

# HDT 3 & 6 VICAT



**CEAST** 

DESIGN AND PRODUCTION OF  
INSTRUMENTS AND APPARATUS  
FOR QUALITY CONTROL  
ON MATERIALS



These instruments are made in  
compliance with CE health  
and safety requirements





HDT test station

**“HDT” test means: determination of temperature of deflection under load**

**Field of application**

The test determines the temperature at which a specified deflection occurs when a standard test specimen is subjected to a bending stress, to produce one of the nominal surface stresses according to international standards. This test is very important for both quality control and research into plastics because it determines the heat resistance characteristics of materials, and is indispensable to define precisely the thermal behaviour of the polymers. The values obtained are indicative of the heat resistance characteristics of materials, even if not directly applicable for design purposes.

**Method**

The specimen, in the form of a rectangular bar of dimensions complying with the chosen standard, is tested as a simple beam with a load applied at midspan to produce a maximum, nominal surface stress according to the chosen standard. The test assembly, with the loaded specimen, is then immersed in a heat-transfer medium, equipped with a system capable of increasing the temperature linearly at a uniform rate (generally 2 °C/min). The temperature, when the specimen reaches a specified deflection is recorded. This value is indicated as the Temperature of Deflection Under Load, in degrees Celsius, of the material under test.

**“VICAT” test means: determination of the VICAT softening temperature**

**Field of application**

The test determines the temperature at which a standard indenter penetrates 1 mm into the surface of a test specimen under load. It is used to establish the differences between many types of thermoplastic materials with regard to their softening properties.

**Method**

An indenting tip of 1 mm<sup>2</sup> circular cross sectional area is placed on the specimen and is loaded with a constant force (10 N or 50 N depending on the standard method used). The test assembly, with the loaded specimen, is immersed in a heat-transfer medium equipped with a system capable of increasing the temperature linearly at a uniform rate (generally, 50°C/hour or 120°C/hour).

The temperature, when the needle has penetrated 1 mm into the specimen, is recorded.

This temperature, expressed in °C, is indicated as the VICAT Softening Temperature of the material under load.

**Additional tests**

Using this instrument it is possible to perform flexural creep tests and to determine the elastic modulus of materials and to measure the thermal dilatation.

The elastic modulus can be evaluated at different temperature

so that it is possible to study the trend of elastic modulus of a material as a function of temperature.

**Standards**

Designed and built to meet the following standards:

**“HDT” TEST**

ISO 75, ASTM D 648, DIN 53461, BSI 2782, Method 121 C, NT T 51-005, UNE 53075 and others equivalent.

**“VICAT” TEST**

ISO 306, ASTM D 1525, DIN 53460, BSI 2782, Method 120 C, NT T 51-021, UNE 53118 and others equivalent.



VICAT test station



HDT 3 VICAT - code 6911.000



HDT/VICAT keyboard and display

### Instrument Features

Compact instrument for HDT, VICAT, and also CREEP testing with automatic control of entire test cycle complete with command keyboard, built in parameters and results display and ability to continuously monitor both temperature and deflection/penetration. Cooling cycle is automatic at test end. Nitrogen blanket diffusor for oil bath safety at high temperature with external electro valve and connection.

Ability to print out full quality control report including graph on A4 printer without need for a PC. Possibility to work with Windows based software without need for any separate interface.

Technical data	6911.000	6921.000
Number of stations	3	6
Test capabilities:		
Hdt, Vicat	■	■
Hdt and Vicat results at the same time		■
Creep, Thermal dilatation, Elastic modulus	□	□
Thermal distribution °C (100 to 250°C)	±0.2 to ±0.3	±0.2 to ±0.3
Thermal stability °C (300°C)	±0.5	±0.5
Temperature range °C	20 to 300	20 to 300
Temperature preset accuracy °C	±0.2	±0.2
Temperature resolution °C	0.1	0.1
Temperature ramps selectable via keyboard:		
• 120°C/h ±10°C (12 ±1°C/6 min)	■	■
• 50°C/h ±5°C (5 ±0.5°C/6 min)	■	■
• Operator may select any other rate between 50 and 120°C/h	■	■
Temperature measurement:		
• Each station - PT 100 thermoresistance calibrated	3	6
• bath control - PT 100 thermoresistance calibrated	1	1
Deflection/penetration measurement:		
• LVDT accuracy for each station (mm) calibrated	0.001	0.001
Independent automatic compensation via dedicated software for thermal expansion of each work station. Calibration data can be printed for each station	■	■
Built-in microprocessor to automatically carry out instrument processing with PID heating control	■	■

	6911.000	6921.000
Electronic control unit with alphanumeric keyboard:		
• Liquid Crystal Display 128 x 240 points	■	■
• CPU board	■	■
• Amplifier and signal board independent	■	■
• DC power supply	■	■
Data display (graphs, parameters)	■	■
Automatic deflection/penetration transducer zeroing	■	■
Automatic cooling system at test end	■	■
Cooling time from 200 to 50°C (min)	20	20
Autocheck during test execution	■	■
Nitrogen diffuser and electrovalve, to create a layer of Nitrogen to prevent the heat transfer medium from degrading at high temperatures	■	■
Nitrogen bottle and connections	□	□
Oil pump	■	■
Oil level depstick	■	■
Safety thermostat	■	■
Heat transfer fluid (kg)	15	20
Binary mass system (one set for each station) consisting of a set of 13 masses to cover all HDT and VICAT tests using any mass from 67 to 5140 g in minimum steps of 1 g	○	○
<b>HDT test</b>		
HDT capability to test sample in flatwise or edgewise position with 64 or 100 mm free span according to international standards	■	■
Automatic calculation and list of masses to apply to reach defined stress according to standards 0.450 - 0.455 - 0.500 - 1.80 - 1.82 - 5.00 - 8.00 MPa	■	■
HDT testing heads complete with traceable certificates (one for each station)	○	○
HDT head positioning tool for HDT head positioning	□	□
<b>VICAT test</b>		
VICAT masses (one set for each station) for a total of 10N and 50N. For VICAT tests only. These masses are ready included in the binary mass system, which allows to perform HDT and VICAT tests	□	□
VICAT testing heads complete with traceable certificates (one for each station)	○	○
<b>Data acquisition</b>		
Parallel port for full report print-out by printer	■	■
RS232 serial port for connection to PC in conjunction with WinHDT6 software	■	■
Software in Windows 95, 98 and NT environment	□	□
Data acquisition interface built into the basic instrument	■	■
Personal computer	□	□
Graphic printer 80 columns, parallel interface and cable	□	□

■ Included    □ Optional    ○ Necessary to perform tests





HDT 6 VICAT - code 6921.000

### Caest Software Available with Hdt Vicat Family

#### VisualTHERM code 0710.500 - Base Module

The program works in Windows environment and can run on any PC.

VisualTHERM enables the user to perform the following operations and to obtain the following results depending on which instrument the software has been configured for:

#### Parameter Management

- Possibility to select, for each station, the test type (HDT or VICAT)
- Presetting of End Test condition: End Displacement (deflection or penetration, even at different values from the standard ones), End Temperature or both
- Saving and reloading of test parameters
- Calculation and display of the load weight needed to apply the required stress on the specimens

#### Process Management

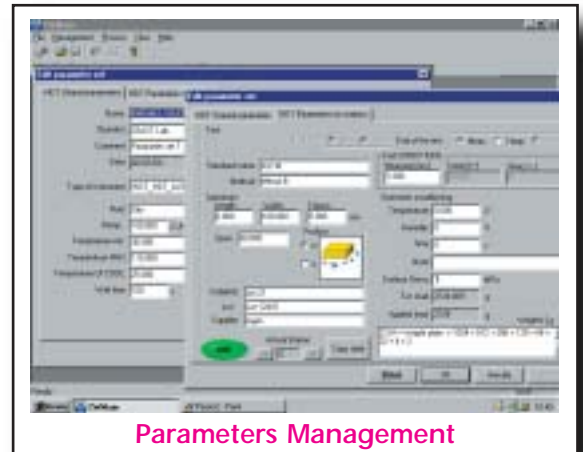
- Transmission of the selected set of parameters to the instrument
- Management of the asynchronous utility commands from the PC (Basket up, Basket down, ...)
- Synoptic panel management: instrument status and read out values
- Station calibration guide with graphic panel
- Test Management is done with guided messages and dedicated buttons
- Test execution with data acquisition from apparatus, real-time graph management

#### Result Processing

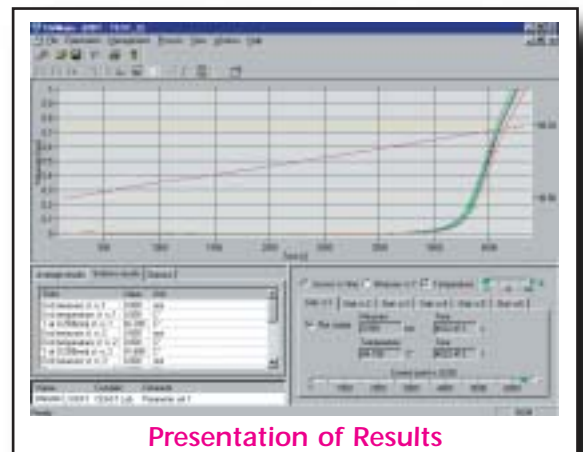
- Saving of all the data acquired by the instrument (raw data)
- Measuring Units selection: SI, BU or other main measuring systems
- Visualization of graph with overlay curves
- Visualization of graph with single curve: possibility to select the station displayed in the graph
- Choice of the kind of graphics: Deflection or Penetration curves Vs Time or Temperature and Shifted curves
- Visualization of table in which all data of each active station are displayed
- Visualization of test general and statistical data
- Visualization of data of single station
- Graphic point management: display of Measurement/Temperature/Time of the point indicated
- Possibility to modify comment after Test
- It is possible to export the selected parameters and the selected data in TXT format file
- It is possible to export the test graphs (even if elaborated by the operator) in BMP format file

#### Standard Report

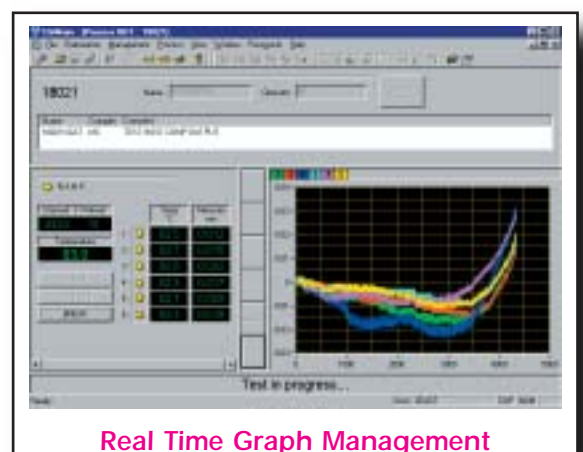
- Printout of parameters, graph and data of the Test for the selected stations.
- It is possible to change the customer logo



Parameters Management



Presentation of Results



Real Time Graph Management

### Additional CEAST software modules:

#### **OPERATOR Module - code 0710.501**

Password-based operator access level management to assure data security and also to simplify the operating procedure of the non-expert operator. 3 levels available: Supervisor, Manager, Operator

#### **MULTI Module - code 0710.503.n**

Concurrent management of n instruments at the same time for all enabled functions, including the complete handling of the process: parameters selection, test execution, real-time synoptic and data acquisition

#### **TRANSFER Module - code 0710.502**

Possibility to manage and transfer data in Excel and Text file with format templates management

#### **CREEP Module - code 0710.443**

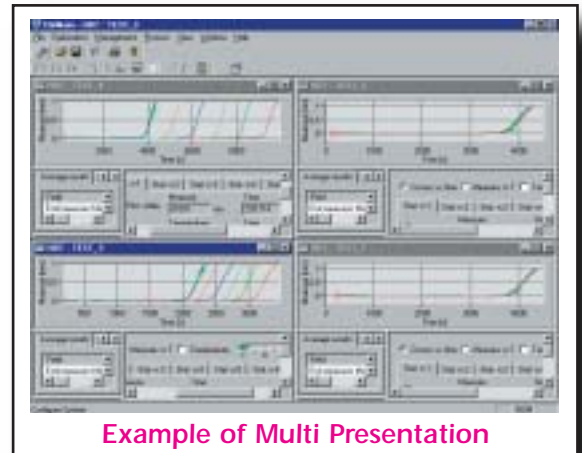
CREEP test management to have an idea of flexural creep behaviour of materials at different temperatures

#### **ELASTIC MODULUS Module - code 0710.444**

To measure Flexural Elastic Module at different temperatures

#### **THERMAL DILATATION Module - code 0710.445**

To investigate the thermal dilatation which the materials might show if kept in temperature



Example of Multi Presentation

Technical Characteristics	6911.000	6921.000
Total bath capacity [l]	18	30
Overall dimensions (L x D x H) [mm <sup>3</sup> ]	1100 x 510 x 600	1420 x 510 x 600
Weight [kg]	110	130
Supply	230 V - 50/60 Hz - Singlephase (110 V on request)	
Power [W]	3000	4000
Paint	fuchsia RAL 4006 - gray RAL 7035	

"Due to the continuous development policy of CEAST's Research and Development Department, changes may be introduced without notice"

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