DYNE TESTING

Salt measurement 2.0

SETTING THE NEW STANDARD

THE FULLY AUTOMATED SOLUBLE SALT METER







Soluble Salt Meter



The Soluble Salt Meter (SSM) was developed specifically to improve current methods of establishing surface cleanliness. The goals in developing the SSM were to:

- Improve the time, quality, and accuracy of in-field analysis
- Eliminate use of syringe needles
- Develop a paperless instrument
- Automate water dosing and washing system
- Eliminate consumables (patches and syringes)
- Exactly replicate the Bresle patch protocol
- Eliminate residue left behind from Bresle and other adhesive patches

The SSM is the approved alternative for use as a replacement to the Bresle patch method equivalent to ISO Standard 8502—9 (Field Method for the conductometric determination of water-soluble salts in accordance with NACE SP0508-2008).

Background

The presence of soluble salts on a surface is detrimental to applied protective coatings. As such, there are set stringent requirements for maximum allowable soluble salt concentrations for various applications. In order to test for surface cleanliness, surface contaminants must be extracted and analysed. In the Bresle method, which is described in ISO 8502-6, a flexible cell is applied to the surface in question and injected by syringe with deionised water. Surface salts are dissolved into this solution that is removed and tested for conductivity. Conductivity measurements, recorded in microsiemens per centimeter (µS/cm), correspond to the concentration of dissolved ions in the solution. A high conductivity measurement indicates a high level of dissolved ions and in turn salt contamination on the surface. ISO 8502-9 provides a method to convert conductivity measurements to equivalent concentration of NaCl.





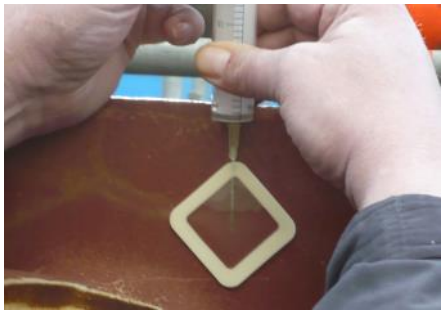


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Current Method

Conventional methods for measuring the soluble salts remaining on a substrate prior to paint application (specifically the Bresle patch method) are tedious, time consuming (approximately 6 minutes per test), and may leave adhesive residue on the surface. In addition these methods can be expensive (e.g. each Bresle patch costs ~£ 4.00 and can be used only once).

Equipment





Drawbacks

- Time Requirements for Bresle method
  - Approximately eight minutes per test
- Requires Post Clean-up Process
  - Removal of sticky film
- Seventeen Step Process
- Built in Errors
- Results in Poor Quality Assurance and Inspection
  - Due to tedious process
  - Reproducibility and accuracy
- Expensive consumables (patches)



The Solution: Soluble Salt Meter (SSM)

A new inspection tool has been developed to replace the Bresle patch method for soluble salt determination. This Soluble Salt Meter (SSM), for which United States Patent No. 8,252,600 was issued on August 28 2012, was designed around the current Bresle patch salt inspection method. The SSM test protocol exactly duplicates the Bresle process, except that measurements are automated and there are no consumables. The complete test sequence requires only one minute. The SSM is approved as an authorised alternative to the Bresle patch method.



Equipment





Generally accepted criteria		
NORSOK	M-501	20-50mg/m2
DNV	RP-F102	20mg/m2
IMO (PSPC)	MSC-215(82)	50mg/m2
IMO (PSPC)	MSC.244(83)	50mg/m2
NAVSEA	FY-12 (CH1) 009-32	30-70uS/cm

Benefits

- Accurate, easy measurements
- Repeatable results
- Rugged, industrial hardened measurement device
- Simple operating instructions
- Reduced process steps (17 steps reduced to 6 steps)
- Reduced process time (only one minute reading to reading)
- Eliminate process induced surface contamination (sticky residue)
- Equipment easily transportable (tank inspections)
- Improved safety (syringes/needles eliminated)
  - Operator error minimised
  - Metered water injection
  - Automatic data recording feature (configured to work with coating technical file)

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Side-By-Side Comparison

Technical Specifications

Bresle Patch

- Compartment Area: 1250 ± 13 mm2 (square)
- Can vary 5% due to stretching
- Attachment Method: Adhesive
- Leaves residue
- Requires post measurement cleanup
- Water Injection Method: Syringe
- Prone to human error and injury
- Air Evacuation of patch:
- Syringe
- Time consuming
- Prone to human error

SSM

- Compartment Area: 1250 mm2 (circular)
- Fixed footprint
- Attachment Method: Magnetic
- No effect on surface quality
- Proven to seal over deep pits
- Water Injection Method: Automated
- Accurate metering valve (3.0 ± 0.04 ml)
- Air Evacuation: Automated
- Chamber relaxes automatically
- No time delays

Proces Procedures

Bresle Patch

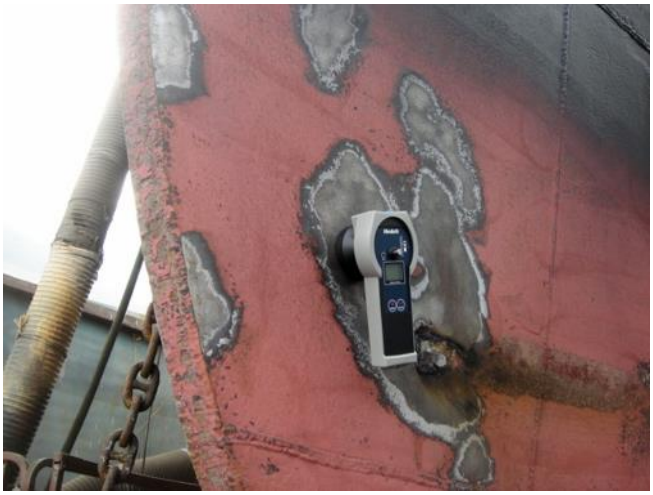
1. Select Bresle patch, remove the protective paper and the punched-out material;
2. Adhere patch to surface (attempting to minimize trapped air);
3. Fill syringe with 3ml deionized water;
4. Inject half of the water into the patch.
5. Reposition needle and evacuate air.
6. Remove the needle from the patch. Holding the syringe with the needle pointing upwards, expel the air.
7. Re-insert the needle into the compartment and inject the remainder of the solvent;
8. Agitate Bresle patch with finger for 10-20 seconds;
9. Extract solution using syringe;
10. Transfer solution in syringe to Horiba B-173 meter;
11. Take reading;
12. Record reading by hand on QA sheet;
    NOTE: ISO 8502-6 dictates that during steps 3 to 10, it is essential that no solvent be lost from the patch or syringe. If any solvent is lost, the solution obtained shall be rejected.
13. Remove Bresle patch from surface;
14. Wipe remaining water from surface with rag
15. Clean any adhesive remaining on surface;
16. Clean and rinse out syringe;
17. Clean Horiba meter.

17 Total Steps (~8 min)

SSM

1. Attach meter to surface;
2. Inject deionised water into measurement chamber with one press of the dose bottle;
3. Meter automatically agitates solution (~ 40 seconds);
4. Meter automatically takes reading;
   - Display reading on LCD screen
   - Stores values electronically
5. Wipe remaining water from surface after removing SSM
6. Flush meter by turning over and injecting water from dose bottle.

6 Total Steps (1 min)



Cost Comparison

This section includes a cost comparison between the Bresle method and the SSM. The time per test is approximated to be 6 minutes per test* for inspectors and reflects additional time required to enter and track measurements by hand. The SSM stores all data electronically, allowing easy data management and tracking.

Bresle Patch	**SSM**
Time = 8 min/test	Time = 1 min/test
Labour = £40/hr inc O/H (£ 0.75/min)	Labour = £40/hr (£0.75/min)
Bresle Patch = £ 4.00	No consumable
~£ 10.00 per measurement	~£ 0.75 per measurement
~£ 7,200.00 per year**	**~£ 540 per year****

*Based on observational data of actual shipyard inspections.

** This is an estimate based on the *labor and materials cost* for 60 measurements per month. These figures do not include expenses such as syringes, deionized water, and conductivity meters.

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The SSM overcomes many of the inherent challenges of taking QA measurements. By reducing test cycle time and automating data measurement and tracking, the SSM will save money and improve QA.

The SSM:

- Cuts sampling/inspection time;
- Simplifies the measurement process (17 steps reduced to 6 steps);
- Improves safety by eliminating the need for syringes and needles;
- Minimizes operator error through automatic metered water injection and electronic recording of measurements;
- Doesn't leave sticky residue on the substrate;
- Extracts surface salts more reliably for more accurate readings;
- Is equivalent to ISO Standard 8502-6 *Extraction of soluble contaminants for analysis -- The Bresle method;*
- Meets the requirements of ISO Standard 8502-9 *Field method for the conductometric determination of water-soluble salts.*

Pricing

The SSM comes with several options, each with its own benefits. In the SSM it is possible to buy measurements like they were consumables. This made it possible to offer the following options:

Buy Lite

Experiencing the benefits of the SSM starts by purchasing the Soluble Salt Meter kit (Buy lite). This kit is al you need to get started and contains:



- Soluble Salt Meter
- SSM adapter flat surface
- Dispenser
- Power supply
- USB cable and PC Software
- Calibration fluid
- Carrying case
- Certificate of performance
- 50 credit readings

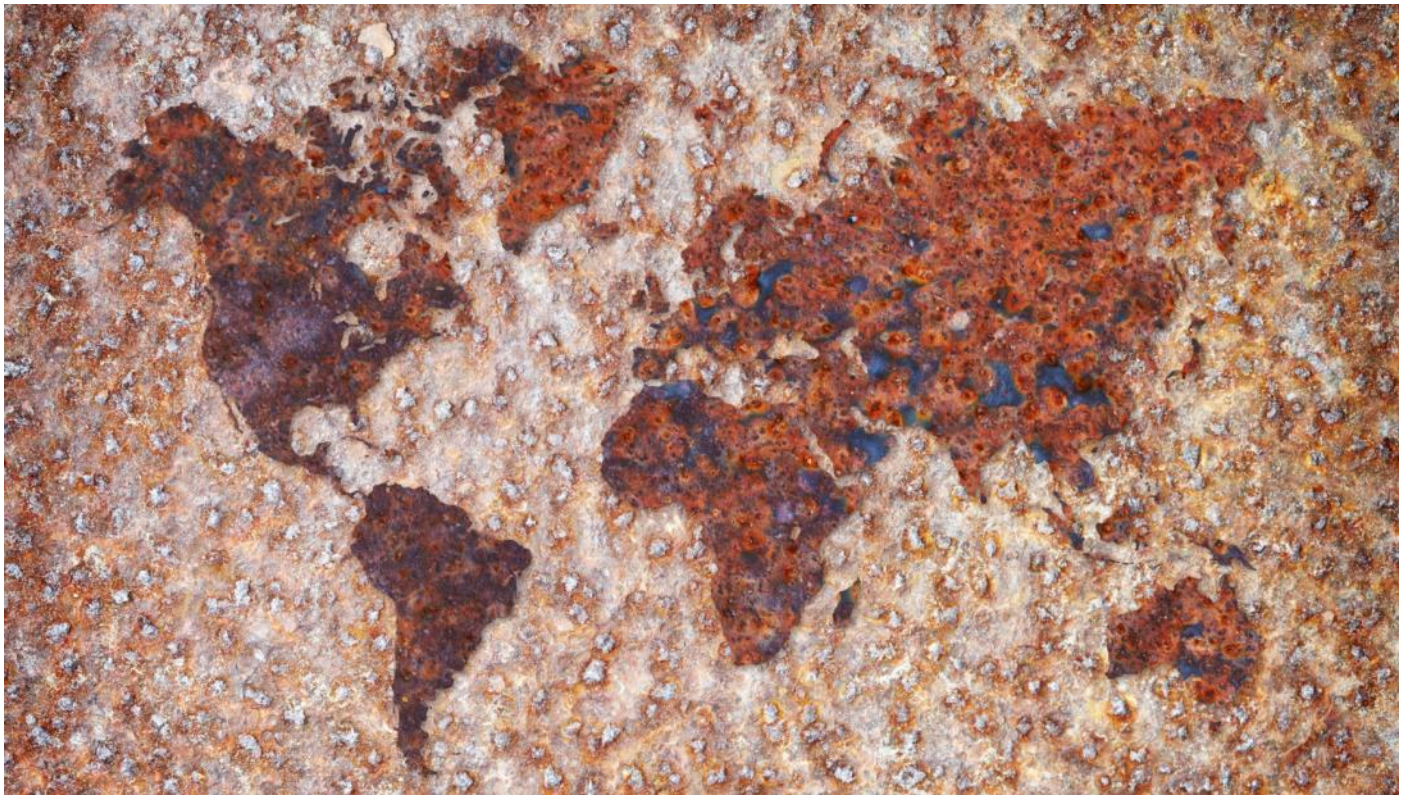
Buy licenses and credits

Purchase additional measurements (credits) only when you need them or add the license for unlimited measurements.

Buy options

Adapters for measurement pipes with diameters from 8” to 42” are available.

Ask Dyne Testing to give you a price quote based on the average number of measurements per year and find all the options in our pricelist. There are possibilities for every situation and budget.



Specifications

Standards	Equivalent to ISO Standard 8502-9 (Field method for the conductometric determination of water-soluble salts; The Bresle method) in accordance with NACE SP0508-2008.
Measurement Area	1250 mm (circular) fixed footprint
Attachment Method	Magnetic with silicone seal (no effect on surface quality; proven to seal over deep pits)
Water Injection Method	Automated, with simple press of fixed volume dispenser
Dose	3 ± 0.05 ml
Measurement Process Steps	5
Total Process Time	60 seconds (measurement to measurement)
Measurement Range	0-100 µS/cm
Resolution	1 µS/cm
Measurement Accuracy	± 3 µS/cm
Surface Temperature Range	5 - 50 °C (41 - 122 °F)
Temperature probe accuracy	± 0.3 °C (± 0.54 °F)
Diameter of curvature:	- Standard measuring head >= 1100mm (44") - Measuring head 1 - 650 <=> 1050mm (26 <=> 42") - Measuring head 2 - 350 <=> 600mm (14 <=> 24") - Measuring head 3 - 200 <=> 300mm (8 <=> 12")
Readout	µS/cm or mg/m2
Memory	Holds up to 1000 measurements (10 batches of up to 100 measurements each)
Connectivity	via USB with PC or laptop
Power Supply	Lithium-ion rechargeable battery
IP Rating	IP54
Dimensions (Instrument only)	21 x 10 x 8 cm
Weight (Instrument only)	780g.

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