

Hoop stress calculations in plastic tubing and pipe

Hoop stress in plastic tubing and pipe may be calculated by the ISO Equation:

or

$$S = \frac{P(D - t)}{2t} \text{ OR } S = \frac{P(R - 1)}{2}$$

S = Stress in circumferential direction, psi

P = Internal pressure, psig

D = Average outside diameter, inches

t = Minimum wall thickness, inches

$R = \frac{D}{t} = \text{SDR} = \text{Standard thermo-plastic dimension ratio}$

Various plastic tubing and pipe dimensional information can be found in the following standards or may be obtained from pipe manufacturers.

ASTM D1785 Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120

ASTM D2241 Polyvinyl Chloride (PVC) Plastic Pipe (SDR-PR)

ASTM D2104 Polyethylene (PE) Plastic Pipe Schedule 40

ASTM D2239 Polyethylene (PE) Plastic Pipe (SDR-PR)

ASTM D2447 Polyethylene (PE) Plastic Pipe, Schedules 40 and 80 Based on Outside Diameter

ASTM D2666 Polyethylene (PB) Plastic Tubing

ASTM D2737 Polyethylene (PE) Plastic Tubing

ASTM D2740 Polyvinyl Chloride (PVC) Plastic Tubing

ASTM D3035 Polyethylene (PE) Plastic Pipe (SDR-PR)

Based on Controlled Outside Diameter
AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4" through 12" for Water
AWWA C901 Polyethylene (PE) Pressure Pipe, Tubing, and Fittings, 1/2" through 3" for Water