



STATIC INDENTATION AND RECOVERY

Application

This procedure is used to determine the recovery of soft interior composite systems after application of static load using an indenter.

Apparatus and Materials Required

Indenter Head

Steel indenter, 41 +/- 1 mm spherical diameter, which will accommodate the application of a 10.9 +/- 0.18 kg (24 +/- 0.4 lb.) static load when measured where the sphere contacts the test specimen. (See Fig 1 and Fig 2).

Rigid Fixture

Rigid fixture for mounting the test specimen, capable of supporting the 10.9 kg load for the duration of the test. Specimens cut from parts must be held in place with screws, clamps or some other mechanical attachment method. The fixture must support the test specimen in a manner that only the ball of the indenter makes contact with the test surface.

Test Apparatus

The test apparatus is to consist of the indenter head, a system for attaching sufficient weight so the total load applied under the sphere is 10.9 kg, a mechanism to allow the weighted sphere to be raised and lowered onto the surface and a rigid fixture for mounting or holding the test specimen. (See Fig 3 and Fig 4 for examples).

Surface Measurement

Any digital scanner capable of capturing 3D surface image, microscope with image capture software capable of focus stacking or Z-stack, digital thickness gauge with appropriate diameter tip or similar apparatus able to accurately measure differences in surface height without destroying the test specimen. The digital scanner is the preferred system for measurement on parts.

Procedure for 3D Digital Surface Measurement System (Scanner or Microscope)

1. Cut test specimen to 60 mm by 105 mm minimum. For assemblies, the specimen location on the part must be reviewed and approved by Core Engineering prior to testing.
2. Mount the test specimen to the rigid fixture with the soft skin side facing the indenter. The test specimen must be fully supported along the B-surface so there is no movement of the specimen when the load is applied and only the indenter head makes contact with the surface.
3. Scan each specimen prior to starting the test as the baseline for posttest overlays. See equipment manufacturer's recommendation on how to do this. If using a digital microscope for surface measurement, this step is not necessary.
4. Apply a 10.9 kg static load to the test specimen for 4 hours, placing the weight on the specimen as gently as possible. Do not allow the weight to drop forcefully onto the test surface.
5. Remove the load and allow the test specimen to recover for 96 hours at ambient conditions. Some 3D scanning systems may require the test specimen remain mounted to the test fixture during the recovery period (refer to equipment manufacturer's instructions).
6. Scan the surface and record depth of indentation in mm.

Date	Action	Revisions	Rev. 0
2017 12 14	Released		



Documents

S. Gatzek, NA

Document Sharing Hub

**Procedure for Using Manual Measurement System (Digital Thickness Gauge)
For Use on Flat Stock or Rolled Goods Only**

1. Cut test specimen to 60 mm by 105 mm minimum. For assemblies, the specimen location on the part must be reviewed and approved by Core Engineering prior to testing.
2. Measure and record the initial thickness of the specimen and mark the measurement location.
3. Mount the test specimen to the rigid fixture with the soft skin side up and align so the initial thickness measurement location is directly under the indenter. The test specimen must be fully supported along the B-surface so there is no movement of the specimen when the load is applied and only the indenter head makes contact with the surface.
4. Apply a 10.9 kg static load to the test specimen for 4 hours, placing the weight on the specimen as gently as possible. Do not allow the weight to drop forcefully onto the test surface.
5. Remove the load and allow the test specimen to recover for 96 hours at ambient conditions.
6. Measure the thickness in the same marked location as the initial measurement.
7. Calculate the depth of indentation:
 $\text{Depth of Indentation} = \text{Initial Thickness} - \text{Thickness after 96 hours}$

Reporting

The following items should be recorded in the final report.

1. Measurement method used.
2. Measurement resolution of the equipment used.
3. Size of test specimen.
4. Photo of test specimen location(s), if cut from a part.
5. Depth of indentation, mm.

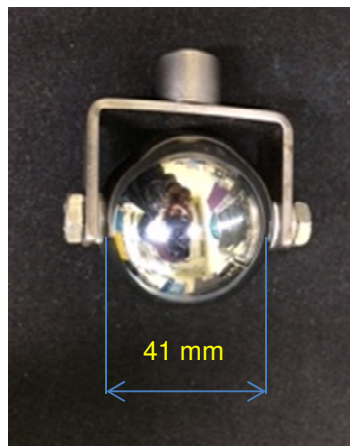


Figure 1. – Indenter Head