



CLEARCOAT CRACKING OVER ROOF- DITCH SEALERS

Application

This method is used for determining the resistance of an automotive clearcoat to cracking when applied over a roof-ditch sealer material. The test method can be used in both laboratory evaluations and field evaluations at appropriate outdoor exposure sites (e.g., Florida, Jacksonville). The test method is easily adaptable to evaluate clearcoat cracking over a range of roof – ditch designs that are dictated by the specific design of the vehicle

Required Test Equipment

Aluminum Tank - having approximate dimensions of 14" X 16" (deep enough to vertically immerse entire sample) and capable of holding about 40 liters of water. Tank is insulated with ½" thick Styrofoam (**Safety item**)

Lid on tank – insulated with ½" thick Styrofoam for heating efficiency

12" x 12" hot plate – or larger that is placed under the aluminum tank, in the case of the smaller hot plates, the corners of tank are stabilized with lab jacks or other non-slip devices (**Safety Item**)

Ice water immersion bath – that allows for the complete and immediate immersion of all test samples

Vented Laboratory Oven – capable of heating to achieve paint/sealer cure temperatures of up to 180 °C

Thermometer – capable of measuring in the range of 0 to 100 °C

Analytical Balance – capable of measuring to 0.1 g

Immersion circulating heater – Fisher Scientific #13-873-44A or equivalent

Sample holders – two stainless steel rods – ¼" X20" with a 90° bend at one end using 1" of the total rod length

Machine shop brake device – for preparation of roof-ditch test substrate

Timer – to measure immersion times

Plexiglass stop – that is 5mm high, 20mm long and the width of the ditch (e.g., 1 ½") that taped into one end of the roof-ditch test panel covering the hole in the panel.

Paint application equipment/ laboratory - for preparation of painted samples representative of painted vehicle system

Humidity Cabinet – capable of maintaining 95 F°/95% RH

Lighted 10x magnifying glass – to examine the sealed roof ditch for cracks

Permanent Marker – for sample labeling

Date	Action	Revisions
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Materials and Solutions Required

- 4" x 12" Panels** – of the metal substrate used on the specific vehicle application, having a standard ¼" hole in the middle of the panel and centered ca 3/8" from the top.
- Coating system** – that is expected for the use with the roof-ditch sealer, including the phosphate system ecoat, primer and topcoat paints
- Heat resistant tape** – capable of maintaining properties up to ca 180 C

Method A – Laboratory Testing

This method is used for determining the sensitivity of a clearcoat to cracking, when it is applied as part of an overall paint system over sealer materials that are part of roof-ditch structures on vehicles. The experiment is conducted, at least in triplicate or to that number that satisfies the applicable Engineering Specification.

I. Preparation of Test Specimens

1. Using the 4" x 12" panels of a substrate to be used on the vehicle and a machine shop brake device prepare a simulated roof ditch along the long axis of the panel. Typical dimension for the ditch is ½" x 11/8". Dimensions for the roof ditch representative of a specific vehicle design should be used whenever possible.
2. Coat the simulated roof ditch panel using the phosphate conversion coating and electrocoat specified for use on the vehicle.
3. Insert a Plexiglass stop into the "hole end" of the simulated roof ditch, carefully covering the hole on the steel panel and tape in place with the heat resistant tape. Block the other end of the roof-ditch with heat resistant tape.
4. The roof-ditch sealer material (78 g +/- 2 g) is weighed into the ditch. The test specimen is tapped and moved to accomplish a uniform layer of sealer across the entire length of the specimen. The sealer is then gelled or fused in the manner representative of production use. Plexiglass stop is removed.
5. Primer, basecoat and clearcoat are applied and cured at specified production coating thicknesses and bakes, respectively.
6. The test panels are conditioned at 95 °F and 95% RH for 10 days prior to testing.

II. Determination of Crack Resistance

1. Fill the temperature bath with water. Bring up and equilibrate the temperature to 90 °C (+/- 4 °C), using the Fisher Scientific #13-873-44A or equivalent immersion heater. If necessary turn on heating plate to assist in warming process.
2. Fill the immersion bath with ice water and bring down and equilibrate temperature at 0 °C (+ 1 °C).
3. Inspect the test panels carefully, noting initial appearance and indicating the presence of initial defects in the paint surface.
4. Hang the panels from the rods.
5. Immerse panels into 90 °C water bath for 5 minutes.

