2.1.3 **Material.** Pipe and fittings are plastic and are usually light gray for IPS pipe and fittings, and tan for SDR 11 tubing and fittings.

2.2 Markings

2.2.1 **Pipe and Tubing.** IPS pipe and tubing markings shall be in accordance with F 441 or D 2846. [UPC 301.1.2]

2.2.2 **Fittings.** Fitting markings shall be in accordance with F 438 or F 439 or D 2846. [UPC 301.1.2]

Note: *Standard number may be omitted on smaller fittings when marked thus with four raised dots.*

2.2.3 **Solvent Cement.** Container labeling of CPVC solvent cement shall be in accordance with F 493.

2.2.3.1 **Color.** Solvent cements requiring the use of a primer shall be colored orange. Solvent cements that do not require the use of a primer shall be colored yellow.

2.2.4 **Primer.** Primer container markings shall be in accordance with F 656.

2.2.4.1 **Color.** Primer shall be colored so as to make its use obvious on a finished joint, but shall not be colored orange or yellow.

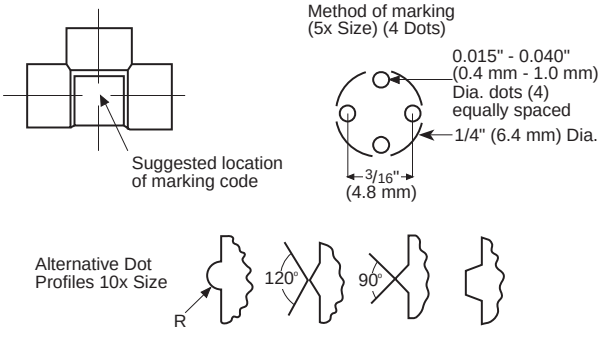
2.2.5 **Position of Markings.** Identification markings shall be visible for inspection without moving materials.

2.2.6 **Alignment.** Piping and fittings shall be aligned properly without strain.

2.3 Protection of Materials

2.3.1 **Abrasion.** Pipe or tubing passing through drilled or notched metal studs or joists or hollow shell masonry walls shall be protected from abrasion due to thermal expansion and contraction by elastomeric or plastic sleeves or grommets or other approved means. Straight runs may have protection at maximum 3 feet (915 mm) intervals. [UPC 313.0]

2.3.2 **Puncture.** Steel plate protection shall be installed when required by the Administrative Authority or section 313.9 of the Uniform Plumbing Code..



2.3.3 **Storage and Handling.** Pipe shall be stored in a way to protect it from mechanical damage (slitting, puncturing, etc.). It shall be stored under cover to keep it clean and avoid long term exposure to sunlight. Exposure to sunlight during normal construction periods is not harmful. CPVC solvent cements should be stored in a cool place except when actually in use on the job site. The solvent cement manufacturer's specific storage instruction should be followed.

2.3.4 **Freezing.** In areas where the system must be drained to protect it from freezing, horizontal lines shall be graded to drain.

2.3.5 **Overheating:**

(a) Tubing shall not be positioned or closer to devices that generate heat such that the temperature around the CPVC tubing is greater than 180°F

(b) Do not apply direct flame onto CPVC.

2.4 Thermal Expansion

2.4.1 **General.** Allowance for thermal expansion and contraction shall be provided by approved means. Allowance shall be based on an expansion rate of 3.5 inches (89 mm) per 100 feet (30,480 mm) of length of run per 100°F (38°C) temperature change.

Note: *Expansion rate is independent of the size of the pipe.*

2.4.2 **Offsets and Loops.** Thermal expansion may be provided for by use of expansion loops, offsets, or changes of direction. From Table 1 determine the length "L" that is required. Note that "L" is based on length of run, diameter of pipe, and maximum temperature of water.

2.5 **Clearance.** Adequate clearance shall be provided between piping and structure (such as bored holes and sleeves) to allow for free longitudinal movement.

2.6 Hangers and Supports

2.6.1 **Vertical Piping.** Vertical piping shall be supported at each floor or as specified by the design engineer to allow for expansion/contraction. Piping shall have a mid-story guide. [UPC 314.0]