

Safe System of Work

Adhesive Shear Strength at Elevated Temperature

Overview

The aim of this test is to determine the load capacity and load-deflection response of epoxy adhesives at elevated temperatures. Specimens will be tested using the Instron 600LX test machine, which is located in Fire Lab 2.

To develop uniform shear stress along the adhesive joint, the tests are carried out in torsion, using a test frame that fits inside the Instron oven. Rotation of the rubes across the adhesive joint will be measured using digital image correlation.

Key Watchpoints



- A stable step ladder or steps must be used when fitting the specimens to the machine, and the operator must never stand on a lab chair.
- The specimen is loaded automatically by the Instron. The test method should be independently checked by another trained user.
- Lab extraction may be required during the heated tests.

Required PPE

Safety boots and glasses must be worn at all times during the tests. Gloves will be required when assembling and dismantling the test setup.



Before Testing

1. The test frame is fitted to the test machine by clamping it in the standard tension grips. Aligning the test frame in the machine requires care. In particular, a stable step or step ladder must be used, and the operator must not stand on the lab chairs to access the machine.
2. To fit and align the tubular sample inside the test frame again requires stable steps or ladder. Proper tools (allen keys and spanners) must be used, not adjustable spanners.
3. For the heated test, the oven should be swung into place, and the ports top and bottom insulated using fibrous insulation (dust mask required).
4. The DIC camera is positioned on a tripod in front of the machine. Cables for camera power supply and timing must be neatly arranged to avoid a trip hazard.
5. The outside door to Fire Lab 2 must not be opened during the test, so should be

locked, and an appropriate notice placed on the outside of the door. It may also be necessary to black out some of the sunlight from the windows to avoid glare.

6. The test area must be free of obstructions (such as test samples and tools) before the test starts, to leave a safe route of exit.

During Testing

7. Other lab users will be informed that a test is about to start, and must wear the PPE required by the test.
8. Load is applied automatically using the Instron controller in displacement control. The emergency stop button on the machine can be used to stop the test.
9. The Instron machine must only be used by a trained user, and due to the automated test method, the first few tests should be conducted in the presence of an independent second trained user, who can spot errors in the test setup or in the test programme.
10. The lab extraction system must be turned on during heated tests due to the possibility of vapours given off by the adhesive.

After Testing

11. Gradually remove any residual load from the specimen.
12. Remove the test specimen from the Instron.
13. Clean the top of the Instron after every test. In particular, keep the seal around the hydraulic ram clean.
14. The tubular specimen should be cleaned ready for another test. Epoxy adhesive waste is benign and can be disposed in the lab waste bin.
15. The test frame must be removed from the Instron grips at the end of each testing period. Tools must be returned to their cupboards.

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