



ULTRASONIC GAUGE LOSS MEASUREMENT OF ELECTROCOATED STEEL TEST PANELS WITH AN UNCOATED AREA ON ONE SIDE

Application

This procedure is designed to ultrasonically determine gauge loss in a locally uncoated region of Electrocoated (E-coated) steel panels after exposure to either the CETP: 00.00-L-467 or CETP: 00.00-R-343 Ford corrosion procedures. The uncoated area must be large enough to take 12 unique measurements with the chosen probe.

Apparatus and Materials Required

E-coated Cold Rolled Steel Corrosion Panel with Uncoated Region

Ultrasonic Thickness Gauge Olympus 38DL Plus with appropriate probe (or equivalent)

Plexiglass Acrylic (or Similar Material) Measurement Template

Glycerin Couplant

Chemicals, materials, parts, and equipment referenced in this document must be used and handled properly. Each party is responsible for determining proper use and handling in its facilities.

Factors affecting performance and accuracy include calibration, surface roughness of the test piece, coupling technique, curvature of the test piece, taper or eccentricity, acoustic properties of the test material (sound scattering, sound attenuation or absorption, and velocity variations), and phase reversal or phase distortion.

Procedure

Before beginning the procedure, check the calibration information and date of service for the ultrasonic thickness gauge. Ensure the instrument is in agreement with calibration deadlines. Reference the instruction manual for set-up information specific to the application.

1.0 Determine the E-coat Correction Factor from an Untested Sample

An “**E-coat Correction Factor**” must be empirically determined to account for the fact that two layers of E-coat are measured during “**Reference Area Measurements**”, and only one layer of E-coat is measured during the “**Corroded Area Measurements**”.

- 1.1 Obtain an untested panel from the group of samples being tested (Figure 1a). The group of samples should all share a common coating process.
- 1.2 Lay the sample on a flat surface with the uncoated region facing down. Apply glycerin couplant to the fully coated side of the panel opposite an area with E-coat present.
- 1.3 Place a measurement template (Figure 2) on the sample so the measurement holes are located where glycerin couplant was applied opposite an E-coated area. The template can be taped to the back of the panel to prevent movement if necessary.

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- 1.3.1 The measurement template must have measurement holes sized appropriately for the specific probe being used. The measurement holes must be oriented to allow for measurements in unique locations on the panel.
- 1.3.2 Ensure glycerin couplant uniformly covers the sample surface in the measurement holes.
- 1.4 Using the measurement template holes as a guide, take ten (10) thickness measurements from the reference area where E-coat is present on both sides of the panel. Ensure the measurement is stable and repeatable before recording the value.
- 1.5 Remove the template from the sample and apply glycerin couplant to the fully coated side of the panel opposite the uncoated region.
- 1.6 Place the measurement template on the sample so the measurement holes are located where glycerin couplant was applied opposite the uncoated region. The template can be taped to the back of the panel to prevent movement if necessary.
 - 1.6.1 Ensure glycerin couplant uniformly covers the sample surface in the measurement holes.
- 1.7 Using the measurement template holes as a guide, take ten (10) thickness measurements from the area opposite the uncoated region. Ensure the measurement is stable and repeatable before recording the value.
- 1.8 The absolute difference between the means of the two data sets will serve as the **E-coat Correction Factor** for that specific group of panels.

2.0 Test Sample Measurements

- 2.1 Obtain an E-coated steel panel with a locally uncoated region that has been subjected to either the CETP: 00.00-L-467 or CETP: 00.00-R-343 Ford corrosion procedures.
- 2.2 Remove any tape or other material from the sample if applicable.
 - 2.2.1 Thick cakes of residual rust can be removed from the sample surface before conducting thickness measurements. Panels can be measured with slight rust still present by employing an empirically determined **Rust Correction Factor** (31 μm).
 - 2.2.1.1 The **Rust Correction Factor** should not be used for samples with less than 100 μm of gauge loss, ("Uncorrected Difference" <100 μm) or if the rust separates from the steel without leaving any residual adherent oxide. Samples with gauge loss below the 100 μm threshold will contain unknown variability in the correction factor of up to 31 μm unless the oxide is removed.
- 2.3 Lay the sample on a flat surface with the uncoated corroded region facing down. Apply glycerin couplant to the fully coated side of the panel opposite an area with E-coat present.
- 2.4 Place the measurement template on the sample so the measurement holes are located where glycerin couplant was applied opposite an E-coated area. The template can be taped to the back of the panel to prevent movement if necessary.
 - 2.4.1 Ensure glycerin couplant uniformly covers the sample surface in the measurement holes.
- 2.5 Using the measurement template as a guide, press the transducer probe to the panel surface. Document the value displayed by the ultrasonic thickness gauge as a **"Reference Area Measurement"** when the value is stable and repeatable.