Rhopoint Instruments Ltd

MINIMUM FILM-FORMING TEMPERATURE BAR

- **Self - Contained bench-top instrument for the determination of the minimum film - forming temperatures of synthetic latices, emulsions, polymers & adhesives**

- **Electrically - controlled heating & cooling with integral air processor**

MINIMUM FILM-FORMING TEMPERATURE BAR

Specification

Platen.....Copper, dull nickel plated (other options available).

Platen dimensions .....483mm X 235mm.

Parallel tracks.....Using 1" cube applicator supplied: max 10.

Weight.....38kg. (851b).

Dimensions.....550mm wide x 350mm high x 610mm deep.

Temperature sensing....10 points on centreline at width intervals 37mm.

Display.....Point temperature and temperature differential between adjacent points.

Sensor accuracy.....0.1 degrees C+.070C

Indication.....Lamps: Instrument ON, heating, cooling.

Alarms.....Audible and visual for water flow failure.

Hinged transparent cover plate raised allows clear access for track laying and cleaning.

Services required

Mains	220-240 volts a.c. 110-115 volts a.c.
Air	4 litres/min @ 100 psig
Water	Normal mains supply
Water drain	Gravity

MFFT DETERMINATION:

One continuous track displays the evenness of the heating, cooling and air flow.

A photographic record of the performance of every instrument is made before despatch.

Complete Instrument Comprises

MFFT Instrument
Mains cable
Air connector
Water connectors
Roving temperature sensor type 166-177 C.
Cube applicator. 75μ x 1" cube
Guide bar
Quantity - Dessicant
Quantity - Indicator crystals
5 Hypodermic type dispensers
Spatula
Spare fuses
Instruction book

Special options

Extended range by the addition of three programmes, 43-70, 53-80,63-90 deg C.
Unplated copper platen
Unit for nitrogen supply, no air processor fitted

Optional extras

Additional cube applicators
Frame for up to 5 applicators

MINIMUM FILM-FORMING TEMPERATURE BAR

The “minimum film-forming temperature” has been described as “the minimum temperature at which a water-borne synthetic latex or emulsion will coalesce when laid on a substrate as a thin film. When this process occurs, in the absence of pigmentation or other opacifying materials, a clear transparent film is formed. At lower temperatures than the minimum, a white, powdery, cracked film will result”.

The minimum film-forming temperature is usually closely related to the glass transition temperature Tg but not synonymous with it; whilst the Tg may be determined by predicted calculation, the minimum film-forming temperature is best determined by the use of a MFFT Bar; the basic principles of which are described in ASTM D2354. Early instruments were usually cumbersome, inaccurate and slow to achieve equilibrium. I.C.I. plc devised a simple integrated instrument which was able to achieve the desired results quickly and efficiently. The initial development was carried out in I.C.I. Paints' laboratories.

PRINCIPLE OF OPERATION

A nickel plated copper platen is electronically cooled at one end and warmed at the other end. Air or nitrogen is caused to flow over the surface, from cool end to warm end as a uniform blanket. To achieve the required degree of uniformity the air or gas is delivered via a carefully designed sintered metal distribution block; the design is such that freezing does not take place at the inlet.

For use with air, a drying system is incorporated into the housing together with a flow controller. The air dryer contains indicator crystals which are clearly visible in a transparent container. The complete air conditioning system is readily accessible at the side of the instrument.

Water at normal mains pressure removes the excess heat from the coolers. Quick release couplings are provided. Water is normally drawn from a laboratory tap and the outlet is run to drain by gravity. Alarms, both audible and visual are actuated in the event of cooling water supply failure.

Temperature sensors are mounted at intervals under the surface of the platen. These are used to control the temperature of the platen in accordance with the chosen programme. They are also used to indicate the platen temperatures down the length of the bar, or they can be switched to indicate differential temperatures between adjacent sensing points, so providing an instantaneous indication of temperature gradient.

A roving probe temperature sensor is provided to facilitate temperature measurement at every point on the platen, it also serves to check the static sensors.

A hinged perspex cover over the platen provides thermal insulation whilst allowing visual inspection of the determination as it progresses. A transparent cursor is mounted on the cover to simplify the identification of the exact minimum film-forming temperature.

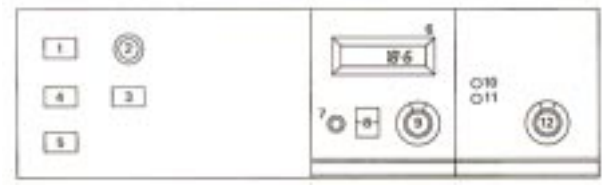
Programmes

Standard model MFFT-60			Degrees C.			
Cool end (Left)	-5	0	+5	+15	+23	+33
Warm end (Right)	+13	+18	+23	+33	+50	+60
Extended range model MFFT 90						
Additional programmes						
Cool end	+43	+53	+63			
Warm end	+70	+8	+90			

OPERATION

In practice the instrument is switched on and the programme chosen, air and water having been connected. An equilibrium condition is noted after about 20 minutes (the time may be less dependant on the programme chosen). At equilibrium the heating cooling lamps illuminate at very low frequency. Several tracks are laid down in quick succession using an applicator, normally a 75 micron (3 mil.) cube applicator. The tracks may be laid down left to right or right to left, but the most common form is a U horizontal, with the track starting and finishing at the right, warm end. Two tracks are normally laid down last as a control, using an emulsion of known MFFT.

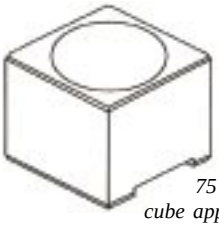
A clearly defined limit of coalescence will show in about 80 minutes and the cursor may then be used to read off the MFFT temperature. Pigmented emulsions may be tested but the determination is more difficult to see. Most operators, however, find that they can readily discern the determination temperature. This can be proven by gently scraping the surface of the film using a wooden spatula.



Alarm and ON Module
1 Mains switch -On/ Off
2 Coolant failure alarm
3 Coolant failure lamp
4 Heating lamp indicator
5 Cooling lamp indicator

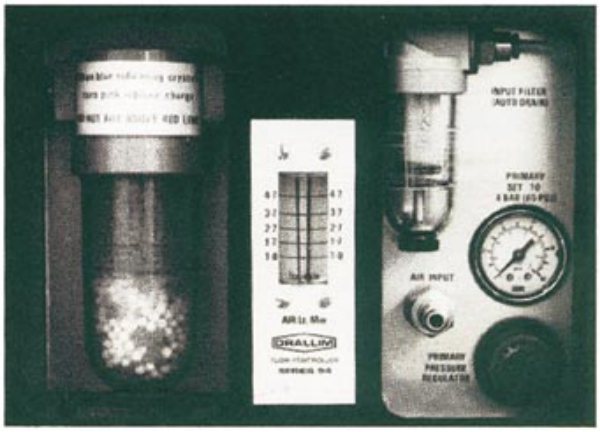
Indication Module
6 Temp. display
7 Probe socket
8 Temp. mode switch
9 Temp. sensor selector

Control Module
10 Heating LED
11 Cooling LED
12 Programme selector



75 micron cube applicator

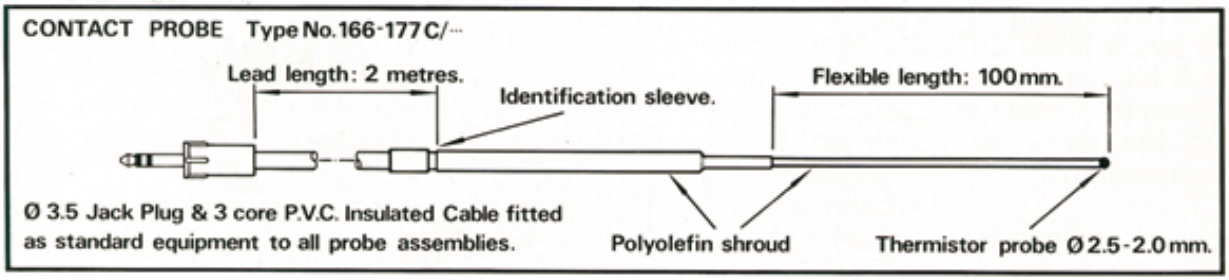
75 micron ring applicator



The air conditioning and control unit, showing the air connection

Shipping Details

Carton dimensions.. 29" x 18.5" x 26"
737mm x 470mm x 661mm
Gross Weight..... 106lb, 48kg



The roving probe

The MFFT Bar is manufactured under licence to I.C.I.plc

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