

RESISTANCE OF POLYMERS AND ADHESIVES TO ENGINE COOLANTS

Application

This method is used to determine the effect of various water-based fluids, such as ethylene glycol-based engine coolants, on elevated temperatures under pressure, on the physical properties of polymers.

Scope

This method describes the exposure of elastomeric, plastic, adhesive, or other materials to engine coolant under pressure at elevated temperatures. It may be useful for comparative evaluation of changes in properties resulting from in-service engine coolant system conditions. CAUTION: A 1:1 mixture of engine coolant and water boils at approximately 105 +/- 2 °C at one atmosphere of pressure. Excessive temperature and pressure will result in confined vapor venting into the laboratory when using an "autoclave"-style container thereby invalidating the test and posing a risk to personnel. General purpose "Parr"-type vessels will withstand extreme temperature and pressure. However, they pose considerable risk of venting super-heated vapor upon opening if opened while hot. Observe all vessel manufacturer's recommendations.

Reference Documents

ASTM D 380	Standard Methods for Testing Rubber Hose
ASTM D 412	Test Method for Rubber Properties in Tension
ASTM D 471	Test Method for Rubber Property - Effect of Liquids
ASTM D 624	Test Method for Rubber Property - Tear Resistance
ASTM D 638	Test Method for Tensile Properties of Plastics
ASTM E 638M	Test Method for Tensile Properties of Plastics
ASTM D 1002	Test Method for Strength Properties of Adhesives in Shear By Tensile Loading - Metal to Metal
ASTM D 1349	Practices for Rubber, Standard Temperatures and Atmospheres for Testing and Conditioning
ASTM D 3183	Preparation of Pieces for Test Purposes from Products
FLTM BV 101-06	Adhesives and Sealants - Overlap Shear Adhesion Test
ISO 34	Test Method for Tear Resistance of Rubber
ISO 37	Test Method for Tensile Properties of Rubber
ISO R527	Test Method for Tensile Properties of Plastics
ISO 1817	Test Method for Effects of Liquids on Rubber Properties

Date	Action	Revisions
2001 03 28	Revised	Editorial – no technical change A. Cockman
1996 10 16		

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Apparatus Required

General Purpose Pressure Vessels

Parr 1000 mL (Catalog No. 4601 and 4621) and 2000 mL (Catalog No. 4602 and 4622) capacity pressure vessel, or equivalent. A needle valve and temperature resistant gage assembly (Catalog No. 4313) is recommended.

Source:	Parr Instrument Company	Scientific & Medical Supplies, Ltd.
	211 Fifty-Third Street	Shirley Institute
	Moline, IL 61265 U.S.A.	Didsbury, Manchester M208RX

Binks 9.5 L pressure tank (autoclave-type) Model No. 83-5460 or equivalent, equipped with thermocouple, pressure gage, and relief valve with capability for monitoring temperatures up to 200 °C and pressures to 345 kPa.

Source:	Binks Mfg. Co.
	9201 W. Belmont Avenue
	Franklin Park, IL 60131 U.S.A.

Oven

Forced-air in accordance with ASTM E 145, Type II-A. CAUTION: The oven must be equipped with an automatic shut-off in the event of a temperature overrun that could cause serious injury.

Materials Required

Engine Coolant

The coolant used should be the appropriate initial fill coolant for the territory of component use at the recommended concentration.

Ethylene Glycol - Reagent grade

Distilled or Deionized Water

20 microohms/cm at 25 °C maximum conductivity (ASTM D 1125).

Wire

For use in hanging specimens: SAE 30302 - 1.0 mm stainless steel wire, or equivalent. Form in such a manner to permit specimens to be suspended approximately 10 mm below the fluid level in the cylinder.

Glass Beads - perforated

6 mm diameter with a 2 mm hole. Used to separate specimens on the wire hanger. Alternatively, short sections (6 mm lengths) of 6 mm diameter glass tubing may be used.