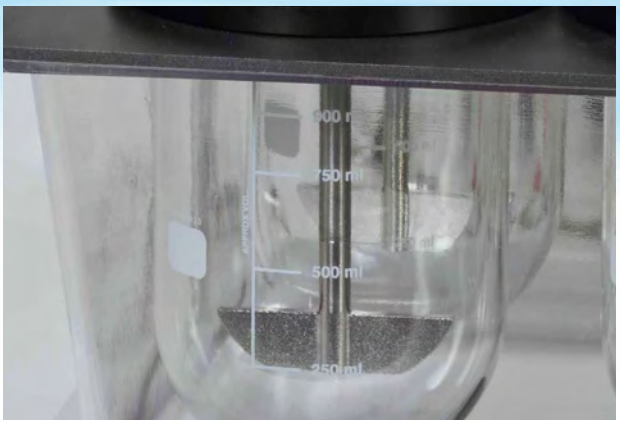
Comparison between Compendial and Enhanced Mechanical Calibration Specifications

Calibration Parameter	Current Pharmacopoeia	Enhanced USP Specification	Enhanced FDA Specification
Bench Horizontality		≤ 1° from the horizontal	No Specification Given
Vessel Support Horizontality		≤ 0.5° from the horizontal in two orthogonal directions	No Specification Given
Basket Conformance	Must conform to <711> Free of "Gross Defects"	Must conform to <711> Mesh should be perpendicular to basket top and bottom (0.5 mm deviation over 37 mm is approx. equal to 1°). Free of "Gross Defects"	
Paddle Conformance	Must conform to <711> Free of "Gross Defects"	Must conform to <711> Free of "Gross Defects"	Must conform to <711> Free of "Gross Defects"
Vessel Conformance	Must conform to <711> Free of "Gross Defects"	Must conform to <711> Free of "Gross Defects"	Must conform to <711> Free of "Gross Defects"
Shaft Wobble; Basket	Rotate smoothly without significant wobble	Measure a full rotation at the bottom basket rim. Deflection of probe tip should be ≤ 1.0 mm	Gauge on top of the vessel plate, position the shaft such that the gauge is measuring a point 20 mm above the top of the basket. ≤ 1.0 mm total run-out
Shaft Wobble; Paddle	Rotate smoothly without significant wobble	Measure a full rotation. Deflection of probe tip should be ≤ 1.0 mm	Position the shaft such that the gauge is measuring a point 20 mm above the top of the paddle. ≤ 1.0 mm total run-out
Shaft Verticality	N/A	<0.5° from vertical. Check two positions	<0.5° from vertical. Check two orthogonal positions
Wobble; Basket	≤ 1.0 mm total run-out	Measure a full rotation at the bottom basket rim. Deflection of probe tip should be ≤ 1.0 mm	Gauge on top of the vessel plate. ≤ 1.0 mm total run-out at the bottom of the basket
Wobble; Paddle		At a position of 10 mm above paddle blade with the stirring element installed, total deflection of the probe tip during 360° rotation ≤ 1.0 mm	
Shaft Centricity; Basket (Vessel Centring)	≤ 2.0 mm from centreline	Measure the distance from the shaft to the vessel at no more than 20 mm below the vessel flange. Measure at 4 orthogonal locations. The difference between the highest and lowest reading must be ≤ 2.0 mm. Roughly translates to ≤ 1.0 mm away from centreline	≤ 1.0 mm at 2 mm and 60 mm above the basket. Basket at operational height (25 mm above the vessel bottom)
Shaft Centricity; Paddle (Vessel Centring)	≤ 2.0 mm from centreline	Measure the distance from the shaft to the vessel at no more than 20 mm below the vessel flange. Measure at 4 orthogonal locations. The difference between the highest and lowest reading must be ≤ 2.0 mm Roughly translates to ≤ 1.0 mm away from centreline	≤ 1.0 mm from the centreline. At 2 mm and 80 mm above the blade
Vessel Verticality	N/A	± 0.5° from vertical. Check two positions.	≤ 1.0° from vertical. Check two orthogonal positions
Height Check; Basket Depth	25 ± 2.0 mm	25.0 ± 2.0 mm - measure each position	25 ± 2.0 mm
Height Check; Paddle Depth	25 ± 2.0 mm	25.0 ± 2.0 mm - measure each position	25 ± 2.0 mm
Rotational Speed	± 4% from target	± 1 rpm evaluated at 50 and 100 rpm.	± 2 rpm
Temperature	37°C ± 0.5	37°C ± 0.5 (All vessels to be within 0.4°C of each other when filled with 500 mL of media)	37°C ± 0.5

Apparatus 1 (Basket)



Apparatus 2 (Paddle)

COPLEY TABLET DISSOLUTION TESTERS

In the majority of cases, the effectiveness of tablets or capsules administered orally relies on the drug dissolving in the fluids of the gastrointestinal tract, prior to absorption through the walls of the gastrointestinal tract into the systemic circulation.

For this reason, the rate at which a tablet or capsule dissolves is therefore critical to its therapeutic efficiency and is a key factor in both the formulation process and final quality control.

The most common apparatus used to measure the dissolution rate of solid dose forms are the **basket** and **paddle**.

Both use the same basic configuration, are simple, robust and can be used to test a variety of different products.

The basic apparatus consists of a covered cylindrical vessel having a hemispherical bottom and capable of holding approx. 1000 mL of simulated gastric juice.

The vessel is partially immersed in a suitable water bath capable of maintaining the temperature of the vessel contents at 37 degrees C.

In the case of the basket method, the tablet or capsule is constrained in a cylindrical basket constructed of sieve mesh of defined proportions.

The basket is attached to a metal drive shaft by a 3-pronged retention spring and the shaft positioned in such a manner, that the bottom of the basket is at 25 mm from the bottom of the vessel.

In the case of the paddle method, the basket is replaced by a paddle and the sample to be tested is allowed to sink to the bottom of the vessel.

During the test, a motor is used to rotate the drive shaft at the speed (normally 50, 75 or 100 rpm) specified in the pharmacopoeias.

Speeds outside 50 to 150 rpm are usually inappropriate because of hydrodynamic inconsistencies and problems with turbulence, respectively.

A sample of the dissolution medium is taken at predefined time intervals to determine the percentage of dissolved drug present – this is normally determined using a UV/Vis Spectrophotometer or High Pressure Liquid Chromatograph (HPLC).

All Copley Dissolution Testers feature:

- Sturdy, robust construction specifically designed to reduce clutter and maximise visibility and access in the critical sampling area above the water bath
- Simple, easy to use operation ensuring that the number of operations required to perform a test are kept to a minimum
- Full supporting documentation (including full IQ/OQ/MQ/PQ qualification documentation if required)

Dissolution Tester Model DIS 8000

Note: Positioning of new drain tap

DISSOLUTION TESTER DIS 8000

The Dissolution Tester Series DIS represents the very latest in tablet testing technology. CNC production techniques combined with modern microprocessor design, guarantee the highest standards of performance and reliability.

All Copley Scientific dissolution testers meet the latest specifications as laid down in the European, United States and associated Pharmacopoeias.

Efficient and extremely compact, the **Tablet Dissolution Tester DIS 8000** is a rugged "no-nonsense" unit having **eight stirred** test vessels and simple, easy to use controls. It is ideal for both R&D and quality control applications.

The design of the unit has been based on those features that you, the user, advised us as being essential to the **"ideal"** dissolution tester.

Unfettered access to the critical sampling area above the water bath

PHARMACOPOEIA COMPLIANCE AND QUALIFICATION

The most critical factors in the design of any dissolution tester are (a) that it complies with the respective Pharmacopoeias, (b) that this compliance can be proved or qualified and (c) that both compliance and qualification can be documented. Copley offer a three tier approach to address these points:

- **Certificate of Compliance to USP/ Ph.Eur.**: Included with each unit. Written statement that the product, by design, complies with the current pharmacopoeial specifications.
- **Laser Numbering and Certification**: Identification and measurement of critical components to provide documented verification of compliance with current pharmacopoeial specifications. Available as an optional service.
- **IQ/OQ/PQ Qualification Documentation**: Comprehensive documentation to guide the user through the installation, operating and performance checks of the equipment in its operating environment, using specified test protocols. It provides a comprehensive record of the suitability of the equipment to perform its specified task, to be created and archived.

Please see the ordering information for further details on our verification and qualification services.

Interchangeable Baskets/Paddles

DESIGN AND CONSTRUCTION

In common with the rest of the series, the DIS 8000 has been specifically designed to reduce clutter and maximise visibility and access in the critical sampling area above the water bath.

Particular emphasis has been placed on those factors affecting the eccentricity, alignment and centring of the stirring elements in order to reduce the number of parts used and hence keep the machine variables at a minimum.

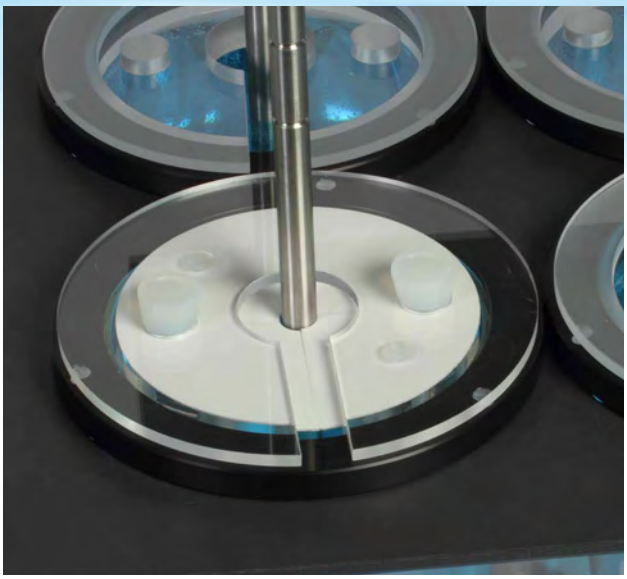
BASKETS, PADDLES AND ROTATING CYLINDERS

All of the DIS series are equipped with precision-ground drive shafts that will accept any of the baskets, paddles or rotating cylinders described in the respective Pharmacopoeias.

Individual clutches enable each individual basket/paddle to be raised, lowered or engaged independent of the drive head.

This feature is particularly useful in the case of staggered starts, and at the end of the test allows the baskets/ paddles to be pushed upwards to gain maximum accessibility to the vessels.

"Easy-Centre" Vessel Location



Two-Part Membrane Sealed Lid

DISSOLUTION TESTER DIS 8000

All stirring elements can be laser numbered and certified on request.

The construction of the **baskets and paddles** are such that they are completely **interchangeable.** Simply screw in the appropriate element, with no further height adjustment necessary.

All of the elements can be supplied with a teflon coating for additional protection against aggressive media, if necessary.

VESSELS, VESSEL CENTRING AND LIDS

All Copley dissolution testers are supplied with USP/Ph.Eur. compliant vessels and feature the unique **"Easy-Centre"** system to ensure that the vessels are perfectly centred every time.

The "Easy-Centre" system is based on a standard 1000 mL borosilicate glass vessel with a rim that has been precision ground and then centred accurately within a two-part acetal ring.

The acetal ring is provided with three bayonet fittings which locate in recesses provided in the vessel support plate. When turned clockwise these fittings lock the vessel into the correct position, relative to the drive shafts.

The fixture is designed such that once secured, the vessels will not become loose or float, even when empty.

All vessels can be numbered and certified on request. UV-resistant amber vessels are also available for those products sensitive to UV.

All vessels are supplied as standard with clear view acrylic lids. Special membrane-sealed two-part lids are available on request, where losses caused by evaporation may be an issue.

CONTROL AND MONITORING OF SPEED AND TEMPERATURE

All of the DIS series of dissolution testers have a speed range of **50-200 rpm**.

The electronic speed control is provided with its own digital closed loop circuitry which guarantees an accuracy of **+/ 2%** by automatically checking and compensating for any drift from the nominal speed.

In the case of the DIS 8000, the temperature of the warming solution is controlled by means of a self-priming **1100 W external digital heater/circulator,** which allows for rapid heating of the test media from ambient to the desired temperature.

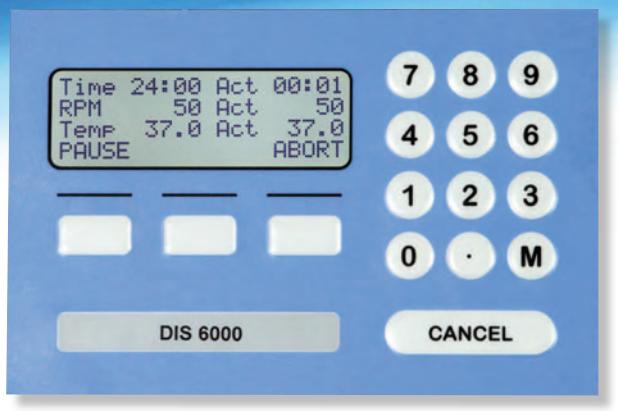
The digital heater/circulator has an accuracy of **+/- 0.1 degrees C** thus ensuring a constant and even distribution of heat throughout the bath. It is fitted with an **adjustable over-temperature cut-out** and alarm indicator, together with a **low-level cut-out** which operates if there is insufficient water available in the bath.

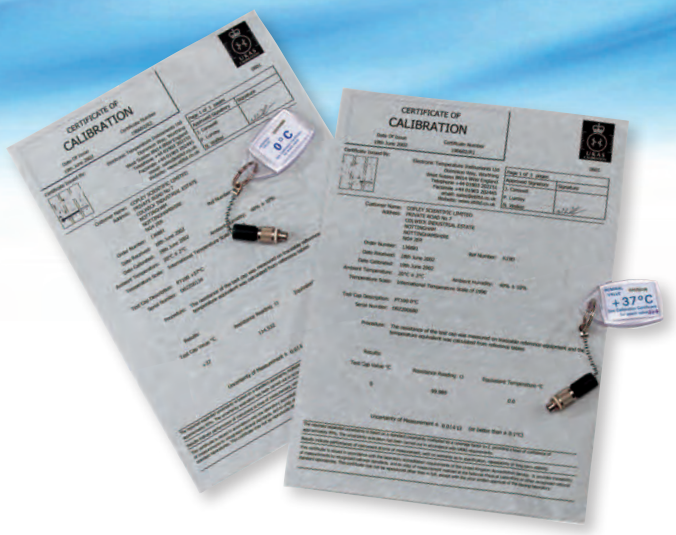
The one-piece vacuum formed water bath is constructed in rigid PETG and has been specifically designed to eliminate leaks and to make it easier to clean. A fill-line is provided on each bath to indicate the level to which the bath must be filled.

The water bath and the easy to clean teflon-coated 316 stainless steel vessel support plate are supported by means of four stainless steel pillars and secured by four thumb screws.

The bath and vessel temperatures can be constantly monitored using the **PT100 temperature probe** provided for this purpose. Provision is made for logging the actual speed and temperature at user-defined intervals throughout the test for subsequent printing.

Digital Heater/Circulator





Temperature Calibration Kit

DISSOLUTION TESTER DIS 8000

OPERATION

The control of all models is provided by a membrane keypad linked to a 4-line 20 character back-lit display, which together with the electronics is mounted in the head of the instrument so as to avoid any accidental spillages in the test area.

Many users have criticised the fact that their existing dissolution testers are overly complex with unnecessary software functionality for day-to-day use. For this reason, considerable attention was given in the design to ensuring that the number of actions necessary to perform a test was kept to a minimum.

Once the test sequence has been initiated, all that is necessary to start the test is to input the required rpm and nominal temperature, together with the duration of the test and the report interval (the time interval during the test at which the actual rpm and temperature is logged and subsequently reported), introduce the samples and press START.

During the test the following information is shown on the display:

- **Nominal and actual rpm**
- **Nominal and actual temperature**
- **Preset test duration and time elapsed**

An audible alarm alerts the user that the test is completed.

The dissolution tester is provided with both parallel and USB ports as standard for print-out of time, date, bath identification, serial number and date of calibration, together with the speed and temperature at operator selectable time intervals during the test.

CALIBRATION

Routine calibration is an essential part of your operation. Therefore a special calibration menu guides the user through the various functions and provides a printed report at the end of the operation.

One unique feature in this respect is the electronic temperature calibration kit. Ordinarily, temperature calibration can prove to be a time consuming and inaccurate process involving iced water. Available as an option, the electronic temperature calibration kit comprises two **UKAS certified test keys (0 and 37 degrees C)** which are simply plugged into the PT100 temperature probe socket to perform the calibration.

We offer a wide range of tools for calibrating your dissolution tester. Please see the appropriate information in the Dissolution Accessories section on page 34.

Temperature Calibration Kit

AUTOMATION

Manual dissolution testing is extremely time consuming and tedious. For this reason, many users are turning to complete automated systems to fulfill their requirements. As in the DIS 6000 and 8000, in most cases, the software involved also controls the dissolution tester.

The DIS 8000 has a bi-directional RS232 interface on the back panel which allows for communication with external devices and incorporation into automated systems.

DIMENSIONS

The DIS 8000 measures:
650 x 450 x 640 mm (w x d x h)
and the Heater/Circulator measures:
260 x 300 x 150 mm (w x d x h)