# Useful and Reliable Technology Automated Soluble Salt Measurement

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#### **Outline of PSPC**

- IMO Resolution MSC.215(82)
- Performance Standard for Protective Coatings for Dedicated Seawater Ballast Tanks in All type of ships and Double-Side Skin Spaces of Bulk Carriers : "PSPC for Ballast Tank"

- PSPC for Void space (Not mandatory)
- PSPC for PMA (Not mandatory)
- PSPC for Cargo Oil Tank will be discussed at DE52

#### **Major Requirements by PSPC**

#### for Ballast Tank

- Blasting for 2<sup>nd</sup> surface treatment
- Approved paint system
- Multi-coating
- 320 micron on DFT under 90/10 rule
- DFT to be measured at many points
- Edge treatment
- Soluble Salt Measurement
- Technical Data File(TDF) to be prepared (All result of inspection to be recorded)
- All measurements/inspection/recording to be carried out under certified inspector's responsibility

#### Impact for ship building business,

#### example:

- Additional Blasting facilities maybe required at many shipyards
- Thicker Paint thickness to be applied
- Painting time period to be extended
- Increase VOC
- Heavy Edge Treatment (Increase in consumables)
- Measuring points of DFT
- Measure the Soluble Salt, even if there is no risk to the block/steel plate, to be carried out by ISO8502-9/6

#### **Soluble Salt Measurement**

**PSPC** required:

Water soluble salts limit, equivalent to NaCl : 50 mg/m<sup>2</sup> of sodium chloride. Conductivity measured in accordance with ISO 8502-9:1998





## Main Source of Soluble Salt during ship building process

- Sea Water (Splashed sea water, Atmosphere) Contents in Sea Water (for Example) : Weight Ratio NaCl:77.9%, MgCl2:9.6%, MgSO4:6.1%, CaSO4:4.0%, KCl:2.1%, Other:0.3%
- Air/Water Pollution (Atmosphere, Splashed river water) Representative chemical substance for Air Pollution
   NOx : HNO3,HNO2
   SOx : H2SO4,H2SO3,
   COx : H2CO3

### Most Popular method of Soluble Salt measurement

• Kitagawa Chloride Detector Tube: Measures "Chlorine Ion"

• Electric Conductivity: "All Soluble Salt Ions"

Measures

### **Kitagawa Chloride Detector Tube: "Chlorine Ion"**





## **Electric Conductivity: "All Soluble Salt Ions"**

#### Process of ISO8502-9/6 called Patch Method "

- Method: Measure Electric Conductivity
- Apply Exclusive Conversion Ratio

**"Bresle** 



#### Salt Concentration in Relation to Conductivity



ISO 8502-9 Figure 1

## Automated ISO8502-9/6



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### Advantages

- Less human error
- Results are Reliable
- Less consumables
- Save measured value in the instrument

#### Use of **magnet** means **no glue** remains on metal surface (unlike Bresle Method)





### Advantages

- Less human error
- Results are Reliable
- Less consumables
- Save measured value in the instrument
- No Glue will remain

### Disadvantages

•Initial cost is expensive

•Measurement for curved part is difficult

#### **Salinity Measurement Methods**

#### **ISO 8502-5**

Ion detection tube method (wiping) ISO 8502-9/6 Bresle method (Soft Cell)

#### New method Rigid Cell method







### **Comparison of Measurement Methods**

	Ion detection tube Method	Bresle Patch method ISO8502-9/6	<b>Rigid cell method</b> <b>Automated ISO8502</b>
Sampling	Wipe with gauze	Bresle Patch and injector	Fix to plate with powered stirring
Detection Method	Silver chromate method	Electric Conductivity method	Electric Conductivity method
Work Time	20 minutes.	10 minutes.	4 minutes.
Pure Water Consumption	150ml	<b>10ml</b>	10ml
Sampling Area	250000mm <sup>2</sup>	1250mm <sup>2</sup>	<b>1250</b> mm <sup>2</sup>
<b>Measurement</b> Calculation	• Cl <sup>-</sup> measurement using sensor tube • Calculate to NaCl concentration.	<ul> <li>Conductivity</li> <li>Measurement</li> <li>Calculate to NaCl concentration</li> </ul>	<ul> <li>Conductivity Measurement</li> <li>Convert to NaCl concentration by software</li> </ul>
Consumables	Water, Tube,Gauze,Tape	Water, Patch	Water
			21

### **Action by Japan**

Japan has submitted a paper to DE51 held on Feb. 2008 in Bonn titled "DE 51/14/2: GUIDELINES FOR MAINTENANCE AND REPAIR OF PROTECTIVE COATINGS Comments on the method of measuring the conductivity of soluble salts "

## Action by NACE

**NACE** (National Association of Corrosion Engineer) is discussing about confirmation method of equivalency for ISO8502-9/6.

TG392: **MEASUREMENT OF SOLUBLE SALTS** ON MARINE SURFACES ASSIGNMENT: TO DEVELOP A **STANDARD** PROVIDING METHODS OF VALIDATING **EQUIVALENCE TO ISO 8502-6/9** ON MEASUREMENT OF THE LEVELS OF SOLUBLE SALT CONTAMINATION ON SURFACES OF MARINE STRUCTURES, INCLUDING SHIPS, BEFORE COATING APPLICATION

### Proposal

• To keep/realize better environment condition by reducing VOC, CO2 and consumables, we must use ECO-Friendly methods.

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• All shipbuilding countries/ASEF, who have latest/modern technology, should cooperate with each other to accomplish the goals.

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## THANK YOU FOR YOUR KIND ATTENTION