ASTM F2389 Standard Speciï¬•cation for Pressure-Rated Polypropylene (PP) Piping Systems / Testing Equipment

Description

8. Requirements

8.1 ***Longitudinal Reversion***â€”When tested in accordance with ISO 15874-2, at the conditions given in Table 8, the mean relative change in pipe length shall not exceed 2 %.

8.2 ***Melt Flow Rate (MFR) of Pipe and Fittings***â€”When tested in accordance with D 1238, the MFR of specimens taken from the ï¬•nished pipe or ï¬•ttings shall be within 30 % of the MFR of the compound used to produce the pipe or ï¬•tting. Two specimens shall be tested, and both shall pass.

8.3 ***Impact Strength***â€”When tested in accordance with ISO 3127, 9 of 10 specimens shall pass at the impact level speciï¬•ed in Table 9 at a test temperature of 32 +- 2Â°F (0 +- 1Â°C).

8.4 ***Thermal Stability and Oxidative Induction Time*** *(OIT)*â€” Pipe and ï¬•ttings shall meet the requirements of 8.4.1â€“thermal stability by hydrostatic testing, and 8.4.2 oxidative induction time.

8.4.1 When tested in accordance with Test Method D 1598, pipe and ï¬•ttings shall not fail at the pressure corresponding to the pipe circumferential stresses and times given in Table 10.If an assembly fails at a joint, the ï¬•tting material shall be permitted to be retested in pipe form.

TABLE 10 Thermal Stability by Hydrostatic Test

Hoop Stress, psi, (MPa)	Temperature, °F (°C)	Time, h
275 (1.9)	230 (110)	8 760

8.4.2 The oxidative induction time (OIT) shall be determined on pipe and ï¬•ttings in accordance with Test Method D 3895. Two specimens shall be tested and the average OIT of the two shall be at least 80 % of the OIT of the virgin material compound. For those materials which require ï¬•nal blending at the extruder (masterbatch/resin), the 80% OIT requirement shall be based on the OIT of the pipe sample which has also passed the hydrostatic testing of 8.4.1or a pipe sample of the same formulation containing no rework.

NOTE 2â€”Initial qualiï¬•cation of changes to materials that have met the requirements of this section may be evaluated based on limited hydrostatic testing and comparison of OIT values.

AHP PLASTIK MAKINA

TABLE 8 Conditions for Heat Reversion Test

Parameter	Type	Value
Oven Temperature	PP-R	275 ± 4°F (135 ± 2°C)
Exposure Time Based on Wall Thickness, *t*	*t* < 0.315 in. (8 mm)	60 min
	0.315 (8 mm) < *t* < 0.630 in. (16 mm)	120 min
	t > 0.630 in. (16 mm)	240 min

TABLE 9 Impact Conditions

Nominal Diameter	Impact Mass, lb (kg), +0.01/–0.00 (+0.005/–0.000)	Impact Height, ft (m)[2] +0.03/–0.00 (+0.01/–0.00)
½ , ¾ , 1, 16, 20, 25	0.55 (0.250)	3.3 (1.0)
1-½ , 2, 3, 32, 40, 50, 63, 75	1.10 (0.500)	3.3 (1.0)
4, 6, 90, 110, 125	2.20 (1.000)	6.6 (2.0)
140	4.41 (2.00)	6.6 (2.0)
160	4.41 (2.00)	8.2 (2.5)

AHP PLASTIK MAKINA

8.5 ***Hydrostatic Pressure Tests***â€”When tested in accordance with 9.1, at the hoop stresses and temperatures given in Table 11, assemblies of pipe and ï¬•ttings shall not fail during the test period speciï¬•ed.

TABLE 11 Hydrostatic Test Conditions

Hoop Stress, psi, (MPa)	Temperature, °F (°C)	Time, h
2320 (16.0)	68 (20)	1
510 (3.5)	203 (95)	1000

8.6 ***Thermocycling***â€”Plastic-to-metal transition ï¬•ttings, intended to be used at temperatures above 113Â°F (45Â°C) shall not separate or leak during or after being thermocycled 1000 times between the temperatures of 60Â°F and 180Â°F (16Â°C and 82Â°C). Transition ï¬•ttings which meet the thermal cycling requirements of ISO 15874-5 for the intended application class are exempt from this requirement. Fittings shall be assembled with pipe per the manufacturerâ€™s instructions, and tested in accordance with 9.2.

9. Test Methods

9.1 ***Hydrostatic Tests***â€”Test assemblies in accordance with Test Method D 1598, at the hoop stresses and temperatures given in Table 10. An assembly shall consist of at least 4 pipe specimens and 6 ï¬•tting joints. For testing valves, the assembly shall include at least 3 valves in the shut-off position (seat test) and 3 valves in the open or partially open position (shell test). Assemblies used in testing of manifolds shall include a minimum of 6 of each type of manifold connection.

Direct Sales by Manufacturer

9.1.1 *Assembly Procedure*â€”The assemblies shall be made in accordance with the manufacturerâ€™s recommended joining procedures and equipment.

9.2 ***Thermocycling Test Method for Transition Fittings*:**

9.2.1 *Apparatus*â€”A nitrogen or air source capable of maintaining a nominal internal pressure of 100 +- 10 psi (690 +- 69 kPa) on the specimens is required. The immersion system shall consist of two water reservoirs controlled at 60 +- 3.6Â°F (16 +- 2Â°C) and 180 +- 3.6Â°F (82 +- 2Â°C). The specimens shall be cycled from one reservoir to the other or the hot and cold water shall be alternately cycled over the test specimens automatically and returned to the proper reservoir.

9.2.2 *Sampling and Specimen Preparation*â€”Select at random six specimens of the type and size of plastic-to-metal transition ï¬•ttings to be tested. Assemble the ï¬•ttings with suitable lengths of pipe or tubing and attach to a common manifold. Assemble strictly in accordance with the instructions of the ï¬• tting manufacturer. Close the specimen assembly with any suitable end closures that allow â€œfree-endâ€• mounting and will not leak under the thermocycling conditions, and connect the specimen assembly to the pressure source.

AHP PLASTIK MAKINA

9.2.3 *Procedure*â€”Pressure the specimen assembly with nitrogen to 100 +- 10 psi (690 +- 69 kPa). Immerse in 60 +- 3.6Â°F (16 +- 2Â°C) water to determine if there are any initial leaks. All leaks shall be eliminated before the thermocycling test is started. Thermally cycle the specimen assembly between 60 +- 3.6Â°F (16 +- 2Â°C) and 180 +- 3.6Â°F (82 +- 2Â°C) by means of immersion in water using the test cycle given in Table 12. For sizes greater than 1-^{1}â•„2 in. (40 mm), shorter dwell times shall be permitted if it has been demonstrated that the shorter time is sufficient to achieve the test temperature at the internal surface of the ï¬•tting. Upon completion of the 1000 cycles, immerse the specimen assembly in 60 +- 3.6Â°F (16 +- 2Â°C) water to determine if there are any leaks.

9.2.4 *Interpretation of Results*â€”Any evidence of leakage at any one of the transition ï¬•ttings or separation of any transition ï¬•tting from the pipe or tubing constitutes a failure of this test.



Longitudinal Tester



MFI MFR Tester



Falling Weight Impact Tester



DSC OIT Tester



Hydrostatic Pressure Test Unit (***Sustained Pressure Test***, ***Elevated Temperature Sustained Pressure Test***, ***Burst Pressure***)



Hydrostatic Pressure Test Hot Water Bath



AHP PLASTIK MAKINA

End Caps for Pressure Testing



Thermal Cycling Tester

AHP PLASTIK MAKINA

Category

1. Equipment for Standards
2. Standards