PVC PIPE ASSOCIATION
TECHNICAL BRIEF

AN ENGINEERING PRIMER ON AWWA C900 PVC PIPE

Utility and consulting engineers sometimes have questions about the adequacy of PVC pressure pipes manufactured to the American Water Works Association (AWWA) Standard C900 (4- through 60-inch). Listed below are facts that should leave no doubt regarding the suitability of PVC pipe for municipal water-pipe projects.

Long-Term Pressure Capacity: The AWWA C900 standard defines the Pressure Class (PC) as "the design capacity to resist working pressure up to 73°F sustained operating temperature." Thus, the Pressure Class is the PVC pipe's long-term pressure capacity.

Short-Term Pressure Capacity: The AWWA standard defines Occasional Surge Pressure as "surge pressures caused by emergency operations, usually as the result of a malfunction." These occasional surge pressures plus the pipe's working pressure must not exceed the pipe's short-term rating, which is 1.6 x Pressure Class.

Cyclic Surge Pressures: The standard also provides a design method for cyclic surge. The method requires calculation of the average stress and the stress amplitude generated by cyclic surges. From these two values, a cyclic life is determined from a chart of cyclic design curves found in each standard.

Pressure Testing: The AWWA C900 standard requires that every piece of pipe be hydrostatically proof-tested. In addition, periodic quality-control burst-pressure testing is performed. The table below shows the pressures for each test for three of the DRs found in the C900 standard.

Product	Pressure Class (psi)	Each-Piece Hydrostatic Test (psi)	Burst-Pressure Test (psi)
DR25	165	330	535
DR18	235	470	755
DR14	305	610	985

AWWA Safety Factors: The C900 standard uses a safety factor of 2 to calculate pressure capacities:

- Long-term capacity – the Pressure Class is determined by dividing the long-term pressure strength by 2.
- Short-term capacity – the short-term rating is determined by dividing the burst pressure by 2.

Note that this safety factor of 2 is intended to cover items such as variations in materials, manufacturing, handling, installation, and operations, as well as to accomodate any additional unforeseen circumstances.

Water System Safety Factors: A recent study by Folkman found that the average operating pressure in municipal systems is 69 psi. This means that in an average system, safety factors for long-term operating pressure would be:

DR25 Pipe	DR18 pipe	DR14 Pipe
4.8	6.8	8.8

PVC – the Best Pipe for Most Applications

PVC pipe is often the most cost-effective, trouble-free option for a pipeline project. The specifier of PVC pipe can rely on the material's inherent advantages supported by demanding product standards and rigorous quality testing.

References: AWWA C900 standard "Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. Through 60 in., for Water Transmission and Distribution" (2007); *Handbook of PVC Pipe*, Uni-Bell (2013); "Water Main Break Rates In the USA and Canada: A Comprehensive Study," Folkman, S. (2018)

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