

# RR Garden Outdoor Structure Materials

## Section 1.01 Abs Plastics

(a) **DEFINE: ABS** - known for its strength, durability and workability. **ABS** is a thermoplastic terpolymer combining the best qualities of the Acrylics, Butyrates, and Styrenes. It is more than half again as rigid as its cousin, Styrene, and size for size, is nearly as rigid as brass. Extremely resistant to most acids and alkalis, the **ABS** lustrous surface is unaffected by most chemicals, even lacquer - a property unheard of in the early plastics.

(b) **QUALITY GUIDELINES: ABS** has been hailed by professional model makers as “the best all-around construction material since wood”. Stronger and more rigid than many metals; easier and more flexible to work with than any previous plastic; cleaner and more durable than wood, **ABS** structural shapes have been used for engineering design models on an international scale since their introduction. **ABS** is also one of the best plastics for heat or vacuum forming and, of course, has excellent bonding characteristics, not only to itself but to other commonly used plastics.

Traditionally Structural Shapes are all carefully molded and extruded to extremely close tolerance and by Plastruct in the colors to best represent the materials being simulated. Unlike wood and brass, Plastruct **ABS** Traditional Structural Shapes require no priming, sanding, or sealing to enhance its hard finish. But like even the most primitive plastics, **ABS** bonds easily, quickly, and with a minimum of fuss.

## Section 1.02 Acrylic

(a) **DEFINE: Acrylic** is the most rigid and brittle of modeling plastics.

(b) **QUALITY GUIDELINES: Acrylic** is processed in three methods; cast, extruded and molded. It is usually warp-free. When used for model making, **Acrylic** is usually used in tubing and thick sheet form, cubes and balls, and round, square and triangular rod. **Acrylic** accepts most paints, including lacquer.

## Section 1.03 Styrene

(a) **DEFINE: Styrene** (also known as Hi-Impact PolyStyrene) is the most commonly used plastic in molded plastic kits, found on hanging racks at hobby stores in many sheet and strip forms and as patterned textured sheeting in many scales.

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(b) **QUALITY GUIDELINES:** **Styrene** may be combined with wood, metal and other plastics using special glues or cements. **Styrene** has a tendency to be brittle, especially after lengthy UV exposure or painting. It is easily warped by solvents, so care must be taken when cementing flat sheets for walls, and reinforcement bracing is recommended. When constructing closed tanks or structures; venting is recommended to allow the inside and outside temperatures to equalize. **Styrene** has excellent forming characteristics and bonds rapidly and permanently. **Styrene** plastic cuts easily using the “scribe and break” method. Textured patterned sheets of styrene are commonly used in outdoor structures. Only use Enamel, Alkyd Oil, Latex or Acrylic paints for styrene plastics.

## **Section 1.04 EPS & XPS Foam Boards**

(a) **DEFINE:** Expanded PolyStyrene (**EPS** [usually referred to as Styrofoam]), White Beadboard, & Modeling Foams, and 4# & 6# density Expanded Urethane Foams. The modeling foam (STYS) has a very fine cell, providing a smooth surface which may be painted. (White Beadboard Styrofoam when shaped with a Surform™ may be acceptable as a rocky surface when used indoors.)

Extruded polystyrene (**XPS**) rigid foam is usually blue or pink in color (yellow & green in some areas) often with a smooth plastic surface that should be removed when used for modeling. This type of rigid foam won't absorb water and is stronger and more durable than expanded polystyrene, so it's probably the most versatile type of rigid foam for modeling. It can be carved to represent blocks and other forms. **XPS** is more expensive in price than expanded polystyrene.

(b) **QUALITY GUIDELINES:** Paint the foam with latex or acrylic paint, many solvent paints will dissolve these types of foam. Included are 2# density Polystyrene foam which may be cut with a saw, knife or hotwire cutter. Urethane foams may be cut with a saw or knife only; a hot-wire cutter will emit toxic fumes. The 2# and 6# density material is usually white in color.

There is a wide selection of these “white” foams that can be used in outdoor modeling applications if well UV protected, but is not recommended. It is very messy when cutting.

## **Section 1.05 Foamboard (Styrene laminations to EPS Styrofoam)**

a) **DEFINE:** These face laminates have been specially developed to provide an excellent surface for painting. Together with these properties and the ease and multitude of shaping methods make **Foamboard** an excellent choice for mass building structures and is available in numerous thicknesses. Removing the **Styrene** skin from one side of

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the board allows bending. Versatile, extremely lightweight and durable, the all plastic construction is moisture proof. This sheet material can be sawed or cut easily with a box cutter.

**ULTRA BOARD**, by United Industries, is a lightweight structural panel consisting of a rigid **PolyStyrene** foam core faced on both sides by a smooth, moisture resistant 4' x 8' sheets of solid **PolyStyrene**. The foam and facers are permanently bonded together. **ULTRA BOARD** panels are a strong, moisture resistant material. When exposed to long periods of very moist conditions, there is little change in either the face or the core. Exposure of unprotected faces to exterior conditions has no effect other than a slight bleaching. Ultra-violet radiation degrades unprotected foam core. Therefore, any exposed foam should be protected with a good quality, pigmented water base coating or other UV barrier.

**GATORPLAST®**, by 3A Composites, manufactures a similar 4' x 8' sheets of rigid polystyrene foam core faced on both sides also with solid PolyStyrene.

Large sheets can often be purchased at sign maker suppliers and from sign making shops. Plastruct and Precision Products offer smaller sheets of exterior grade **foamboard**.

**b) Quality Guidelines:** Large panels should be well supported to protect against any bowing movement. Caution should be taken when using darker colored paints. Dark coated panels may blister when exposed to direct sunlight. Foamboard accepts many paints and the gluing on of textured patterned **Styrene** sheets.

**NOTE:** Foamboard sold at office supply stores should not be used for outdoor applications because the faces are of a pulp nature and will not hold up outdoors.

## **Section 1.06 PVC & PVC Foam Board**

**(a) DEFINE: Polyvinyl Chloride**, commonly abbreviated **PVC**, it is a thermoplastic polymer. It is cheap, durable, and easy to assemble. It is also commonly used for figures and tubing.

**Closed-cell PVC Foam board**, is a light-weight rigid material used primarily in the manufacture of signs and displays, although its material properties have made it extremely popular among model builders. Like **PVC**, closed-cell **PVC** foam board is solid and has a very rigid structure. Where it differs is in its closed-cell foam structure, which makes it very light (as little as half the weight of solid **PVC**), highly resistant to moisture, and very easy to cut and shape. Typically, closed-cell **PVC** foam board can be cut as easily as wood softened and shaped by immersing in boiling water or with a standard heat gun, and painted with standard paints.

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(b) **QUALITY GUIDELINES:** PVC is commonly available at plumbing supply houses. The cement softens the material to a gel state until the adhesive layer cures. This has another practical application of being able to hand-machine with a razor blade the PVC pipe to change the wall thickness to allow assembly of nonstandard radius arc segments. Buried PVC pipes are used in both water and sanitary sewer applications and as track support applications in Railroad Gardens.

## **Section 1.07 Wood**

(a) **DEFINE Acceptable Types:** Western Red Cedar, Redwood, Ipe are close, tight, homogeneous grain structure, making it ideal for a wide variety architectural scratch building model projects. Precision cutting can provide a consistent, high quality strips. Preferred by most hobbyists because of its workability and finishing qualities.

(b) **QUALITY GUIDELINES:** Wood structures are most commonly found along older and rural railroads. Modeling with wood is easy, and more preferable to plastic among many seasoned railroaders. There is no better way to achieve wood grain than by using wood. However, wood does have its disadvantages. While wood accepts many glues, it takes much longer than plastic for the glued joints to set. Most woods have a “fuzz” that should be lightly sanded unless a rough finish is desired. Wood accepts most paints, but should first be primed. Sanding is suggested after a primer or first coat is applied. Wood can easily be stained and weathered. Because stains will quickly be absorbed in wood, care should be taken to not over-soak wood sheets so that they do not warp. Cutting wood can be accomplished with most common hobby tools, including a hobby saw or knife.

**NOTE:** Sheet composite woods such as chipboard, particleboard and others should not be used because they can absorb moisture and deteriorate. Plywood has been found to be acceptable with some modelers, but it is recommended that if used it be encapsulated/saturated in epoxy. Consideration of sealing and/or applying a wood preservative should be taken with any wood used outdoors. Plastic should be considered whenever possible because it is easier and faster to work with than wood or metal.

## **Section 1.08 High-density polyethylene (HDPE)**

(a) **DEFINE: High-density polyethylene** is one of the most commonly used plastic in the United States. Labeled as #2 plastic, it is typically found in milk jugs, plastic bags and refillable plastic bottles. In modeling it is used as plastic lumber in its extruded form. Recycled HDPE is used to manufacture lawn and garden products.

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Bear Board™ is made of 100% recycled **HDPE** as compared to many brands of plastic lumber sold at big box lumber supply stores which have wood pulp in their composition. Plastic lumber made with wood pulp is not as stable as Bear Board™ especially in the small sizes cut for modeling applications. Depending on the dyes used in the manufacture of “plastic **HDPE** wood” it looks very much like real wood, thereby not requiring any painting.

**(b) Quality Guidelines:** **HDPE** can be sawed, blade cut, drilled, screwed, countersunk, lathe-turned, carved, sanded and filled using standard woodworking tools and it will not splinter. Parts can be joined in minutes with small amounts of cements. For bonding **HDPE** plastic materials to foam, wood Omni-Stick glue and others can be used. It has a tendency to loose strength when exposed to hot summer days. Chain link fence stretchers glued to post timbers have been used strengthen 1:24 scale trestle bents.

This material has been used by many for ladder type RR track sub-roadbeds as shown below.

