

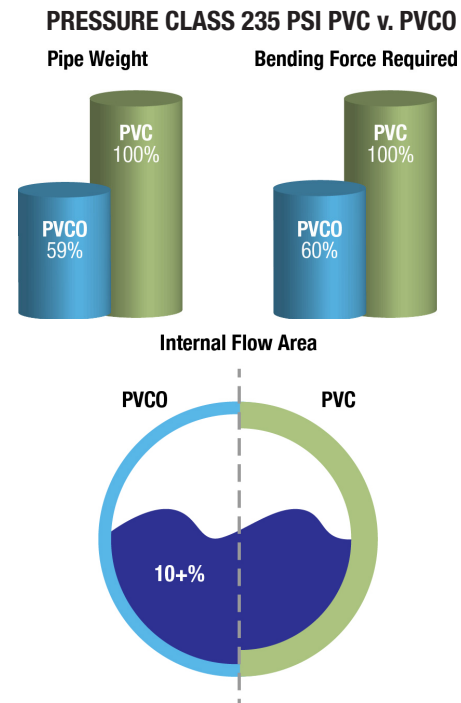


## PVCO & PVC: What To Know

With NAPCO's recent release of PVCO pipe into the market, knowing key similarities and differences between PVCO and PVC is essential in making key decisions about which product may be best for your project.

What is PVCO? PVCO stands for molecularly oriented PVC. PVCO pipe actually starts as a piece of PVC pipe stock. During the manufacturing process, the PVC pipe stock is stretched over a mandrel to expand the pipe stock's diameter. This process of expanding the pipe stock's diameter orients the PVC molecules in both the hoop orientation and longitudinal orientation. This orientation allows the PVC material to withstand greater stresses from internal pressure than it could before it was expanded. The final product becomes stronger, tougher, and more flexible than traditional PVC, providing enhanced ease of assembly while maintaining high performance in buried applications.

Why PVCO? PVCO achieves the same pressure rating as PVC, but with a thinner wall – allowing for over 10% more internal flow area for the same pipe outside diameter as PVC as well as more than 40% reduced pipe weight compared to PVC products. See table 3 for flow area, and weight reduction information.



### PVCO & PVC: KEY DIFFERENCES

- **Nomenclature**
  - Unlike PVC, PVCO is not classified by dimension ratio (DR). For example, “AWWA C909 DR18 PVCO” does not exist.
  - PVCO is classified only by its pressure class. For example, “AWWA C909 PC (pressure class) 235 psi” does exist.
- **Wall Thickness**
  - A PVCO pipe has approximately ½ of the wall thickness as a PVC pipe of the same nominal size and pressure class.
- **Pipe Stiffness**
  - The pipe stiffness of PVCO is less than PVC when comparing two pipes of the same size and pressure class. The pipe stiffness of PVCO is still suitable for most buried applications. Refer to table 2 below for more information.
- **Bending the Pipe**
  - It takes approximately 40% less force to longitudinally bend PVCO pipe compared to PVC.
- **Making Connections**
  - NAPCO AWWA C909 PVCO pipe cannot be solvent welded or “glued” like AWWA C900 PVC pipe.
  - MJ fittings/restraints used on AWWA C909 PVCO pipe should be explicitly compatible with AWWA C909 PVCO pipe. Designs qualified only for AWWA C900 PVC pipe, should not be used with AWWA C909 PVCO pipe.
- **Service Taps**
  - Direct tapping of AWWA C909 PVCO should not be performed under any circumstances.
  - Only AWWA C909 compatible saddle and sleeve taps should be used.
- **Maximum Service Temperature**
  - The maximum allowable operating temperature of AWWA C909 PVCO pipe is 130°F (54°C).
  - The maximum allowable operating temperature of AWWA C900 PVC pipe is 140°F (60°C).
  - The pressure class of both AWWA C909 PVCO & AWWA C900 PVC must be derated at temperatures above 73°F (23°C).



# PVCO & PVC: What To Know

## PVCO & PVC: KEY SIMILARITIES

- **Bending the Pipe**
  - The minimum bending radius and allowable offsets for longitudinal bending of AWWA C909 PVCO pipe and AWWA C900 PVC pipe are the same.
- **Making Connections**
  - NAPCO's AWWA C909 PVCO pipe is a Cast Iron Outside Diameter (CIOD). This is the same as AWWA C900 PVC pipe.
  - Both AWWA C909 PVCO and AWWA C900 PVC pipes are compatible with AWWA C907 injection molded fittings, and C900 Fabricated PVC fittings.
  - AWWA C909 PVCO and AWWA C900 PVC pipe may be assembled together. Correct Insertion depths must be accounted for.  
*\*Note that the internal diameters are different*
- **Short Term Pressure Rating**
  - Both AWWA C909 PVCO and AWWA C900 PVC have a Short Term Pressure rating of 1.6X the pressure class of the pipe.
- **Thermal Derating Factors**
  - The thermal derating factors for operating temperatures elevated above 73°F (23°C) are the same for AWWA C909 PVCO and AWWA C900 PVC. *\*Note the difference in maximum service temperatures above*

TABLE 1: PVC COMPOUNDS

PVCO		PVC	
Pipe Standard:	AWWA C909-16	Pipe Standard:	AWWA C900-16
Diameter Standard:	CIOD	Diameter Standard:	CIOD
PVC Compound Cell Class:	12454	PVC Compound Cell Class:	12454
Hydrostatic Design Basis (HDB):	7,100 psi (Finished PVCO Pipe)	Hydrostatic Design Basis (HDB):	4,000 psi
Lay Length:	20'	Lay Length:	20'

TABLE 2: PIPE STIFFNESS

PVCO	Pipe Stiffness (psi)	PVC	Pipe Stiffness (psi)
PC 235	81	DR18	364



## PVCO & PVC: What To Know

TABLE 3: FLOW AREA & WEIGHT

Nominal Size	Outside Diameter (OD) in. [mm]	AWWA C909 PVCO			AWWA C900 PVC				PVCO Flow Area Advantage over PVC (% more flow area)	PVCO % Weight Reduction Compared to PVC
		Pressure Class psi [kPa]	PVCO Flow Area (in. sq.) [M sq.]	Pipe Weight (20 ft./6.1m length) lb. [kg]	DR (PVC Only)	Pressure Class psi [kPa]	PVC Flow Area (in. sq.) [M sq.]	Pipe Weight (20 ft./6.1m length) lb. [kg]		
6" [150mm]	6.900 [175.3]	235 [1,620]	32.7 [0.021]	62 [28]	18	235 [1,620]	29.5 [0.019]	105 [48]	10.8	41.0
8" [200mm]	9.05 [229.9]	235 [1,620]	56.3 [0.036]	107 [49]	18	235 [1,620]	50.8 [0.033]	182 [83]	10.9	41.3
10" [250mm]	11.1 [281.9]	235 [1,620]	84.7 [0.055]	161 [73]	18	235 [1,620]	76.4 [0.049]	275 [125]	10.9	41.3
12" [300mm]	13.2 [335.3]	235 [1,620]	119.8 [0.077]	229 [104]	18	235 [1,620]	108.1 [0.070]	390 [177]	10.8	41.3

**Notes:**

1. These dimensions are for estimating purposes only.
2. Dimensions in brackets are metric equivalents.
3. DR = Dimension Ratio
4. AWWA Pressure Class @ 73°F [23°C] which includes a 2:1 safety factor.
5. Flow area calculated using nominal outside diameter and minimum wall thickness.

This Technical Bulletin is published for general informational purposes only and is not intended to imply that these materials, procedures, or methods, are suitable for any particular job or should be relied on by the user. Materials, procedures, or methods may vary according to the particular circumstances, local building code requirements, design conditions, or statutory and regulatory requirements. While the information in this Technical Bulletin is believed to be accurate and reliable, it is presented without guarantee or responsibility on the part of NAPCO. User is solely responsible for usage of any material, procedure, or method contained herein.