

LOW TEMPERATURE IMPACT TEST FOR PLASTICS

Application

This method is used to determine the low temperature impact resistance of various plastic parts. It was developed to provide a repeatable evaluation of foamed instrument panel assemblies

Test Equipment

The impact equipment consists of a pendulum arm with the impact ball, and a adjustable milling table capable of holding sample fixtures securely during the test. The milling table should be grooved to hold the sample fixture horizontally or vertically depending on the requirements of the part tested. The pendulum should have the capability to be stopped at any specified angle between 0 and 90° to apply the required impact velocity to the part. The impact ball has a hollow center partially filled with shot to prolong the impact time. The weight of the ball is 4.5 kg; the resultant weight of the ball and pendulum arm is 6.5 kg. A sketch of this equipment is shown in Figure 1.

Engineering drawings on how to construct this equipment are available from:

Body Interior Materials Engineering
Materials, Fasteners and Corrosion Protection Engineering
Advanced Vehicle Technology

Sample Fixture

The sample fixture consists of a steel plate with a steel substrate that contains a sufficient number of original mounting holes to securely hold the test specimen during the test. The length of the substrate and test specimen should not be less than 200 mm. The substrates should be welded to the steel plate so that the impact area of the specimen will be normal to the pendulum ball face. A minimum of three fixtures should be made in order to allow repeat testing (see relevant Engineering Document for specific number of assemblies to be tested).

Convection Oven

Capable of maintaining a temperature of 80 +/- 2 °C.

Cold Box

Capable of maintaining temperatures to -40 +/- 2 °C.

Gloves

Insulated, strong fabric.

Date	Action	Revisions
2001 04 02	Revised	Editorial – no technical change A. Cockman
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Conditioning

All test values indicated herein are based on material conditioned in a controlled atmosphere of 23 +/- 2 °C and 50 +/- 5 % relative humidity for not less than 24 hours prior to testing and tested under the same conditions unless otherwise specified.

Procedure

1. Remove a test specimen from the component with a length sufficient to fit in the sample fixture. The length of the test specimen should not be less than 200 mm.
2. Mount the test specimens to the steel substrate on the fixtures using the production approved fasteners to form a test assembly and condition for 24 h at 23 +/- 2 °C and 50 +/- 5 % relative humidity. The number and location of fasteners should be sufficient to provide a rigid mount.
3. Slide one of the conditioned assemblies into the groove in the milling stand and slowly lower the pendulum head onto the sample surface.
4. Adjust the vertical position of the milling stand so that the pendulum will fall on the target area of the sample.
5. Adjust the height of the milling stand so that the arm of the pendulum is at 0 degrees (horizontal) while resting on sample surface.
6. Raise the arm to the required number of degrees as stated in the specification and apply the arm brake.
7. Place the assemblies into the oven for 24 hours at 80 +/- 2 °C.
8. Using gloves, remove the assemblies from the oven and condition them for 2 hours at 23 +/- 2 °C and 50 +/- 5 % relative humidity.
9. Place the assemblies into the cold box for 5 hours at the temperature stated in the relevant Engineering Document.
10. At the end of the cold conditioning, using the gloves, remove one of the assemblies from the cold box and quickly slide it into the groove in the milling stand.
11. Immediately release the pendulum arm, allowing it to fall and come to rest on the surface of the sample. Steps 10 and 11 must be completed in less than 10 seconds to prevent the surface of the material from warming up.