Vicat-HDT-Tester

...die intelligentere Lösung
COESFELD MATERIALTEST
...the more intelligent solution

40-190
Vicat-HDT-Tester
3 measuring stations with air/water cooling

- for determination of VICAT Softening Temperature (VST) and Heat Deflection Temperature (HDT)
- testing unit for fully automatic tests
- control is performed by a PC via RS 232 (not included in scope of delivery)

Capability characteristics:
- automatic recording of VICAT/HDT-temperatures
- inductive distance recorders, accuracy 0,01 mm
- temperature range +20...+300°C, resolution ±0,1 K
- temperature gradient corresponding to ISO 306: 50 K/h, 120 K/h or free programmable
- start temperature: free programmable
- automatic recooling with air cooling and built-in cooling coil for additional liquid cooling
- motor operated lifting platform
- variable HDT span: 64 mm (flat) or 100 mm (edge)
- possible connection of an external refrigerator/cooling water

Including software "WIN-VICAT/HDT":
- menu and window managed user interface
- manual input of sample dimensions and calculation of weights
- data acquisition and storage in ASCII format
- permanent data presentation on screen
- graphical display of Vicat-Penetration curves and/or HDT-Bending curves versus time or temperature
- free scaling of all axis
- flexible report generator acc. to ISO 9000 ff
- user groups with password
- for WIN 95 / NT4 / 2000 / XP

Dimensions (H x W x D):
approx. 460 x 600 x 650 mm
Weight:
approx. 65 kg without accessories
Filling amount for bath:
approx. 12 l
Mains: 230 V, 50 Hz
Power: 3000 VA

40-190-001 Vicat-HDT-Tester
3 measuring stations and heat exchanger

- for determination of VICAT Softening Temperature (VST) and Heat Deflection Temperature (HDT)
- with high power cooling system
- recooling time from 300°C to ambient temperature in approx. 12 minutes
- testing unit for fully automatic tests
- control is performed by a PC via RS 232 (not included in scope of delivery)

Capability characteristics:
- automatic recording of VICAT/HDT-temperatures
- inductive distance recorders, accuracy 0,01 mm
- temperature range +20...+300°C, resolution ±0,1 K
- temperature gradient corresponding to ISO 306: 50 K/h, 120 K/h or free programmable
- start temperature: free programmable
- automatic recooling with built-in heat exchanger
- motor operated lifting platform
- variable HDT span: 64 mm (flat) or 100 mm (edge)

Including software "WIN-VICAT/HDT":
- menu and window managed user interface
- manual input of sample dimensions and calculation of weights
- data acquisition and storage in ASCII format
- permanent data presentation on screen
- graphical display of Vicat-Penetration curves and/or HDT-Bending curves versus time or temperature
- free scaling of all axis
- flexible report generator acc. to ISO 9000 ff
- user groups with password
- for WIN 95 / NT4 / 2000 / XP

Dimensions (H x W x D):
approx. 900 x 1230 x 700 mm
Weight:
approx. 138 kg without accessories
Filling amount for bath:
approx. 12 l
Mains: 230 V, 50 Hz
Power: 3000 VA

40-190-002
Vicat-HDT-Tester
3 measuring stations, autom. weight appliance and heat exchanger

- for determination of VICAT Softening Temperature (VST) and Heat Deflection Temperature (HDT)
- with high power cooling system
- automatic weight appliance
- recooling time from 300°C to ambient temperature in approx. 12 minutes
- testing unit for fully automatic tests
- control is performed by a PC via RS 232 (not included in scope of delivery)

Capability characteristics:
- automatic recording of VICAT/HDT-temperatures
- inductive distance recorders, accuracy 0,01 mm
- temperature range +20...+300°C, resolution ±0,1 K
- temperature gradient corresponding to ISO 306: 50 K/h, 120 K/h or free programmable
- start temperature: free programmable
- automatic recooling with built-in heat exchanger
- motor operated lifting platform
- variable HDT span: 64 mm (flat) or 100 mm (edge)

Including software "WIN-VICAT/HDT":
- menu and window managed user interface
- manual input of sample dimensions and calculation of weights
- data acquisition and storage in ASCII format
- permanent data presentation on screen
- graphical display of Vicat-Penetration curves and/or HDT-Bending curves versus time or temperature
- free scaling of all axis
- flexible report generator acc. to ISO 9000 ff
- user groups with password
- for WIN 95 / NT4 / 2000 / XP

Dimensions (H x W x D):
approx. 900 x 1230 x 700 mm
Weight:
approx. 137 kg without accessories
Filling amount for bath:approx. 18 l
Mains: 230 V, 50 Hz
Power: 3000 VA

- ASTM D 1525 - DIN 53 460 - ISO 306 - ASTM D 648 - BS 2782 - DIN 53 461 - EN ISO 75 - UNI 5641 -

Vicat-HDT-Tester

40-197
Vicat-HDT-Tester
As 40-190, buth with 6 measuring stations
Dimensions (H X W x D):
approx. 460 x 780 x 650 mm
Weight:
approx. 80 kg without accessories
Filling amount for bath:
approx. 18 l

40-197-001
Vicat-HDT-Tester
As 40-190-001, buth with 6 measuring stations
Dimensions (H X W x D):
approx. 900 x 1480 x 650 mm
Weight:
approx. 160 kg without accessories
Filling amount for bath:
approx. 18 l

40-197-002
Vicat-HDT-Tester
As 40-190-002, buth with 6 measuring stations
Dimensions (H X W x D):
approx. 900 x 1480 x 650 mm
Weight:
approx. 160 kg without accessories
Filling amount for bath:
approx. 18 l

Accessories

40-240
Travel Calibration Set for VICAT and HDT
(1 x per unit)

40-191
Vicat Needle
(1 x per measuring station necessary)

40-196
Vicat Weight Set Tester
ISO 306 10 N and 50 N
(1 x per measuring station necessary)

40-194-001
Centering Tool
for Setup of HDT

40-192
HDT Test Assembly
(1 x per measuring station necessary)

40-217
HDT Weight Set ISO 75 f
1,8-0,45-8 MPa Tester
(1 x per measuring station necessary)

40-218
HDT Weight Set ISO 75 e
1,8-0,45-8 MPa Tester
(1 x per measuring station necessary)

40-261
Universal Weight Set to cover
all VICAT and HDT requirements
(1 x per measuring station necessary)

40-211/10
Thermal fluid 10 l

40-211/5
Thermal fluid 5 l

Please consider the filling level.

COESFELD-PC

COESFELD-
colour ink jet printer

Basic Vicat-HDT-Tester

40-272-001
Basic Vicat-HDT-Tester
3 Messstationen

- Bestimmung der Vicat-Erweichungstemperatur (VST) und HDT-Formbeständigkeit in der Wärme
- Grundgerät mit drei Universalmessköpfen
- manueller Prüfablauf
- PC-Erweiterungssatz (inklusive) ermöglicht automatische Messdatenerfassung über PC mit RS232
- PC nicht im Lieferumfang enthalten

Leistungsmerkmale:
- Temperaturbereich von +20 ... +250°C
- Temperaturgradient entsprechend ISO 306: 50 K/h, 120 K/h, oder frei wählbar
- Starttemperatur frei wählbar
- Wegmessung mit digitalen Wegmessuhren

Anzeigegenauigkeit ± 0,01 mm
- RS 232 – Schnittstelle
- Probendicke 2 – 12 mm
- Anschluss für externe Rückkühleinheit (nicht im Lieferumfang)

Abmessungen H x B x T:
ca. 440 x 440 x 570 mm
Gewicht: ca. 30 kg ohne Zubehör
Öl Füllmenge: ca. 12,5 l
Netz: 230V, 50/60Hz
Leistung: 2000 VA

40-272-006
Basic Vicat-HDT-Tester
wie 40-272-001, jedoch bis 300°C
Leistung: 3000 VA

Wir liefern Geräte mit 1 bis 6 Messstationen.

40-272-004
Basic Vicat-HDT-Tester
2 Messstationen und 1 TMA-Messstation

- Bestimmung der Vicat-Erweichungstemperatur (VST), der HDT-Formbeständigkeit und der thermo-/mechanische Analyse in der Wärme
- Zwei Universalmessköpfe für den manuellen Prüfablauf von Vicat bzw. HDT-Tests
- Ein Messkopf für thermo-/mechanische Analyse (TMA)
- PC-Erweiterungssatz (inklusive) ermöglicht automatische Messdatenerfassung über PC mit RS232
- PC nicht im Lieferumfang enthalten

Leistungsmerkmale:
- Temperaturbereich von +20 ... +250°C
- Temperaturgradient entsprechend ISO 306: 50 K/h, 120 K/h oder frei wählbar
- Starttemperatur frei wählbar
- Wegmessung mit digitalen Wegmessuhren

Anzeigegenauigkeit ± 0,01 mm (Vicat/HDT-Test)
Anzeigegenauigkeit ± 0,001 mm (TMA)
- RS 232 – Schnittstelle
- Probendicke 2 – 12 mm
- TMA Messbereich 50 mm
- Anschluss für externe Rückkühleinheit (nicht im Lieferumfang)

Abmessungen H x B x T:
ca. 460 x 440 x 570 mm
Gewicht: ca. 30 kg ohne Zubehör
Öl Füllmenge: ca. 13 l
Netz: 230V, 50/60Hz
Leistung: 2000 VA

Durchführung der Thermisch-Mechanischen-Analyse (TMA) von Kunststoffen in Öl.

Messprinzip:
Es wird im kontinuierlich aufgeheiztem Ölbad die Dickenzunahme von Kunststoffprobekörpern als Funktion der Temperatur bestimmt.

Anwendbarkeit:
- Plexiglas GS: Zur Bestimmung des Polymerisationsschrumpf
- Zur Bestimmung des thermischen Rückschrumpfes beliebiger Kunststoffe, sowie mono- und biaxial gereckten Kunststoffen.
- Zur Bestimmung des linearen thermischen Ausdehnungskoeffizienten.

40-206-001
PC-Erweiterungssatz
für Basic-Vicat / HDT-Tester mit 3 Mess-Stellen

- Interface zum Anschluss der digitalen Wegmessuhren
- Verbindungsleitungen für Interface und RS 232 ermöglicht automatische Messdatenerfassung über einen PC

- PC nicht im Lieferumfang enthalten
- angeschlossener PC benötigt 2 RS 232

inkl. Software "WIN-VICAT/HDT":
- menü- und fenstergesteuerter Programmablauf
- manuelle Eingabe der Probendimensionen und Berechnung der Gewichte
- Datenerfassung und Speicherung im ASCII-Format
- permanente Datenübersicht auf dem Monitor
- graphische Darstellung der VICAT - Eindringkurven und/oder der HDT-Durchbiegungskurven über der Zeit oder Temperatur
- freie Achsenskalierung
- flexible Prüfprotokolle gem. ISO 9000 ff
- Benutzergruppen mit Password-Abfrage
- Win 95 / NT4 / 2000 /XP

Vicat-Zubehör:

40-240
Weg-Kalibriersatz für VICAT und HDT

40-191
Vicat-Prüfnadel
(1 x pro Messkopf notwendig)

40-275
Vicat Gewichtssatz Basic ISO 306 10N und 50N
(1 x pro Messkopf notwendig)

HDT-Zubehör:

40-194-001
HDT- Kalibrier- und Zentriermittel

40-192
HDT-Prüfstempel
(1 x pro Messkopf notwendig)

40-276
HDT-Gewichtssatz ISO 75 f 1,8-0,45-8 MPa Basic
(1 x pro Messkopf notwendig)

40-277
HDT-Gewichtssatz ISO 75 e 1,8-0,45-8 MPa Basic
(1 x pro Messkopf notwendig)

Vicat-/HDT-Gewichtssatz:

40-261
Universal-Gewichtssatz 5500 für alle VICAT / HDT-Prüfnormen
(1 x pro Messkopf notwendig)

40-211/10
Wärmeträgerflüssigkeit
1 Gebinde = 10 Liter

40-211/5
Wärmeträgerflüssigkeit
1 Gebinde = 5 Liter

COESFELD-PC

COESFELD-Farbtintenstrahldrucker

Basic Vicat-HDT-Tester

40-272-001
Basic Vicat-HDT-Tester
3 measuring stations

- for determination of Vicat Softening Temperature (VST) and HDT Heat Deflection Temperature
- basic unit with 3 universal measuring stations
- testing unit for manual tests
- PC extension set (inclusiv) enables automatic data storage over PC with RS 232 interface
- PC not in this delivery schedule

Capability characteristics:
- temperature range +20...250°C
- temperature gradient corresponding to ISO 306: 50 K/h, 120 K/h or free programmable
- start temperature free programmable
- displacement measuring by digital gauges accuracy of indication: ± 0,01 mm
- RS 232 interface
- sample thickness 2 - 12 mm
- external recooling unit connectable (not in this delivery schedule)

Dimensions: (HxWxD)
approx. 440 x 440 x 570 mm
Weight:
approx. 30 kg without accessories
Oil capacity: max. 12,5 l
Mains: 230V, 50/60Hz
Power: 2000VA

40-272-006
Basic Vicat-HDT-Tester
as 40-272-001, but up to 300°C
Power: 3000 VA

The testers can be equipped with 1 up to 6 measuring stations.

40-272-004
Basic Vicat-HDT-Tester
2 measuring stations and 1 TMA measuring station

- for determination of Vicat Softening Temperature (VST), HDT Heat Deflection Temperature and thermo-/ mechanical analysis
- 2 universal measuring stations for manual tests of Vicat respectively HDT-tests
- 1 measuring station for thermo-/ mechanical analysis (TMA)
- PC extension set (inclusiv) enables automatic data storage over PC with RS 232 interface
- PC not in this delivery schedule

Capability characteristics:
- temperature range +20...250°C
- temperature gradient corresponding to ISO 306: 50 K/h, 120 K/h or free programmable
- start temperature free programmable
- displacement measuring by digital gauges accuracy of indication: ± 0,01 mm (Vicat/HDT-Test) accuracy of indication: ± 0,001 mm (TMA)
- RS 232 interface
- sample thickness 2 - 12 mm
- TMA measuring range 50 mm
- external recooling unit connectable (not in this delivery schedule)

Dimensions: (HxWxD)
approx. 460 x 440 x 570 mm
Weight:
approx. 30 kg without accessories
Oil capacity: max. 13 l
Mains: 230V, 50/60Hz
Power: 2000VA

Carrying out a thermal mechanical analysis (TMA) of plastics in oil.

Measuring principle:
The increase in thickness of plastic test specimens in a continuously heated oil bath is measured as a function of the temperature.

Applications:
- Plexiglas GS: measuring the polymerization shrink
- Measuring the thermal backshrinking of any plastics, and of mono- and biaxially stretched plastics.
- Measuring the linear coefficients of thermal expansion.

40-206-001
PC-Extension set
compatible to Basic-Vicat-HDT-Tester with 3 measuring stations

- Allows automatic data storage via PC
- Interface to connect digital gauges
- Connection cables for interface and RS 232
- PC is not in this delivery schedule
- PC has to be configurated with two RS 232

Including software "WIN-VICAT/HDT":
- Menu and window managed user interface
- Manual input of sample dimensions and calculation of weights
- Data acquisition and storage in ASCII format
- Permanent data presentation on screen
- Graphical display of Vicat-Penetration curves and/or HDT-Bending curves versus time or temperature
- Free scaling of all axis
- Flexible report generator acc. to ISO 900|0 ff
- User groups with password
- Windows 95 / NT 4 / 2000 / XP

Vicat-accessories:

40-240
Travel Calibration Set for VICAT and HDT

40-191
Vicat Needle
(1 x per measuring station necessary)

40-275
Vicat Weight Set Basic ISO 306 10 N and 50 N
(1 x per measuring station necessary)

HDT-accessories

40-194-001
Centering Tool for Setup of HDT

40-192
HDT Test Assembly
(1 x per measuring station necessary)

40-276
HDT Weight Set ISO 75 f 1,8-0,45-8 MPa Basic
(1 x per measuring station necessary)

40-277
HDT Weight Set ISO 75 e 1,8-0,45-8 MPa Basic
(1 x per measuring station necessary)

Vicat-/HDT weight set

40-261
Universal Weight Set to cover all VICAT and HDT requirements
(1 x per measuring station necessary)

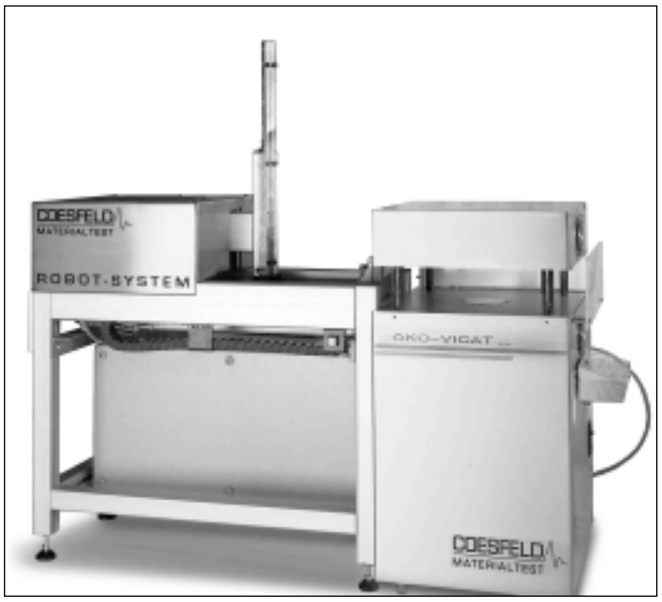
40-211/10
Thermal fluid 10 l

40-211/5
Thermal fluid 5 l

COESFELD-PC

COESFELD-colour ink jet printer

Öko-Vicat
Eco-Vicat



40-280-001
Öko-Vicat
6 Messstellen max.
Probenabmessung 10 x 10 mm

- Ermittlung der Vicat-Erweichungstemperatur gemäß ISO 306
- metallische temperaturgeregelte Heizblöcke
- vollautomatischer Prüfablauf
- integrierte und automatische Gewichtsauflage
- PC gesteuert über RS 232
- Verbindungsstecker für automatische Zuführeinheit

Leistungsmerkmale:
- automat. Erfassung der Vicat/HDT-Temperaturen
- induktive Wegmessung mit 0,01 mm Genauigkeit
- Temperaturbereich: +20...+300°C, Auflösung: ±0,1 K
- Temperaturgradient entsprechend ISO 306: 50 K/h, 120 K/h
- automat. Rückkühlung auf die Starttemperatur der nächsten Messung
- Luftkühlung mit beigestellter Preßluft (200 °C bis 30 °C ca. 30 Minuten)
- Flüssigkeitskühlung mit Umwälzkühler (200 °C bis 30 °C ca. 10 Minuten)

inkl. Software
"WIN-ÖKO-VICAT":
- menü- und fenstergesteuerter Programmablauf
- Datenerfassung und Speicherung im ASCII-Format (dadurch Weiterverwendung in Tabellenkalkulationsprogrammen möglich)
- permanente Datenübersicht auf dem Monitor
- graphische Darstellung der VICAT - Eindringkurven über der Zeit oder Temperatur
- freie Achsenskalierung
- Prüfauftragsverwaltung
- flexible Prüfprotokolle gem. ISO 9000 ff
- Benutzergruppen mit Password-Abfrage
- für WIN 95 / NT4 / 2000 / XP

Abmessungen (H x B x T):
ca. 620 x 400 x 750 mm
Gewicht:
ca. 90 kg ohne Zubehör
Luftdruckanschluss: 6 – 10 bar
Netz: 230/240V, 50/60Hz
Leistung: 550 VA

40-282-001
Automatische Probenzuführung
Für den vollautomatischen Endlosbetrieb des Öko-Vicat Prüfgerätes.
Inklusiv Magazin für 120 Proben; zur Messung von hydrophilen Produkten kann das Magazin mit Trocknungsgas beaufschlagt werden.

Abmessungen:
1000 x 800 x 600 mm
Gewicht: 30 kg

COESFELD-PC

COESFELD-
Farbtintenstrahldrucker

40-280-001
Öko-Vicat
6 measuring stations
max. sample dimensions 10 x 10 mm

- For determination of Vicat Softening Temperatur (VST) acc. to ISO 306.
- Tempering by metal heating blocks
- Integrated and automatic weight appliance
- Testing unit for fully automatic tests
- PC control via RS 232
- Connector to sample feeder

Capability characteristics
- Automatic recording of VICAT-temperatures
- Inductive displacement sensors, resolution 0.001mm, accuracy better 0,01mm

- Temperature range: +20°C.....+300°C, resolution ± 0,1 K
- Temperature gradient corresponding ISO 306: 50 K/h, 120 K/h
- Automatic cooling down to the start temperature of the next test
- Air cooling with the compressed air
(200°C down to 30°C within approx. 30 minutes)
- Liquid cooling with water or external cooling device
(200°C down to 30°C within approx. 10 minutes)

Including software
"WIN-ÖKO-VICAT":
- Menu and window managed user interface
- Data acquisition and storage in ASCII format
- Online data presentation on screen
- Graphical display of Vicat-Penetration curves versus time or temperature
- Free scaling of all axis
- Flexible report generator acc. to ISO 9000 ff
- User groups with password
- Export for further evaluations e.g. with Excel
- for WIN 95 / NT4 / 2000 / XP

40-282-001
Automatic sample feeder
For fully automatic continuous operation of the Öko-Vicat tester. Inclusive magazine for 120 samples; for measuring hydrophylic products the magazine can be filled additionally with drying agents.

dimensions: 1000 x 800 x 600 mm
weight: 30 kg
Dimensions: (HxWxD):
approx. 620 x 400 x 750 mm
Weight: approx. 90 kg
Pneumatic supply: 6 - 10 bar
Mains: 230/240V, 50/60Hz
Power: 550VA

COESFELD-PC

COESFELD-
colour ink jet printer

- DIN EN ISO 306 - ASTM D 1525 - DIN ISO 306 -

HDT-Vollautomat
Fully-automatic HDT tester

Fully-automatic HDT measuring of up to 90 specimens is possible with the HDT tester from COESFELD – an important contribution to the process of automation in every test laboratory. This article describes the appliance and the test procedure. Two members of the Test Engineering Section of BAYER AG report on their experiences using the fully-automatic HDT tester.

HDT measuring in conformance to standards
The deflection temperature of plastics under load HDT (heat deflection temperature) is a parameter for hard rubber and plastics. It is the temperature at which the distortion of the specimen reaches its standard deflection after heating. The three methods under DIN EN ISO 75 f stipulate that the specimens must be tested laid flat with a nominal edge fibre tension of 1.80 MPa (HDT/A), 0.45 MPa (HDT/B) or 8.00 MPa (HDT/C).

Comfortable test layout – thanks to the fully-automatic appliance
The test device consists of a fixed metal frame in which a rod can move vertically without obstruction. At the bottom of the rod there is a pressure fin. The support for the specimen is on the base of the frame. The receptacle consists of cylindrical metal specimens 64 mm apart (standard clearance). The supports are attached to the base of the frame in such a way that the force applied vertically to the specimen bodies through the pressure fin acts in the middle between two supports. The supports and the pressure fin are rounded with a radius of 3.0 (± 0.2) mm and must be longer than the width of the test specimen.
Previous test appliances have a plate at the top of the rod for attaching weights. The fully-automatic HDT has the advantage that weights no longer have to be handled manually. The calculated loads are applied down to the exact gram with a lever system by means of a computer-controlled slide.

Feeding and scanning the specimens
For measuring in accordance with DIN EN ISO 75 f (test specimens laid flat) the thickness h of the test specimen has to be determined. According to a standard table this fixes the standard deflection at which the deflection temperature of plastics under load is recorded. The fully-automatic HDT tester automatically scans the thickness h and width b of the 80 mm long specimens. This excludes the possibility of operating errors.
The fully-automatic HDT tester also enables specimens to be fed in and removed automatically. This means that there is no down time between measuring, and oil-smeared fingers are a thing of the past as well.
A single magazine can hold 90 specimens.

Tempering
The specimens are heated in an oil bath to guarantee a high tempering quality. The heating process is monitored with seven PT-100 sensors which record a temperature range up to 300°C with a measuring accuracy of ±0.1°C. The reproducibility is in fact 0.05°C.
The fully-automatic HDT tester has an efficient cooling system through a heat exchanger.

Software
A special highlight is the software for the fully-automatic HDT tester. The clear operator interface is self-explanatory and can therefore be operated intuitively. The operator can vary the most important measuring parameters without special prior knowledge and after just a brief familiarisation period. After the start measuring is carried out fully automatically, even over 1-2 days. A test report can be printed out automatically after each measuring. After the heat deflection temperature is reached, the computer automatically saves all values and provides a temperature record for the six measuring points.
As an alternative, the measuring parameters for the test jobs can be read in from LIMS via a database interface and the measured values can be transmitted there.
System managers have a large selection of (password-protected) options available with which the program sequence can be adapted to individual requirements. The

operator then only needs to enter one or two parameters. The remaining settings are set in one of the individually compiled and saved measuring programs.

Measuring can be reproduced exactly
The PC takes over the control of the measuring series. Feeding the specimens, scanning and removing are all automatic. The starting temperature and the temperature increase of 120 K/h can be recorded exactly through the PC controller. This leads to a reduction in down time and non-productive time (dimension measuring, fitting, etc.).
The specimens are subjected to loads through a computer-controlled lever system, so that there are no subjective factors. Applying weights accurately to a gram is therefore possible without having to handle individual weights.

Automation enables improved capacity utilisation
A measuring operation take approx. 30 to 90 minutes, because the cooling rate is much higher thanks to the external cooler. Fifteen operations can be carried out consecutively with a magazine that can hold 90 specimens. This makes it possible to have measuring periods of 22 hours with a single magazine. Another shift can be occupied with the measured values series.

Software simplifies processing of measuring results
The distribution of measured values is smaller than with hand appliances, because of the lack of human influences. The measuring results are transmitted to the customer via the LIMS (Laboratory Information Management System). From the LIMS the data is exchanged with COESFELD's fully-automatic HDT testers through the Access database interface.

Checks are easy to carry out
All components can be checked at any time without any great effort, which makes it easy to eliminate minor faults. Calibrations with reference materials are easy to carry out. COESFELD carries out maintenance at regular intervals.

Log and remote diagnosis
Automatic diagnosis logs enable rapid, low-cost remote diagnoses. The programmable controller of the fully-automatic HDT tester has security devices to ensure that the appliance's technology is not damaged even with incorrect parameterising at the PC. With the appropriate reference materials each measuring point can be calibrated online in the framework of measuring equipment monitoring under ISO 9000.
The measuring logs can be printed separately for each group of specimens, either using the supplied

HDT-Vollautomat
Fully-automatic HDT tester

form, or can be designed by users to their own requirements. The individual elements (logo, measuring curve, measuring parameters, etc.) can be placed using drag-and-drop.

40-230
HDT-Automat
6 measuring stations, heat exchanger, fully automatic weight appliance and fully automatic sample measurement / sample feeding

- for determination of HDT Heat Deflection Temperature Sample dimensions 4 x 10 x 80 (flatwise)
- with high power cooling system
- Recooling time from 300°C to ambient temperature in approx. 12 minutes
- Testing unit for fully automatic tests
- Fully automatic weight appliance
- Fully automatic sample measuring
- Fully automatic placement robot
- Sample magazine
- Control is performed by a PC via RS 232

Capability characteristics:
- Automatic recording of HDT-temperatures
- Inductive distance recorders, accuracy better 0,01 mm
- Temperature range +20...+300°C, resolution ±0,1 K
- Temperature gradient corresponding to ISO 75f: 50 K/h, 120 K/h or free programmable
- Start temperature: free programmable
- Automatic recooling with in-built heat exchanger
- Motor operated lifting platform with draining rack
- Automatic approaching of needed weights by motor operated load controller, accuracy ±1g
- HDT-stamps with calibration and centring device inclusive
- Fully automatic measuring and feeding of samples resolution 0,01mm
- Sample magazine for 90 samples

Including software "WIN-VICAT/HDT":
- Menu and window managed user interface
- Manual input of sample dimensions and calculation of weights
- Data acquisition and storage in ASCII format
- Permanent data presentation on screen
- Graphical display of HDT-Bending curves versus time or temperature
- Free scaling of all axis
- Flexible report generator acc. to ISO 9000 ff
- Win9x / NT4 / ME / 2000 / XP

Dimensions(HxWxD):
approx. 1100 x 1480 x 1300 mm
(inclusive control cabinet)
Weight: approx.195 kg without accessories
Cooling water: 10°C (optimal)
Filling amount for bath:
max. 35 l thermal oil
Mains: 400V-3P/N/PE/16A, 50Hz
Power: 4000VA

HDT-Halbautomat
HDT-Semi-Automat

40-200
HDT-Halbautomat
6 Messstationen, Wärmetauscher und vollautomatische Gewichtsbelastung

- Bestimmung der HDT-Formbeständigkeit in der Wärme für Probenmaße: 4 x 10 x 80 mm in flacher Auflage
- Messgerät für einen vollautomatischen Prüfablauf
- Hochleistungs – Kühlsystem
- Rückkühlzeit von 300ºC auf Raumtemperatur ca. 12 Minuten!
- Vollautomatische Gewichtsbelastung
- Steuerung über PC mit RS 232

Leistungsmerkmale:
- automat. Erfassung der HDT-Temperaturen
- induktive Wegmessung mit 0,01 mm Genauigkeit
- Temperaturbereich: +20...+300°C, Auflösung: ±0,1 K
- Temperaturgradient entsprechend ISO 75 f: 50 K/h, 120 K/h oder frei wählbar
- Starttemperatur: frei wählbar
- automatische Rückkühlung mit Wärmetauscher
- motorische Hebebühne mit Abtropfeinrichtung
- automatisches Anfahren und Auflegen der Gewichtsbelastung über motorische Verfahreinheiten mit einer Genauigkeit von ±1g
- HDT-Prüfstempel mit Kalibrier- und Zentriersatz inklusive

inkl. Software "WIN-VICAT/HDT":
- menü- und fenstergesteuerter Programmablauf
- manuelle Eingabe der Probendimensionen und Berechnung der Gewichte
- Datenerfassung und Speicherung im ASCII-Format
- permanente Datenübersicht auf dem Monitor
- graphische Darstellung der HDT-Durchbiegungskurven über der Zeit oder Temperatur
- freie Achsenskalierung
- flexible Prüfprotokolle gem. ISO 9000 ff
- Benutzergruppen mit Password-Abfrage
- Win9x / NT4 / ME / 2000 / XP

Abmessungen H x B x T:
ca. 1100 x 1480 x 700 mm
(inklusive separatem Schaltschrank)
Gewicht: ca. 160 kg
(ohne Schaltschrank)
Kühlwassertemperatur: 10°C
(optimal)
Öl Füllmenge: ca. 22 l
Netz: 400V-3P/N/PE/16A, 50Hz
Leistung: 4000VA

40-200
HDT-Semi-Automat
6 measuring stations, fully automatic weight appliance and heat exchanger

- for determination of HDT Heat Deflection Temperature sample dimensions 4 x 10 x 80 mm (flatwise)
- with high power cooling system
- Recooling time from 300°C to ambient temperature in approx. 12 minutes
- Testing unit for fully automatic tests
- Fully automatic weight appliance
- Control is performed by a PC via RS 232

Capability characteristics:
- Automatic recording of HDT-temperatures
- Inductive distance recorders, accuracy 0,01 mm
- Temperature range +20...+300°C, resolution ±0,1 K
- Temperature gradient corresponding to ISO 75f: 50 K/h, 120 K/h or free programmable
- Start temperature: free programmable
- Automatic recooling with in-built heat exchanger
- Motor operated lifting platform with draining rack
- Automatic approaching of needed weights by motor operated load controller, accuracy ±1g
- HDT-stamps with calibration and centring device inclusive

Including software "WIN-VICAT/HDT":
- Menu and window managed user interface
- Manual input of sample dimensions and calculation of weights
- Data acquisition and storage in ASCII format
- Permanent data presentation on screen
- Graphical display of HDT-Bending curves versus time or temperature
- Free scaling of all axis
- Flexible report generator acc. to ISO 9000 ff
- User groups with password
- Win9x / NT4 / ME / 2000 / XP

Dimensions H x W x D :
approx. 1100 x 1480 x 700 mm
(inclusive control cabinet)
Weight: approx.160 kg
(without accessories)
Cooling water 10°C (optimal)
Filling amount for bath:
max. 22 l thermal oil
Mains: 400V-3P/N/PE/16A, 50Hz
Power: 4000VA

QuickSoft

QuickSoft softening temperature measuring appliance

The QuickSoft appliance from COESFELD enables non-destructive measurement of the softening temperature of high polymer plastics during production.
This article describes the appliance and the test procedure. A former employee of Röhm GmbH reports on his experiences using QuickSoft.

Quick measuring of the softening temperature
Quality control during the production of high polymer plastics demands, among other things, measuring of the VICAT softening temperature in accordance with ISO 306. Traditional measuring methods take several hours to carry out, but QuickSoft supplies the measuring results in just 2 minutes.
This makes it possible to monitor production continuously and production faults are detected immediately before any serious damage is caused.

Compact construction
The test appliance consists of a portable control appliance with a control display and a detachable measuring adaptor. The control appliance contains the power supply, the temperature controller for the heater in the measuring adaptor and the programmable controller.

Testing directly in production
The QuickSoft test appliance is portable and can be used directly in production without any complications after a very brief setting up time. All that is required is a power point.
There is no need to prepare sample material, the test is non-destructive and is carried out directly using the production material.

Easy to handle
To carry out a test all that needs to be done is to set the required test temperature. Once this temperature is reached, the measuring adaptor is placed on the specimen and measuring is started. After just two minutes the control display shows the measured value. Because the appliance is easy to use, wrong handling is practically impossible, so that the test run is completely independent of the operator and provides reliable results.

Data recording and software
The data memory in the control appliance records the measuring data which can then be transmitted to the PC via a serial interface. The specially developed software enables all empirically determined measured values to be read in and out and to be stored. In addition, it calculates the fits for correlation with the Vicat values.

Design and method of functioning
There are three test pins in the measuring adaptor which are preheated by the heater to the set-point temperature above the softening temperature. As soon as the measuring adaptor is positioned on the sample the three test pins penetrate the specimen. The weight of the measuring adaptor guarantees a constant load on the test pins.
The penetration depth in the sample is measured with a high-precision position measuring system. The sensor is located in the middle between the test probes and continuously measures the distance between the measuring adaptor and the surface of the sample. The penetration distances at defined measuring periods after the measuring adaptor was placed on the specimen are relevant.

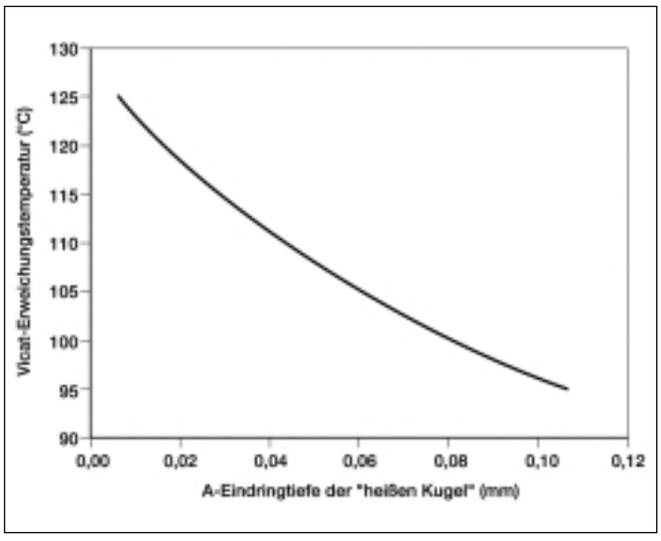
Measuring empirical values
To compensate for zero errors caused by uneven placement of the measuring adaptor, when measuring on PMMA the difference in the penetration depths is measured after set times. With a load of 5 kg and a test temperature of 140°C (the optimal test parameters for PMMA) the measured values showed the compensation curve shown below.

The correlation found in this way enabled the Vicat softening temperature in most specimens to be predicted to within an accuracy of about 1K.

Easy to use
With its sturdy construction the QuickSoft is designed for flexible use at different locations, whether in production or in the test laboratory. The appliance is extremely simple to use so that wrong operations are practically impossible, which contributes to the reliability of the measuring results.
During measuring the display shows all the parameters or the course of measuring and the results. All measured values are stored initially in the control appliance and they can be evaluated and filed using software after transmission to the PC.

QuickSoft – the revolution in quality assurance
The QuickSoft softening temperature measuring appliance is the successful development of a non-destructive test device which has revolutionised quality tests in the manufacture of plastics.
QuickSoft enables quality control of polymers without taking samples, and at the same time the test results are as reliable as the complicated Vicat tests.
There is no heating to the glass transition range. Heating is done by the test medium itself, namely exclusively in that part of the surface which is required for the test. With the QuickSoft this means the direct contact zone between the hemisphere and the surface with a diameter of just 2 to 3 mm.
The heat given off at the contact surface to the sample is replaced immediately, because the contact body is connected to a large heat reservoir from a solid thermostatically controlled heating block. This copper block is at the same time the weight for the load. In contrast, the unheated housing protects the test area from the ambient conditions and is included as a reference for measuring the penetration depth.
The penetration depth reached at a set time is to be regarded as a module measurement of the heated material area. Here, an influence can certainly be expected through the volume share heated in the contact period: there is, at is were, a race between penetration because of the size of the heating area diameter and the penetration because of the height of the module.
In general, the difference between the heat conductivity and the specific heat capacity of different batches of a material is much less than the module in the glass transition range. For this reason, the combination of test period and test temperature must be optimised for each material class until a maximum difference is reached. Testing with QuickSoft is not (yet) a standard procedure, such as the Vicat softening temperature, the HDT test and other test procedures. However, for quality control the QuickSoft test enables a better differentiation than previous standard tests and, as a mainly non-destructive test method, can be used directly on semi-finished or finished products.

Experiences during development
During the development phase optimising tests were carried out on different materials until the ideal conditions for the test parameters were found. Following an evaluation of the measuring re-



QuickSoft

sults and an approximation it was possible to predict the Vicat values to within 1 K.

Measuring on PMMA
Following this it was possible to use the QuickSoft test as a quality test during production.
Calibrations of the appliance at regular intervals showed that the determined correlation equation is permanently correct. It was also seen that the appliance is sturdy enough for practical use under everyday operating conditions and works for years with practically no maintenance.
The most extensive measurements were made with high molecular PMMA, including special materials such as up to 10 cm thick PMMA blocks. This is a special context in which the decisive advantage of non-destructive testing comes to the fore.
In addition it was possible to record fine details of the production process thanks to a more intensive use of the fast-action QuickSoft test. It was possible to determine optimising potentials which enabled even greater improvements to the quality of the products.

Extreme reliability
The statistical evaluation of the calibration measurements carried out regular over many years confirm the reliability of the measuring results. A means difference of less than 1 K was found between the Vicat temperature measured in accordance with the standard and the calculated softening temperature. The measured standard deviation of less than 0.3 K in fact exceeds the reproducibility required by the standard.

40-250
QuickSoft
Appliance for measuring softening under the influence of the temperature.

The QuickSoft mobile measuring appliance described below is used for the secure, rapid, non-destructive parallel determination of the softening behaviour of plastics. Following several years of technical verification the QuickSoft test appliance has now been successfully used by a manufacturer of plastic products in quality assurance parallel to production.

The determination of the VICAT softening temperature (VST) under ISO 306 is a global application. However, available appliances in accordance with the state of the art require a test period of between 1.5 and 3.5 hours, because of the process and depending on the measuring parameters. In addition to this there is the expense and effort of preparing the samples.

QuickSoft provides quality control in production directly at the object that is just as precise but much faster and practically non-destructive.

QuickSoft components

QuickSoft consists of two parts:

1. The measuring head is linked to the measuring and control unit by a cable. The measuring head is placed on the sample to be measured by means of a handle. The measuring head stands on the sample on three pins with hemispherical ends. The pins are arranged as an equilateral triangle and are below the centre of gravity of the measuring head. There is a position sensor placed symmetrically between the pins that measures the penetration depth of the pins during measuring.

2. The measuring and control unit contains the measuring electronics, the measuring controller, the power supply, the temperature controller and a display and input panel. The measuring head is placed safely in a holder in the measuring and control unit after measuring in completed and when the appliance is being transported.

- Mains cable (230 V AC/50 Hz) with mains switch
- Power consumption approx. 500 W
- Test period per measurement approx. 2 minutes
- Reproducibility better than 2%
- Total weight approx. 10 kg
- Temperature controller: digital with Pt 100
- Temperature measuring range: RT..300°C
- Temperature accuracy: +/- 1°C
- Position measurement: incremental
- Position measurement accuracy: 0..1500 µm
- Weight = weight of the measuring head approx. 5 kg
- Measuring pins: 3 hemispheres
- Diameter of the measuring pins: 5 mm
- Controller: programmable controller: RS 485 dimensions
- Control appliance (WxHxD): 320x320x170 mm
- Diameter of the measuring head: 100 mm
- Height of the measuring head: 290 mm

Software: the Windows software (not part of the delivery) provides a correlation of measured distances to the VICAT temperatures in accordance with ISO 306

QUICKSOFT HAS BEEN REGISTERED FOR PATENT.