

Elcometer 138

Bresle Kit and Patches

Operating Instructions



CE The Conductivity Meter model B-173 has been tested in accordance with EU regulations governing Electro-magnetic compliance and it meets the required directives.

Note: Gauge readings may be affected if the unit is operated within a radio frequency electromagnetic strength of greater than 3 V/m.

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A copy of this Instruction Manual is available for download on our Website via www.elcometer.com/downloads.

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Thank you for your purchase of this Elcometer 138 Bresle Kit and Patches. Welcome to Elcometer.

Elcometer are world leaders in the design, manufacture and supply of inspection equipment for coatings and concrete. Our products cover all aspects of coating inspection, from development through application to post application inspection.

Your Elcometer 138 Bresle Kit and Patches is a world beating product. With the purchase of this product you now have access to the worldwide service and support network of Elcometer. For more information visit our website at www.elcometer.com

1 ABOUT THIS TEST KIT

The Elcometer 138 Bresle Kit and Patches provides all the materials and equipment required to determine surface chloride contamination level. Chloride salts are extracted from the surface using the Bresle Patch method and the chloride content of the test solution is measured using a Conductivity Meter.

These instructions incorporate two test methods:

- ISO 8502-6
- US NAVY PPI 63101-000 (Rev 10)

The Elcometer 138 Bresle Kit and Patches can also be used in accordance with ISO 8502-9; ISO 8502-11; AS 3894.6-A and SSPC Guide 15.

The Conductivity Meter model B-173 included in the test kit measures the conductivity of aqueous solutions. The meter is **not** designed to measure solids, organic solvents, surfactant, oil, adhesive, alcohol, strong acids (pH: 0 to 2) or strong alkalis (pH: 12 to 14). **The life of the sensor will be extremely short if these substances are measured.**

1.1 WHAT THE BOX CONTAINS

- Elcometer 135 Bresle Patches, box of 25
- Pure Water, 250 ml in clear plastic bottle
- Syringes, 5 ml, 3x
- Needles (blunt), 3x
- Beaker, plastic, 30 ml
- Conductivity Meter model B-173 and Sensor
- Batteries, CR2032 lithium, 2x
- Standard solution 1.41 mS/cm, 2x
- Moistening solution
- Purified water (deionised water)
- Pipette
- Conductivity meter storage pouch
- Operating instructions
- Carrying Case



The Elcometer 138 Bresle Kit and Patches is packed in a cardboard and foam package. Please ensure that this packaging is disposed of in an environmentally sensitive manner. Consult your local Environmental Authority for further guidance.

To maximise the benefits of this instrument please take some time to read these Operating Instructions. Do not hesitate to contact Elcometer or your Elcometer supplier if you have any questions.

1.2 CAUTION



The needles supplied for use with this kit are blunt, but care must be exercised when using and disposing of these needles to prevent accidental needle stick injuries. It is recommended that used needles be disposed of as special waste, and not in landfill.



If the standard solution used for calibration of the meter comes into contact with skin, wash the skin with fresh water. If the standard solution comes into contact with eyes, immediately flush the eye with large amounts of fresh water and seek medical advice.

2 TEST PROCEDURE: ISO 8502-6

2.1 BEFORE YOU START

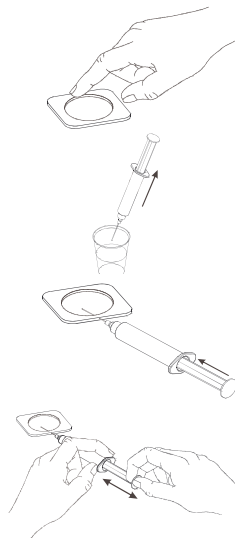
1. Calibrate the conductivity meter - see "Calibration" on page 13.
2. Wear gloves during the test. The test is extremely sensitive; wear clean latex or nitrile gloves during the extraction of soluble salts to prevent contamination of the surface.

2.2 PROCEDURE

1. Remove protective backing and foam centre from Bresle Patch.



2. Apply patch to surface. Press firmly around perimeter of patch to ensure a complete seal.
 3. Fill syringe with 3 ml of deionised water.
 4. Insert syringe into patch through spongy foam perimeter and inject 1.5 ml of deionised water into patch. Do not remove syringe.
 5. With syringe still in patch, reposition needle and evacuate any air in patch.
 6. Remove syringe from patch, hold syringe with needle pointing upwards and expel air.
 7. Insert syringe into patch through spongy foam perimeter and inject remaining deionised water into patch. Do not remove syringe.
 8. After a suitable period of time^a suck the solution back into the syringe and then immediately re-inject back into the patch.
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- a. On un-pitted blast-cleaned areas a period of 10 minutes has been found satisfactory.



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9. Repeat step 8 until at least four injection/sucking cycles have been completed.

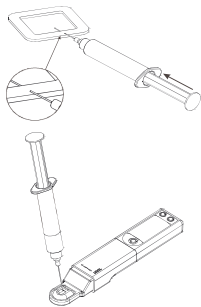
10. At end of last cycle extract as much solution as possible and remove syringe from patch^b.

11. Measure conductivity of solution using Conductivity Meter model B-173 - see "Taking a measurement" on page 14.

Inject sample directly into sensor cell. Rinse cell several times with solution to be measured before taking reading.

12. After the test is complete:

- Record temperature of solution.
- Remove Bresle Patch from surface and clean surface. If required, any adhesive residue from the Bresle Patch left on the test surface can be removed by wiping the surface with a cloth moistened with a suitable solvent. Ensure that the solvent will not damage the surface before use.
- Rinse all components of the test kit in fresh water. The components can then be used again.



2.3 TO CALCULATE THE SURFACE DENSITY OF SALTS

Take the reading obtained from the conductivity meter in step 11.

b. During steps 4 to 10 it is essential that no solution is lost. If any solution is lost the test shall be rejected.

- If the reading is in $\mu\text{S}/\text{cm}$, multiply it by 1.2
- If the reading is in mS/cm , multiply it by 1200

The resulting number is the surface density of salts in milligrams per square metre (mg/m^2).

3 TEST PROCEDURE: US NAVY PPI 63101-000

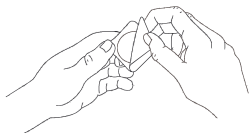
3.1 BEFORE YOU START

1. Calibrate the conductivity meter - see "Calibration" on page 13.
2. Wear gloves during the test. The test is extremely sensitive; wear clean latex or nitrile gloves during the extraction of soluble salts to prevent contamination of the surface.

3.2 PROCEDURE

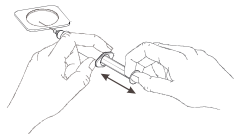
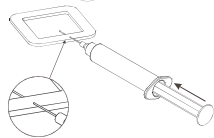
Measurements shall be made randomly over the prepared surface. Take five (5) measurements every 90 m^2 (1000 ft^2). Areas less than 90 m^2 (1000 ft^2) shall have five measurements made.

1. Remove protective backing and foam centre from Bresle Patch.

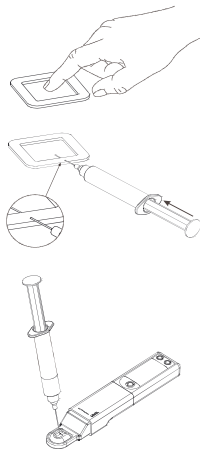


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2. Apply patch to surface. Press firmly around perimeter of patch to ensure a complete seal.
3. Fill syringe with 3 ml of deionised water.
4. Insert syringe into patch through latex and spongy foam perimeter and inject 1.5 ml of deionised water into patch. Do not remove syringe.
5. With syringe still in patch, reposition needle and evacuate any air in patch.
6. Once air has been removed, inject remaining 1.5 ml of water.
7. Remove syringe from patch.



8. Rub surface of patch gently for 10 to 15 seconds to allow water to dissolve surface contaminants.
9. Insert syringe into patch through spongy foam perimeter and extract solution from patch.
10. Measure conductivity of solution using Conductivity Meter model B-173 - see "Taking a measurement" on page 14.
Inject sample directly into sensor cell. Rinse cell several times with solution to be measured before taking reading.
11. After the test is complete:
 - Record temperature of solution.
 - Remove Bresle Patch from surface and clean surface. If required, any adhesive residue from the Bresle Patch left on the test surface can be removed by wiping the surface with a cloth moistened with a suitable solvent. Ensure that the solvent will not damage the surface before use.
 - Rinse all components of the test kit in fresh water. The components can then be used again.



3.3 PASS/FAIL CRITERIA

For immersed applications, conductivity due to soluble salts (total ionic) shall not exceed 30 $\mu\text{S}/\text{cm}$. For non-immersed applications, conductivity due to soluble salts shall not exceed 70 $\mu\text{S}/\text{cm}$.

Note: The charts produced by the US Navy for the calculation of chloride level are not required for this test method. Please contact Elcometer or your Elcometer supplier if you require a copy of these charts.

4 USING THE CONDUCTIVITY METER

4.1 CAUTION



Do not drop the meter.

Never apply undue force when opening the meter (to change batteries/sensor).

Do not exert undue force on the sensor.

Do not allow utensils (tweezers, pipette etc.) to touch sensor cell.

Do not immerse past the immersion level line.

Do not measure samples hotter than 35°C.

Do not allow contact with solvents.

Do not subject the meter to high temperature or humidity.

4.2 FITTING BATTERIES

The Conductivity Meter model B-173 and Sensor uses dry cell batteries only. Two CR2032 lithium batteries are supplied in the kit.

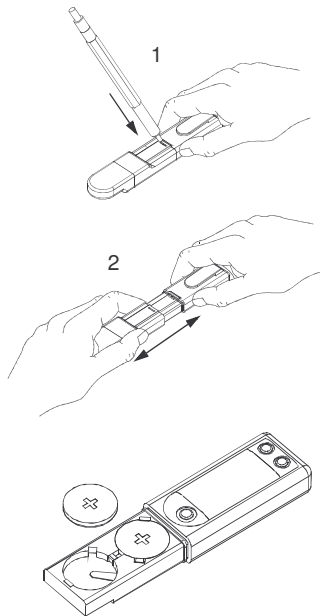
To fit or replace the batteries:

1. Locate sensor retaining clip and use a ball point pen or similar to press down clip
2. Pull sensor away from body of meter to open battery compartment. Do not use excess force.
3. Place batteries in battery clips ensuring correct polarity.
4. To reassemble meter, slide sensor onto body of meter and push body and sensor together gently until sensor retaining clip engages.

When battery voltage becomes low, Low Battery Warning Indicator **B** will flash. Replace both batteries immediately.

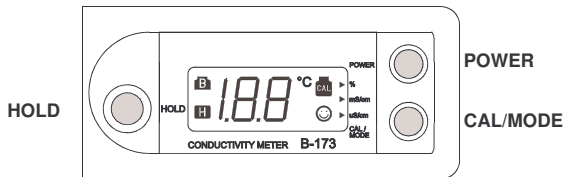
Note: *Lithium batteries must be disposed of carefully to avoid environmental contamination. Please consult your local Environmental Authority for information on disposal in your region.*

Do not dispose of any batteries in fire.



4.3 CONTROLS AND DISPLAY

The meter is operated using 3 buttons and displays readings and other information on an LCD screen.






CONTROL BUTTONS

POWER	Press POWER button to turn meter on or off. The meter will switch off automatically after 15 minutes of inactivity.
CAL/MODE	Changes operating mode: <ul style="list-style-type: none"> • Measurement of conductivity • Calibration (CAL) • Measurement of salinity
HOLD	Retains reading on display.

DISPLAY INDICATORS

H	HOLD indicator	On: Retains reading on display. Flashing: Automatic hold mode.
B	Low battery warning	Flashing: Low battery voltage. Replace both batteries.
°C	Temperature alarm	Flashing: Temperature of sample is outside range - see "Technical specification" on page 17.

	Calibration indicator	On: Displayed during calibration of meter. Turns off when calibration is complete. Flashing: Meter is not calibrated. Check solution and calibrate again.
	Range/mode indicator	Indicates mode (conductivity or salinity) and range (mS/cm or μ S/cm)
	Stabilisation indicator	On: Indicates measurement is complete.
1.8.8	Conductivity/salinity readings	On: Displays reading. Flashing: Reading is out of measurement range of meter - see “Technical specification” on page 17.

4.4 CALIBRATION

The meter **must** be calibrated before taking a measurement. Calibration at least once a day is recommended.

1. Remove sensor protection cap.
2. Press POWER button to switch on meter.
3. Fill sensor cell with standard solution.
4. Press CAL/MODE button.

Display shows Calibration Indicator  and 1.41 mS/cm.

When Calibration Indicator disappears, calibration is complete.

5. Wash sensor cell with tap water and wipe away any residual water using a clean tissue.

Calibration values are stored in the memory of the gauge when the gauge is switched off.

4.5 TAKING A MEASUREMENT

Before taking a measurement ensure that the gauge is calibrated.

1. Remove sensor protection cap.
2. Press POWER button to switch on meter. Always switch on meter with no liquid in the sensor.
3. Set measurement mode; measurement can be made of conductivity or salinity. To set measurement mode:

For **conductivity** press CAL/MODE button until Range/mode indicator ► shows either $\mu\text{S}/\text{cm}$ or mS/cm .

For **salinity** press CAL/MODE button until Range/mode indicator ► shows %.

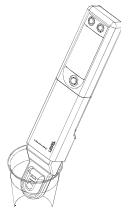
Note: *The range switches automatically between mS/cm and $\mu\text{S}/\text{cm}$ according to the concentration of the sample.*

4. Take measurement. There are two methods of measuring, depending upon the quantity of sample available:

Method 1 - Immerse sensor in sample

When immersing sensor in sample do not immerse past the maximum immersion level line marked on body of sensor.

Method 1
Immerse sensor in sample



Method 2 - Drop sample into sensor cell using syringe or pipette.

When dropping sample into sensor cell ensure that the sample fills the sensor cell and that the sample does not contain any bubbles.

5. Read displayed figure when Stabilisation Indicator ☺ appears.

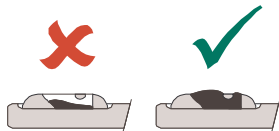
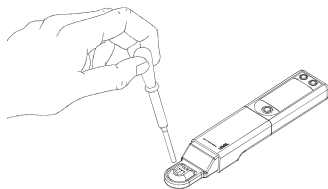
4.6 HOLD FUNCTION

The Hold function retains the reading on the display. It is used to hold the reading at the end of measurement so that the results can be recorded.

MANUAL HOLD: Press HOLD button to retain measurement figure on display. The Hold Indicator **H** appears and the displayed figure is retained until any button is pressed.

AUTOMATIC HOLD: Switch off meter. Press and hold down HOLD button and press POWER button to switch on meter. Meter enters automatic hold mode and Hold Indicator **H** flashes. In this mode the meter will automatically hold the displayed figure when the Stabilisation Indicator appears.

Method 2
Drop sample into sensor cell using syringe or pipette



Sample must fill sensor cell

4.7 AFTER MEASUREMENT

1. Press POWER button to switch off meter.
2. Wash sensor with tap water and wipe away any residual water using a clean tissue.
3. Replace sensor protection cap.

Note: *If the meter is to remain unused for a long period of time use purified (deionised) water instead of tap water.*

5 MAINTENANCE

The Conductivity Meter is designed to give many years reliable service under normal operating and storage conditions.

5.1 CARE OF THE CONDUCTIVITY METER SENSOR

- Prolonged periods of non-use may cause the sensor to dry out. This can result in malfunction or unstable readings. Pour moistening solution into the sensor cell and leave for a few minutes to allow the sensor to become saturated. Wash the sensor with water prior to use.
- If the measuring surface of the sensor is contaminated or if air bubbles are regularly present in the sample, clean the sensor using a diluted neutral detergent (diluted 100 times).

5.2 FAULTS

The Conductivity Meter does not contain any user-serviceable components. In the unlikely event of a fault, the Conductivity Meter should be returned to your local Elcometer supplier or directly to Elcometer.

Contact details can be found at www.elcometer.com

6 STORAGE



The conductivity meter incorporates a Liquid Crystal Display. If the display is heated above 50°C (120°F) it may be damaged. This can happen if the conductivity meter is left in a car parked in strong sunlight.

Always store the components of the Elcometer 138 Bresle Kit in the carrying case when the kit is not being used.

7 TECHNICAL SPECIFICATION

7.1 BRESLE PATCH

Patch Size:	5.2 cm x 5.2 cm
Test Area:	12.5 cm ²
Sample Volume:	1.5 ml to 2.0 ml

7.2 CONDUCTIVITY METER

Measurement method:	AC bipolar
Measurement mode:	Conductivity/sodium chloride (NaCl) salinity conversion
Range - conductivity:	0 µS/cm to 19.9 µS/cm
Repeatability:	± 1%
Memory capacity:	200 readings
Display:	Liquid Crystal Display (LCD) 2½ digits

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Measurement temperature:	5°C to 35°C (41°F to 95°F)
Dimensions:	149 mm x 27 mm x 16 mm (5.9" x 1.1" x 0.6")
Weight (incl. dry batteries):	47 g (1.7 oz)
Case:	ABS
Battery Type:	2 x CR2032 lithium ^c

7.3 CARRYING CASE

Overall Case Dimensions:	300 mm x 220 mm x 75 mm (11.8" x 8.7" x 3")
Weight:	2.1 kg (4 lb 10¼ oz)
Material:	Polypropylene foam-lined with cutouts for Bresle Patches, Water, Conductivity Meter and accessories

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- c. When exhausted these lithium batteries must be disposed of carefully to avoid environmental contamination. Please consult your local Environmental Authority for information on disposal in your region.
Do not dispose of any batteries in fire.

8 SPARE PARTS AND ACCESSORIES

The Elcometer 138 Bresle Kit is complete with all the items required to get started and take measurements, however over the life of the kit replacements may be required. The following items are available from Elcometer, or your local supplier.

8.1 CONSUMABLE ITEMS

Bresle patches, box of 25:	E135----B
Syringes, 5 ml, 3x:	T13818517
Needles, 3x:	T13818518
Beaker, plastic, 30 ml:	T13818519
Calibration standard solution, 4x:	T13818516
Pure water, 250 ml:	T99911344

8.2 REPLACEMENT ITEMS

Conductivity Meter model B-173:	T13818515
Sensor for conductivity meter:	T13818525

9 RELATED EQUIPMENT

In addition to the Elcometer 138 Bresle Kit and Patches, Elcometer produces a wide range of other equipment for testing and measuring the characteristics of coatings. Users of the Elcometer 138 may also benefit from the following Elcometer products:

- Elcometer 134A Chloride Ion Test Kit for Abrasives
- Elcometer 134S Salt Detection Kit for Blast Cleaned Surfaces
- Elcometer 134W Chloride Ion Test Kit for Water/Liquids
- Elcometer 130 Salt Contamination Meter

For further information contact Elcometer, your local supplier or visit www.elcometer.com