

PRODUCT PROFILE

HOBAS Pressure Pipes - ASTM Test Proven for Long-Life

Introduction

HOBAS centrifugal cast fiberglass reinforced polymer mortar (CCFRPM) pressure pipes have been tested according to and in compliance with ASTM and AWWA standards to determine their long-term pressure resistance. This permits safe design of the pipes in pressure applications per AWWA Manual M45 procedures. Using the safety margins specified (M45), the average HOBAS CCFRPM pressure pipe life is in excess of a thousand years!!

Background

When pipes of any material are pressurized, a slight growth in diameter is experienced resulting in a ring tensile strain (stretch). The magnitude of the ring tensile strain depends on the pressure level, the diameter to wall thickness ratio and the ring tensile modulus of the pipe wall material. For plastic pipes including PVC, HDPE and HOBAS CCFRPM, the ring tensile strain developed is also a function of time, based on the creep characteristics of the material. To operate safely, the long-term ring tensile strain must not exceed the capabilities of the pipe wall material. The long-term behavior and capabilities are determined by extended pressure tests of several pipe specimens.

Capabilities Determination

The test protocols to measure and analyze the pipes' behavior under pressure are ASTM D1598 and D2992. The procedures require a minimum of 18 pipes to be pressurized until failure. The pressures

must be chosen so pipe failures occur over a specified range of time, including at least one test that fails at or beyond 10,000 hours (~14 months). Generally, higher initial wall strains (stress) result in shorter failure times, while pipes with lower strains have longer failure times. Per the ASTM method, the data (initial strain vs. time to failure) is analyzed by covariant log-log linear least squares regression and extrapolated to 50 years to determine average the initial strain (stress) level (hydrostatic design basis - HDB) that causes pipe failure in 50 years.

Pipe Design

Per AWWA M45 procedures and the ASTM & AWWA fiberglass pressure pipe product standards' requirements, the maximum allowable initial ring tensile strain due to operating pressure in the piping system cannot exceed the HDB (50 year capability) reduced by a 1.8 safety factor. Therefore, for each application, the pipe must be designed (wall strength and thickness) to limit the initial strain caused by system operating pressure to be equal to or less than the HDB strain / 1.8.

HOBAS Pipe Testing and Results

Per the test method requirements, a total of 18 HOBAS Pipe USA pressure pipes, produced in our Houston factory, were tested under hydrostatic pressure, at our facility, until failure occurred. These tests were witnessed and periodically inspected by Southwestern Laboratories of Houston (acting as an independent auditor). The test data was analyzed per ASTM D2992 requirements to develop the regression equation to characterize

the pipes' long-term behavior under pressure. The resulting projected 50 year HDB strain is 0.62234%. The maximum allowable initial ring tensile strain for HOBAS CCFRPM pressure pipes due the operating pressure is $0.63334\% / 1.8 = 0.346\%$.

Conclusion & Benefits

Based on the ASTM long-term pressure testing results, HOBAS CCFRPM pressure pipes, operating with an initial ring tensile strain of ~0.346%, will have an expected average service life of several thousand years!! At lower strain levels, the projected life will be even longer!!

HOBAS Pipe USA has delivered ~500,000' of pressure pipes in the USA for sewer mains, water supply and other applications. Worldwide, over 2000 miles of HOBAS CCFRPM pipes are performing trouble-free in pressure service, some for over 40 years!! Specify HOBAS CCFRPM pressure pipes with confidence knowing that they are test proven and service tested for long life. ●