

# **HANATEK**

## ***FILM SHRINK TESTER***

### **MODEL 2010**

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## **INSTRUCTION MANUAL**

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## **1. The HANATEK Film “Free Shrink” Tester**

“Free Shrinkage”, or unrestrained Linear Thermal Shrinkage, of film is defined as the irreversible and rapid reduction in linear dimension, in a specified direction, generally expressed as a percentage of the original dimension.

- a) Undesirable internal stresses in film, generated by the manufacturing process are released by this test, thus insuring a degree of manufacturing control, producing a consistent known quality of product.
- b) Film manufactured for “shrink-wrapping”. In this case, the film shrink performance is a figure required in order to establish application suitability; a Quality Control requirement.

This method will measure, at given temperatures, the “free-shrink” of film up to 0.76 mm, (0.03 inches) in thickness.

Related standard:  
ANSI/ASTM D.2732-70 (76): Issue1

Unrestrained linear thermal shrinkage of plastic film and sheeting of 0.76mm (0.030”) thickness or less.

## 2. The Equipment

The Equipment consists of a 90mm dia. aluminium block, fitted with a nozzle heater and controlled by a 3-term, auto tune, temperature controller. A PT100 temperature sensor is fitted for control and indication.

The unit indicates both “set-point” and actual” temperature.

The unit is internally divided and provides a separate compartment for cooling the sample. The area is back-lit for reading directly off the marked disc, the shrinkage in millimetres or percentage.

### **Rear Panel: -**

Mains switch  
Back light switch  
Cooling fan

### **Ancillaries**

Template 50mm dia (for providing samples)  
Cutting knife  
Copper discs. 70mm dia. Used as a sample carrier  
Silicon oil  
Mini-pipette  
Tweezers

## 3. Set-up Procedure

- 3.1. The equipment should be unpacked and checked for damage.
- 3.2. The hot-plate grille must be in the “down” position.
- 3.3. Connect the mains lead to a 220-240V 50/60 Hz supply.
- 3.4. Switch rear mains switch to “On” and the hot-plate will start heating up.
- 3.5. The temperature controller is a factory configured. The top figure displays the actual temperature and will be increasing to match the set-point.
- 3.6. To set the required test temperature, press the “UP” key till the required “temp” is displayed (see Eurotherm controller operators manual enclosed).
- 3.7. The test temperature should be reached and stabilised, ready for use in 20 minutes.
- 3.8. The power neon on the controller should be cycling at uniform rate when required temperature is reached and stable.

## 4. Sample Preparation

- 4.1. Cut the required number of 50 mm test discs from the sample using the template and cutting knife, ensuring that the edges are as clean cut as possible.
- 4.2. Mark the test discs to indicate the “machine direction”
- 4.3. Should the standard test method being followed require pre-conditioning this must be applied before proceeding further.

## 5. Test Method

- 5.1. Take a copper carrier disc with the edge turned up (to facilitate handling by the tweezers) and place in the cooling area.
  - 5.2. Add a few drops of the silicon oil to the hot-plate surface. This should form a film about 0.25mm thick.
  - 5.3. Add a few drips of silicon oil to the copper disc. As the oil spreads, carefully place the sample under test on the copper foil. The oil should draw the film disc down. A floating condition must be aimed at and there should be no obvious bubbles underneath.
  - 5.4. Set the timer for the exact time required by the test method (usually 30-40 seconds).
  - 5.5. Using the tweezers, place the carrier disc as flat as possible on the hot-plate.
  - 5.6. Start the count-down timer.
  - 5.7. On hearing the alarm at the end of the time set, remove sample from the carrier disc and place in the cooling area.
  - 5.8. Switch on the backlight.
  - 5.9. Centralize the sample and read off the percentage shrinkage.
  - 5.10. (The carrier disc may be re-used if undamaged)
- NB. Should the sample “cockle up” instead of shrinking then it may be found useful to cover the upper surface of the test piece with oil before placing in on the hot-plate.

## 6. Treatment of Results

- 6.1. Generally, because of different properties with and across the machine direction, shrinkage is anisotropic and the discs will have assumed an elliptical shape.
- 6.2. Noting the machine direction, measure both the “Major” and “Minor” axes. The result is then reported as a percentage of the original dimension (50mm).

## 7. Calculations

- 7.1. The percentage free shrinkage is given by:-

Unrestrained linear shrinkage,

$$\% = \frac{(L_o - L_f) \times 100}{L_o}$$

Where:  $L_o$  = initial length (=dia. 50mm)

$L_f$  = length after shrinking (=dimension of major and minor axes of final ellipse)

## 8. Maintenance

- 8.1. The unit has been designed to be essentially maintenance free. The removal of the two slotted screws on either side of the unit frees the cover and allows access to all components: the unit must be unplugged (isolated from the electrical supply) before removing the cover.

## 9. Spares

<b>Part</b>	<b>Part No</b>
Temperature controller	HAN-E4010-001
Heater (240V)	HAN-E-BANDHEATER
Thermocouple	HAN-H-PRTSENSOR
Timer	HAN-H-TIMER/CLOCK
Fan	HAN-H-FAN240V
Bulb	HAN-H-BULB
Measuring disc	HAN-H-GRATICULE
Fuse (3 Amp)	HAN-H-QFUSE3A
Tweezers	HAN-H-TWEEZERS
Pipette	HAN-H-PIPETTE
Silicon Oil	HAN-H-SILICONOIL210H
Aluminium discs	HAN-H-FOIL
Template	HAN-H-BLACKTEMP
Cutting Knife	HAN-H-SNAPKNIFE

To obtain the items listed above contact your local agent, or contact HANATEK Services Ltd:

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