Issue 26

Materials Testing Accessories Newsletter

In This Issue: Testing at Non-Ambient Temperatures

- The properties of materials at high and low temperatures are of major interest to engineers. In most cases, you can add an environmental chamber or furnace to your testing system.
- Environmental chambers cover a typical temperature range of -150°C to +600°C. Instron chambers use forced convection heating and cooling in which a fan is used to circulate the air within the chamber. The specimen is located near to the center of the chamber and held or supported by suitable temperature-rated grips or fixtures. The grips and fixtures are attached to the system via pull or push rods that extend through the chamber ports. Due to the vast range of applications, the pullrods are configured to suit your combination of testing machine, chamber, grip, or fixture and load cell as part of any quotation. A hinged door containing a window allows access to the load string.
- The application range of an ElectroPuls™ can be enhanced by mounting a chamber to it. The new 3119-505 is the latest addition to the environmental chamber range and is ideally suited for use with the ElectroPuls testing system.

3119-505 Environmental Chamber fitted on an ElectroPuls E10000

- The chamber can be rigidly mounted or use a roller mounting, which allows the chamber to be moved back from the test space when not in use. Removable wedges (optional in most models) in the front of the chamber allow the chamber to be moved backwards without the need to remove the load string.

Removable Wedges

Roller Mounting

- Testing below ambient temperatures requires the use of a refrigerant gas, such as liquid nitrogen or carbon dioxide. The cooling gas is injected into the chamber via a solenoid valve controlled by the chambers temperature controller.
- Furnaces are used to apply temperatures much higher than those achievable with environmental chambers up to +1600°C in air. However, since the heat transfer mechanism is predominantly radiation, they are not very efficient at temperatures below 300°C. The heated volume in a furnace tends to be smaller than in an environmental chamber in order to achieve high temperatures at a reasonable power requirement and cost. Grips and specimens are generally much more specific in design, utilizing specialised materials to withstand high temperatures and atmospheric degradation.
- Furnace design itself has developed in recent years with traditional clam shell designs being augmented by short furnaces with external gripping. High temperature extensometers are available for direct strain measurement at very high temperatures, and these are also of a very specific design.

Split Furnace

Furnace with External Grips and Extensometer

High-temperature Extensometer

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Online Request

Related Links

- Fourth Edition of the Accessories Catalog for Materials Testing is now available!

- Missed previous issues of the Accessories Newsletter? Catch up at the Instron Library. Follow the link and select "Newsletter" as the Document Type.
- Visit our Testing Solutions to find technical tips relevant to your testing application.

Future Events

For a list of upcoming shows that Instron will be attending, please visit the Events page of our website.

Hints and Tips When Using a Chamber and Furnace

- If your system incorporates specimen or load protect you can compensate for load string and specimen expansion/contraction while your furnace reaches the set point temperature. The crosshead or actuator will move to keep the force applied to the specimen below the set threshold.
- To prevent loss of heat around pull and push rods use any convection shields provided or pack the space between the pull rod and the furnace or chamber port with a suitable refractory fibre.
- Use the recommended anti-seize compounds and lubricants on your grips to help aid specimen removal.
- Use the smallest grips possible to reduce heat-up times and maximize the available travel in an environmental chamber.
- After you have finished testing at below ambient temperatures, you can remove any condensation from the grips and pull rods by warming them in the chamber and allowing them to cool naturally.

Chambers with Video Extensometry

- Certain materials become very soft at elevated temperatures while others become brittle at low temperatures. Aggressive environments can also greatly reduce the apparent strength of materials. Due to these effects, the presence of a contact force from a contacting extensometer is highly undesirable, and the non-contacting nature of the Instron video extensometer offers substantial benefits.
- All extensometers contain sensitive measurement devices, which are affected by the environment in which they operate. Many conventional contacting extensometers are only capable of operating over a restricted range of temperatures (typically -70° C to +200° C), while special high or low temperature versions can be complex and expensive. The non-contacting nature of the Instron video extensometer allows the unit to mount outside the hostile environment eliminating the effects of temperature on the extensometer. Distortion effects due to the glass window of the chamber are minimized by the use of multipoint calibration.

For more information on Accessories, visit us on the web,submit an online request, or call us at +800 564 8378 (US only) or +44 1494 456815 (Europe only)

Are you testing something a little different? Do you think more people should know about it? Would you like to submit an article for possible publication in the Instron accessories newsletter? If so, please submit your story.

What do you think? Tell us!

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