









- Extremely strong, tough, and abrasion resistant;
- Has self lubricating characteristics;
- Properties:
 - Impact resistance;
 - Mechanical strength;
 - Resilience
 - Good insulating properties;
 - Dimensional stability at high temperatures;
 - Resistance to a variety of chemicals;
- Uses include bushings, pulleys, and gears.
- To glue, Loctite Epoxy Plastic Bonder or Poly-Zap Multi-Purpose Formula may be used but the joins may not be high strength.

- **Polyethylene -- LDPE and HDPE**
 - Flexible and impact resistant;
 - Chemical resistant;
 - Uses include plastic bags (LDPE), bottles and cutting boards (HDPE).
 - Loctite Epoxy Plastic Bonder or TAP Poly-Weld Adhesive may work as a glue.
- **Polypropylene -- PP**
 - Harder surface than Polyethylene;
 - Chemical resistant;
 - Uses include plastic bags (LDPE), cutting boards (HDPE).
 - Loctite Epoxy Plastic Bonder or TAP Poly-Weld Adhesive may work as a glue.
- **Polystyrene ("styrene" and Styrofoam)**
 - Excellent forming and injection molding properties;
 - Non-toxic and odorless.
 - Uses include signs, models, toys, packaging, coffee cups.
 - Glue with hobby model glue.
 - Toluene or Methelene Chloride work as a solvents.
- **Thin film materials**
 - Flexible sheets;
 - Cutable;
 - Printable.
 - **Cellulose Acetate --**
 - Used in graphics and signs;
 - Doesn't glue very well, but Goop may work for some uses.
 - Acetone may work as a solvent.
 - **Polyethylene Terephthalate -- Polyester Film -- PETE (Mylar) --**
 - Used in soda bottles;
 - Doesn't glue very well, but Goop may work for some uses.
 - **Vinyl**
 - Very flexible;
 - Used in signs and upholstery;
 - Use special vinyl glues or materials for PVC.
- **Resins**
 - For surfacing or molding;
 - **Polyester Resins**
 - Two part fiberglas and casting resins;
 - Use TAP Styrene Monomer as a thinner.
 - Acetone works as a solvent.
 - **Epoxy Resins**
 - Two part fiberglas and casting resins;
 - Acetone and MEK work as a solvents/thinners.
 - **Polyurethanes -- PU**
 - Foams and surface coatings;
 - Used in insulation and protective coatings;
 - Not much dissolves it after it sets.
 - **Melamine formaldehyde (Melamine, Formica)**
 - Uses include dishes and tabletops.
 - Some contact adhesives and silicone sealants work for gluing.
- **Polyetheretherketone -- PEEK**
 - Strong, chemical and heat resistant;
 - Uses include medical implants.
 - Some epoxies may work as adhesives.
- **Polytetrafluoroethylene -- PTFE (Teflon)**
 - Slippery, chemical and heat resistant;
 - Low friction surface;
 - Uses include plumber's tape, guides, gasketing, non-stick surfaces.
 - Not much will work as an adhesive.

Commercial Adhesive Roundup

- **Testors (and others) Model Cement** -- Toulene based for models and toys. Only works on polystyrene.
- **Cyanoacrylate "Super Glues"** -- work sometimes on some things for some time.
- **SureHold 302 Plastic Surgery Glue** -- better than regular cyanoacrylate Super Glue on most plastics.
- **Gorilla Glue** -- Polyurethane glue for wood and many plastics.
- **Loctite Plastics Bonding System** -- Two part super glue. Bonds leather, cork, paper, cardboard, wood, chipboard, fabric, metal, ceramic, rubber and plastics such as acrylic, polycarbonate, polystyrene, PVC, polyethylene, polypropylene, and PTFE (maybe...).
- **Loctite Epoxy Plastic Bonder** -- Two part, primer and adhesive, for bonding: PVC, polycarbonate, acrylic, ABS, polyester fibre, Nylon, Mylar, Delrin, and phenolic to themselves or aluminum and stainless steel. Not recommended for wet areas or bonding polyethylene, polypropylene, or Teflon.
- **JB Weld PlasticWeld** -- Two part epoxy putty, bonds nearly every material perfectly, with the exception of polyethylene, polypropylene, and Teflon (according to the web).
- **Weld-On (adhesive products chart):**
 - **Weld-On 4 and 16** -- A clear solvent or thickend cement for acrylic. Both also cement styrene, butyrate, and other plastics.
 - **Weld-On 55** -- For bonding a wide variety of thermoplastics, including polycarbonate, butyrate, PETG, buffed acrylic, ABS, PVC, polyurethane and foam board.
 - **Weld-On 66** -- Light bodied, fast setting, versatile solvent cement for bonding flexible or rigid vinyl to itself or to urethane, leather, canvas, ABS, foamed PVC, butyrate, and wood.
- **Poly-Zap Multi Purpose Formula** -- For Lexan. Medium viscosity, sets in seconds. Not for use in wet locations or with Teflon, polyethylene, polypropylene, and certain silicone rubbers.
- **TAP Poly-Weld Adhesive** -- Two part adhesive for Polyethylene.
- **All Purpose Amazing GOOP® (good review)** -- A silicon type glue and sealant which sticks to almost everything except nylon and polyurethane. Remains slightly resilient after curing. According to the intertubes the Automotive, Household, and Plumbing versions are identical but the Marine and Outdoor types are more UV-resistant. The original Shoe Goo is a bit more flexible after curing. The E6000 version is more liquid and "self leveling". Useful Info: According GOOP Central (1-800-693-GOOP), there are three recommended solvents for GOOP. They are acetone, toluene and naphtha. Acetone will do a good job on GOOP that has not fully set. Toluene is a more powerful solvent that will remove fully set GOOP. Naphtha, a solvent used in dry cleaning and a primary component of Zippo®, Ronson® and other lighter fluids (used in wick-type cigarette lighters), is recommended for removing GOOP on clothing.
- **Duco Cement** -- Multi-purpose household glue. Bonds wood, china, leather, glass, paper, ceramics and metal. Works on phenolic resin plastics such as formica but not for polystyrene, polyethylene, or polypropylene. Acetone is a good solvent for Duco.

For the Recyclers Out There

The Plastic Identification Code				
Symbol	Type of Plastic	Properties	Common Uses	Recycled In
 PET	PET Polyethylene Terephthalate	Clear, tough, solvent resistant, barrier to gas and moisture, softens at 80°C	Soft drink and water bottles, salad domes, biscuit trays, salad dressing and peanut butter containers	Pillow and sleeping bag filling, clothing, soft drink bottles, carpet
 PE-HD	PE-HD High Density Polyethylene	Hard to semi-flexible, resistant to chemicals and moisture, waxy surface, opaque, softens at 75°C, easily coloured, processed and formed	Crinkly shopping bags, freezer bags, milk bottles, ice cream containers, juice bottles, shampoo, chemical and detergent bottles, buckets, rigid agricultural pipe, milk crates	Recycling bins, compost bins, buckets, detergent containers, posts, fencing, pipes
 PVC	PVC Unplasticised Polyvinyl Chloride PVC-U Plasticised Polyvinyl Chloride PVC-P	Strong, tough, can be clear, can be solvent welded, softens at 80°C Flexible, clear, elastic, can be solvent welded	Cosmetic containers, electrical conduit, plumbing pipes and fittings, blister packs, wall cladding, roof sheeting, bottles Garden hose, shoe soles, cable sheathing, blood bags and tubing, watch straps	Flooring, film and sheets, cables, speed bumps, packaging, binders, mud flaps and mats
 PE-LD	PE-LD Low density Polyethylene	Soft, flexible, waxy surface, translucent, softens at 70°C, scratches easily	Glad wrap, garbage bags, squeeze bottles, black irrigation tube, black mulch film, garbage bins	Rubbish bin liners, pallet sheets
 PP	PP Polypropylene	Hard but still flexible, waxy surface, softens at 140°C, translucent, withstands solvents, versatile	Dip pottles and ice cream tubs, potato chip bags, straws, microwave dishes, kettles, garden furniture, lunch boxes, blue packing tape	Pegs, bins, pipes, pallet sheets, oil funnels, car battery cases, trays
 PS  PS-E	PS Polystyrene PS-E Expanded Polystyrene	Clear, glassy, rigid, brittle, opaque, semi-tough, softens at 95°C. Affected by fats and solvents Foamed, light weight, energy absorbing, heat insulating	CD cases, plastic cutlery, imitation 'crystal glassware', low cost brittle toys, video cases Foamed polystyrene hot drink cups, hamburger take-away clamshells, foamed meat trays, protective packaging for fragile items	Coat hangers, coasters, white ware components, stationery trays and accessories
 OTHER	OTHER Letters below indicate ISO code for plastic type e.g. SAN, ABS, PC, Nylon	Includes all other resins and multi materials (e.g. laminates) Properties dependent on plastic or combination of plastics	Car parts, appliance parts, computers, electronics, water cooler bottles, packaging	Car parts, concrete aggregate, plastic timber

Typical Solvents for Cementing Thermoplastics

Plastics	Solvents																
	Acetone	Cyclohexanone	N,N-Dimethyl formamide	Dioxane	Ethyl acetate	Ethylene dichloride	Formic acid	Glacial acetic acid	Methyl ethyl ketone	Methyl cellosolve	Methylene chloride	N-Methyl pyrrolidone	O-Dichlorobenzol	Perchlorethylene	Toluene	80 Toluol-20 Ethanol	Xylene
ABS					X			X		X		X					
Acrylic					X		X			X							
Cellulose acetate	X				X			X	X								
Cellulose acetate butyrate	X	X			X	X		X	X							X	
Ethyl cellulose					X	X											
Nylon							X										
Polaryl ether	X				X												
Polyaryl sulfone			X									X	X				
Polycarbonate					X			X		X							
Polystyrene		X		X	X			X	X	X	X	X	X	X	X		
Polysulfone		X				X		X		X		X	X	X	X		X
Polyvinylchloride (PVC)	X	X							X			X					
PPO base(Ndyrl)						X				X				X			
Styrene acrylonitrile	X							X				X	X				
Vinylidene chloride		X	X							X			X				
Vinyl chloride-vinyl acetate	X	X						X		X			X				