

UNITOR™

by Wilhelmsen

Combined Test Kit Plus

User Manual



Combined Test Kit Plus **USER MANUAL**

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Combined Test Kit Plus - Content

- 1x Digital Cell Device
- 1x WR Safe Reagent Set – 500ml
- 1x TBN Reagent – 500ml
- 1x Cell Cleaner – 500 ml
- 1x ViscoStick
- 1x Instruction WR Safe Preparation
- 1x Digital Cell Device Manual
- 1x ViscoStick Manual
- 1x Saltesmo Test Kit
- 1x Spot Test Paper A5 Block
- 1x Salt Manual
- 1x Insoluble Spot Test Manual
- 6x SDS





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WR Safe Preparation - Manual



WR Safe Preparation Manual

Introduction

The Unitor WR Safe Reagent Kit is intended to determine water in oil. It consists of two components:

- **WR Safe** tube
- **WR Releaser**

As long as the components are not mixed, they are classified as non-dangerous for transport and storage.

The reagent can be prepared for instant use in portions for a small number of tests, which is advantageous for maintenance personal. Or it can be mixed in one, if needed in one place.

Technical Specification

For further information to the technical specs please refer to the enclosed SDS.

Safety

Please always make sure to carefully read the instructions including the SDS (safety data sheet) of chemicals involved in the measurement procedure. Wear goggles and gloves while testing to protect your health. Perform the testing in suitable and safe places to protect the people around you and the environment. Provide good ventilation with fresh air, while testing!

WR Safe Preparation Manual

Preparation

There are two different ways of preparing the reagent:

1. Mixing of WR Safe and WR Releaser directly in the bottle. By this method the complete reagent is ready for use and is dangerous for transport and storage after preparation!
2. Mixing in a separate mixing tool, where only a limited amount is activated for 3 tests. The rest of the separated WR Safe and WR Releaser is kept in the original state and both are allowed to be transported and stored without any restrictions.

Preparation of WR Safe in the Releaser Bottle

Standard preparation of **WR Safe Reagent** starts with **WR Safe tube** and the **WR Releaser** bottle. Tear of the red label which indicates the changed nature of the content. Open the WR Safe tube and pierce the seal of the tube with the pin in the top of the tube cap.



WR Safe Preparation Manual

1. Preparation of WR Safe in the Releaser Bottle

Open the WR Releaser bottle. Press the complete content of the WR Safe tube into the WR Releaser bottle.

Note: *If the WR Safe tube is warm, then the content gets out with ease.*



The **WR Releaser** bottle contains steel balls for mixing. After firmly closing the cap of the bottle start shaking the bottle. Do this for about 5 minutes and let it rest for about 10 minutes. Repeat shaking another 5 minutes following a rest of 10 minutes until a homogeneous mixture inside the bottle is achieved.

The reagent is ready for use. The WR Safe Reagent is now in an active state and can be used directly for water-in-oil determination in the Digital Cell. Note the restrictions for transport and handling in the safety data sheet due to the changed nature of the components in the bottle!

WR Safe Preparation Manual

2. Preparation of WR Safe in the Mixing Tool

Use the mixing tool to prepare a limited amount of **WR Safe Releaser**.

Note: Do not remove the red label when mixing the reagent components inside the mixing tool (conical tube with steel ball and magnetic pin). The WR Releaser bottle is not assigned as dangerous good, if mixed outside the bottle!



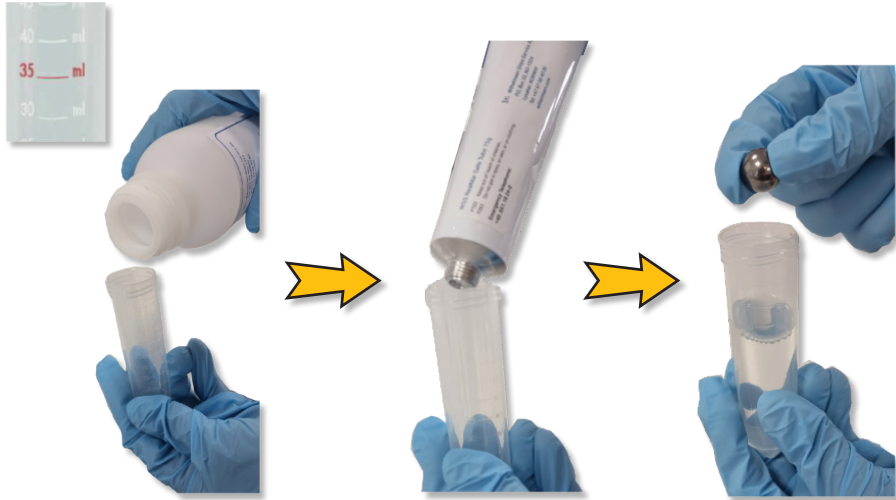
The mixing tool is suitable for mixing the amount for 3 tests! To mix an amount of only one test is difficult and not recommended due to the small amount of reagent.

Note: To get a steel ball out of the WR Releaser bottle, put the enclosed magnet to the lid of the closed bottle and turn it. Afterwards gently unscrew the lid and take one ball.

WR Safe Preparation Manual

2. Preparation of WR Safe in the Mixing Tool

In the following it is described how to mix an amount for three tests:



Open the mixing tool and remove the magnetic pin and one steel ball. Check the scale and **fill 35 ml of WR Releaser** into the conical tube.

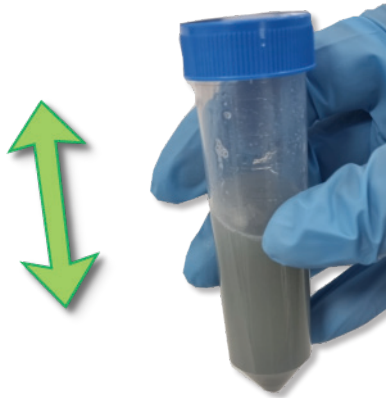
Open the **WR Safe tube** and press paste into the conical tube until the **level of 40 ml mark** in the conical tube is reached.

Place one steel ball into the conical tube and close the cap.

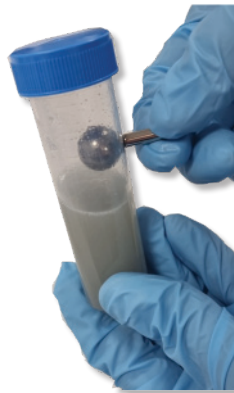
WR Safe Preparation Manual

2. Preparation of WR Safe in the Mixing Tool

Start mixing the components by shaking the mixing tool. The ball inside has to move. Stop shaking, when you mixed a homogeneous liquid.



Take the magnetic pin and fix the steel ball to avoid the ball moving while pouring out the WR Safe Reagent.



Open the cap of the mixing tool and pour the reagent into the chamber of the Digital Cell (up to the mark of the chamber "R").

Maintenance

After each testing the device should be cleaned carefully to assure proper function and accurate measurement.

Make sure that it is only used the delivered cell cleaner and a soft rag to avoid any damage on the unit!

Do not use compressed air for cleaning!

Do not use any cleaning chemicals which are not recommended!

Do not use any tools like screw driver, needle or knife for cleaning!



Consumables & Service

For consumables and necessary service like training on the test or FAQ and repairs please contact:



Wilhelmsen Ships Service AS

P.O. Box 33, NO-1324,

Lysaker, NORWAY

Tel: +47 67 58 40 00

wilhelmsen.com

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Digital Cell Manual



Digital Cell Manual

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1. General Information

The Digital Cell enables the operator to assess the water content and the Base Number of any lubricant oil. The device combines the traditional testing method of so-called shaking devices, with a rethought measuring process. The chemical reaction is not any more rated by the testing time, but only through the intensity of agitation which is displayed in the progress bar whilst agitating.

To ensure a repeatable measuring procedure, the agitation intensity is measured by an acceleration sensor inside the device.

Also, it is possible to enter BN references for calibrating the device manually.

1.1 Warranty and Support

Only use original reagents and replacement packs from Uunitor. We are only able to support crew onboard and grant high accuracy and warranty of the test devices if you use the original.

Original reagent



1.2 Test Frequency

Water-in-Oil Analysis:

Base Number (BN/TBN) Analysis:

Every week /
approx. 125 running hours

1.3 Safety precautions

Please read carefully this instruction manual and the safety data sheet (SDS). Wear safety glasses and gloves while testing to protect your health. Failure to follow these instructions can result in severe injury. The operator of the device is responsible for injuries and damage that result from the failure to comply with the information provided in this manual. Repairs may only be carried out by the Unitor service department.

After each testing the device should be cleaned carefully to assure proper function and accurate measurement. Especially the inner and outer threads need to be free of reagent and oil parts for next use to prevent jamming of the lower chamber.

1.4 Checking delivery

Please check the appliance without delay for defects or missing parts. If your delivery is incomplete or you detect defective parts, contact your local sales partner.

- 1x Unitor Digital Cell
- 1x Power supply

Only Test Kit:

- 1x Case
- 1x Manual
- 1x SDS
- 3x 3ml syringe (reusable)
- 500ml WR Reagent Set
- 500ml Cell Cleaner
- 500ml TBN Reagent

2. Properties

2.1 Specifications

Measuring range: - Water Content^[1]: 0 - 2 Vol.%; 2-10 Vol.%
- Base Number: 4 - 150 BN

Measuring accuracy^[2]: - Water Content: +/- 0,02% Vol.
- Base Number: +/- 5.0%

Measuring time: - Water Content: ~ 3 min per sample
- Base Number: ~ 2 min per sample

Classification of reagents: non dangerous goods

[1]

Water content Vol. -%	Meas. Range Digital Cell	Oil Q'ty in ml	Multiplicator Meas. value x M
0 - 2 %	0 - 2 %	3,2 ml	M = 1
2 - 4 %	0 - 2 %	1,5 ml	M = 2
4 - 10 %	0 - 2 %	0,5 ml	M = 5

[2]

on-board conditions

***Do not dispose of in domestic waste systems.
Dispose of in accordance with local regulations.***



2.2 Display and Keys



Power ON/OFF



- Press the **middle** selection button for at least 2 seconds to switch on the unit.
- To switch off the unit, select **Power down** in the main menu.
- The remaining buttons are named as mentioned on the display!


Power Supply

The *Digital Cell* has an internal rechargeable battery that powers the device for at least 72 hours. The battery power is displayed in the battery symbol (top right). **To charge the battery, select “Start Charging” in the main menu**, plug in the provided USB cable. Connect the plug-in power supply to a 120V or 240V outlet.




DO NOT USE NORMAL BATTERIES – this will cause overheating / burning and destroy the device. Only rechargeables!

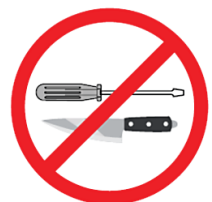
Please charge the rechargeables properly before first time of use.

 120 – 240V: Connect the power supply adapter to a safe socket where you can easily disconnect in case of need.

Cleaning the Digital Cell Device

Make sure that you only use the delivered cell cleaner and a soft rag to avoid any damage on the unit!

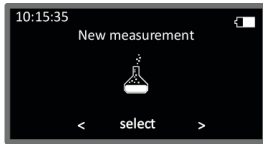
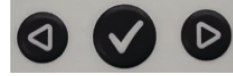
NO compressed air,
NO cleaning chemicals which are not recommended, **NO tools like screw driver, needle or knife** for cleaning!



3. Menu Navigation

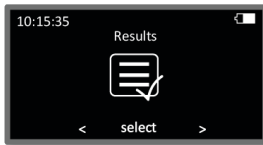
3.1 Main Menu

The Digital Cell is provided with an intuitive menu guidance. The main menu is divided into the following categories. Selection is always done by using the buttons underneath the shown arrows “< >” and “select/back”:



New measurements

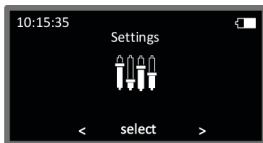
Choose **New measurements** to determine the TBN or the WiO value. See **5.1 Water in Oil** and **5.2 Base Number**



Results

Choose **Results** to view the latest test results. The *DIGITAL CELL* provides **100 storage locations** for test results.

→ For a simple documentation you can import the results of the device via the attached USB connector to your computer. The data is provided as CSV-file, so it is also possible to send or implement the data.



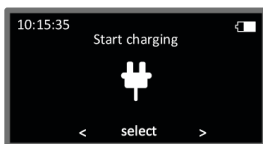
Settings

Choose **Settings** to manage the TBN references, to set the time and date, to set the unit of the WiO result and to display the system information.



Power Down

Choose **Power down** to shut down the Digital Cell.



Start charging

Choose **Start charging** to load the rechargeable batteries.

3.2 Settings

Within the Menu **Settings** you will be guided through System Infos, managing BN references and setups:



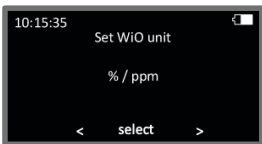
System Info

Choose **System Info** to get Date, Serial-No. and the hardware version. Return with left button “*BACK*”.



Manage BN Ref.

Choose **Manage BN Ref.** to view, edit, add and delete BN calibration for up to 6 BN calibration values. **See 5.2 Base Number.**



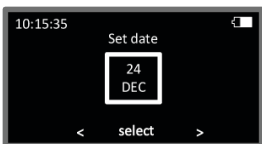
Set WiO Unit

Choose **Set WiO unit** to select [%] or [ppm] unit.



Set Time

Choose **Set time** to enter the current time. Select “*BACK*” after single setting hours and minutes and select *OK?*. Discard with *NO!*



Set Date

Choose **Set date** to enter the current date. Select “*BACK*” after single setting year, month and day and select *OK?*. Discard with *NO!*



Back

Choose **back** to return to the main menu.

4. Start-Up

Before starting the test procedure, make sure that you are drawing a representative sample for testing.

Place all needed items on a free and clean space where you can easily perform the test.

5. Test Procedure



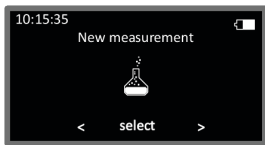
Note: The complete test is also displayed on the screen of the Digital Cell.

5.1 Water in Oil

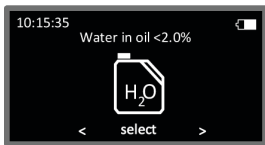
→ Needed items:

- DIGITAL CELL
- reusable 3ml syringe
- prepared WR Reagent
- safety glasses
- gloves

Draw a **representative** sample and agitate the sample vigorously for several minutes to **homogenize** the content.

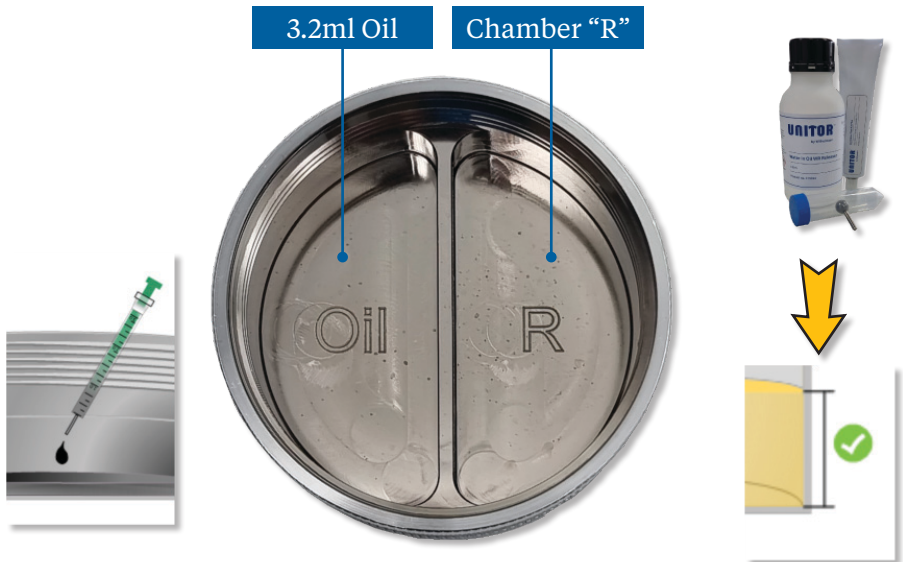


1. Start the device, select **New measurement**.



2. Use the outer selection keys to choose **Water in Oil < 2.0%**. Confirm by pressing **select**.

- Open the device. Fill **chamber R** up to the mark with **WR Reagent**.
- Add **3.2 ml^[1]** of the **oil sample** to the oil chamber, using a reusable **3 ml syringe**. For this, gently pull the syringe piston towards the end of the syringe till a **noticeable resistance** occurs.

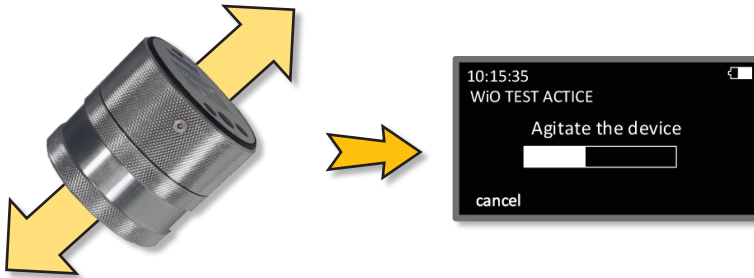


^[1] For a measurement range = 2-4 V% or 4-10 V% → Page 25

- Close the device **tightly** and confirm to start the measuring process.

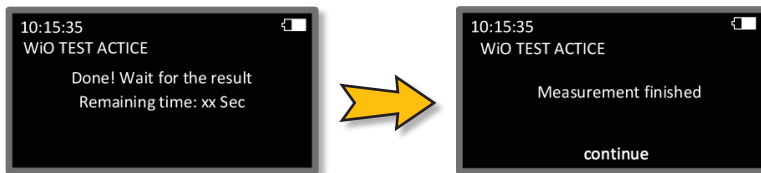


- Agitate the device. The intensity of agitation is indicated in the progress bar. Agitate the device until the progress bar achieves the maximum.

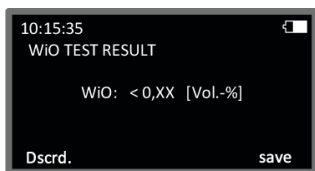


While agitating move the device in a **vertical** direction to maximize the turbulences inside the fluid!

- Leave the sample to stand for **60** seconds. The remaining time is displayed on the device:



- To view the result, confirm by pressing **continue**.
- The result can be saved directly on the device. For this, press **save**. To discard the value, press **Dscrd**. You will then be automatically returned to the WiO menu.



After each testing the device should be cleaned carefully to assure proper function and accurate measurement. Use a lint-free cloth to avoid any damage on the unit!

Measuring Range 2-10 Vol. %

With the Digital Cell it is possible to measure 2-10 Vol. % water-in-oil, too.

Please exactly follow the instructions of below table (1).

Example testing see manual Page 22 - 24

- Range: 4-10 Vol. %
- Start the device
- Choose (water-in-oil): <2,0 Vol. %
- Use 0,5ml of your sample.
- Result = 1,12 Vol. % (displayed; Digital Cell)
- Result Digital Cell (displayed) x multiplier (here: = 5) = final result
- Final result = 1,12 Vol. % x 5 = 5,60 Vol. %

Water content Vol. -%	Meas. Range Digital Cell	Oil Q'ty in ml	Multiplier Meas. value x M
0 - 2 %	0 - 2 %	3,2 ml	M = 1
2 - 4 %	0 - 2 %	1,5 ml	M = 2
4 - 10 %	0 - 2 %	0,5 ml	M = 5

Table 1

5.2 Base Number [TBN/BN]

5.2.1 Calibration process

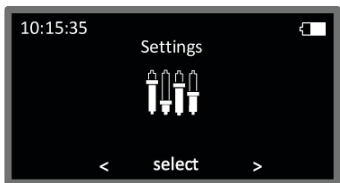
To value the Base Number, a BN reference is required. This reference could be added by calibrating the device on a respective **fresh oil sample**.

Calibrating the device with a 3-fold determination

- *Digital Cell*
- reusable 3ml syringe
- TBN Reagent
- safety glasses
- Gloves
- Sample of fresh oil

Draw a **representative** sample of the fresh oil and agitate the sample vigorously for several minutes to **homogenize** the content!

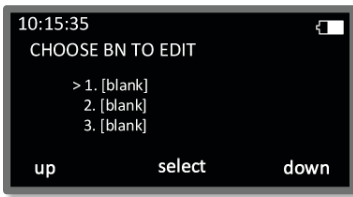
1. Start the device, select **Settings**



2. Use the outer selection keys to choose **Manage BN Ref.** Confirm by pressing **select**.



3. **Select** the desired storage location. For this, use the **outer keys** to scroll up and down. Press “**SELECT**”.

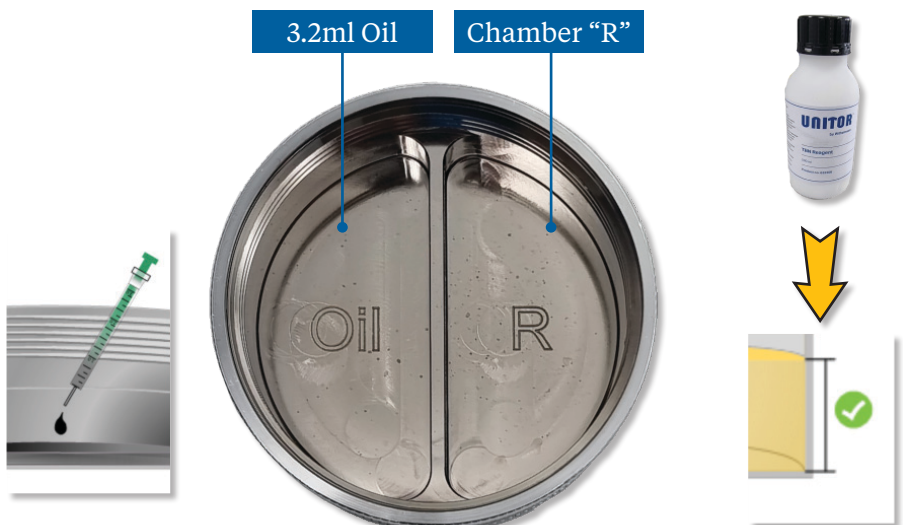


4. By using the outer keys you can choose read, edit, add and delete the current entry. Return with cancel. Choose **add**.

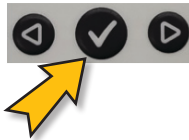
The manual will also be shown on the display of the device. To confirm the net step, press “**NEXT**”. To start immediately with the test, press “**SKIP**”.

5. Open the device. Fill **chamber “R”** up to the mark with **TBN Reagent**.

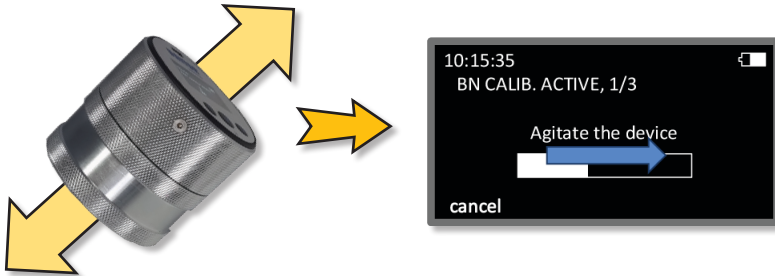
Add **3.2 ml** of the **oil sample** to the oil chamber, using a reusable **3 ml syringe**. For this, gently pull the syringe piston towards the end of the syringe till a **noticeable resistance** occurs



- Close the device **tightly** and confirm to start the measuring process. Return with “*BACK*”.

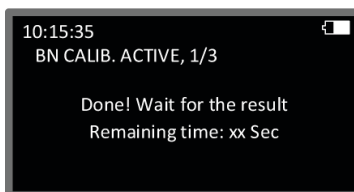


- “*BN Calibration Active, 1/3 – 3/3*” is shown. Each procedure has to be done **with a new fresh oil sample**. Agitate the device. The intensity of agitation is indicated in the progress bar. Agitate the device until the progress bar achieves its maximum.

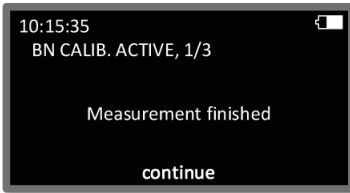


While agitating move the device in a **vertical** direction to **maximize** the turbulences inside the fluid! “Cancel” to resume to the previous menu.

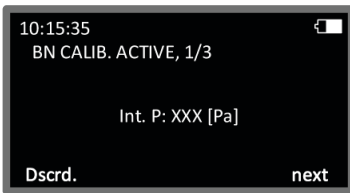
- Leave the sample to stand for **30** seconds. The remaining time is displayed on the device:



9. To view the result, confirm by pressing “*CONTINUE*”.



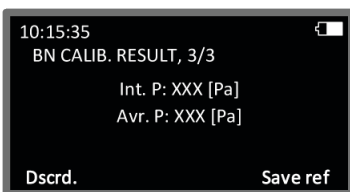
10. The result can be saved directly on the device. For this, press “*NEXT*”. If you like to discard the value, press “*DSCRD.*”.



To ensure a proper result as reference, the Digital Cell uses a three-fold determination. For this, the device will guide you through two more measuring’s when pressing next! Use a new fresh oil sample for the next 2 determinations.

After each testing the device should be cleaned carefully to assure proper function and accurate measurement. Use a lint-free cloth to avoid any damage on the unit!

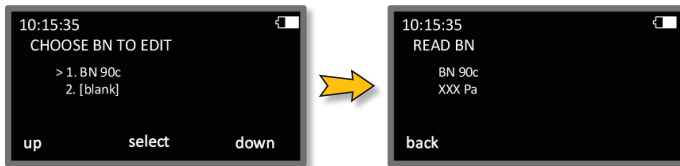
11. After the third measuring, the average of the whole process is displayed. Press **save ref** to store the reference, to discard the result, press **Dscrd.**



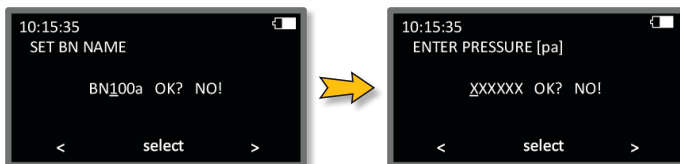
12. **Set** the BN number of the reference. The letters “BN” are fixed. Preset is “BN100a”. Change the value to your BN of your oil. 1 – 999 are possible values. It is highly necessary to set the correct BN as reference for further correct measuring. Letter a – f to differentiate similar oil. Use the **outer keys** to change the position, press “*SELECT*”. to select the position, again use the **outer keys** to change the value of the position. Press “*BACK*” to proceed with next position. To confirm the name, choose OK? and press “*SELECT*”.



You return to the previous menu. To **read** the entry, choose “*SELECT*” and then press “*READ*”. “*BACK*” to previous menu.



To **edit** the entry, choose “*EDIT*” with outer keys. Set BN name and select “*OK?*” to proceed. Change pressure accordingly if needed. Select “*OK?*” and return in previous menu.



Choose “*DELETE*” to **erase**, “*ADD*” to **replace** the entry. “*CANCEL*” to return to setting menu.

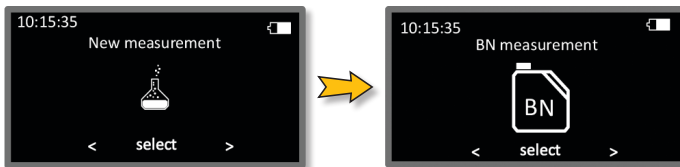
5.2.2 Determination Base Number BN / TBN

→ Needed items:

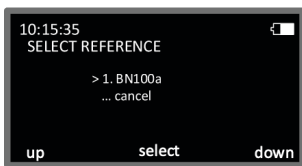
- Digital Cell
- reusable 3ml syringe
- TBN Reagent
- safety glasses
- gloves

Draw a **representative** sample and agitate the sample vigorously for several minutes to **homogenize** the content!

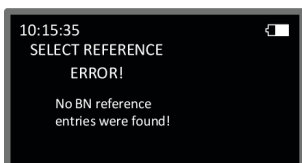
1. Start the device, select **New measurement**. Then use the outer selection keys to choose **BN measurement**. Confirm by pressing **select**.



2. Choose the required reference. Use the **outer keys** to change the position, press **select** to confirm the position. Return, select “... CANCEL”.

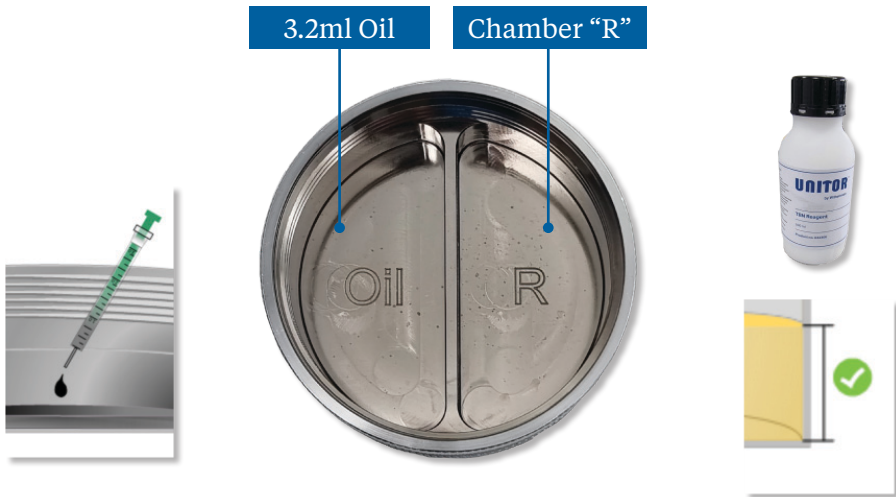


3. If no reference was set before, then an error message occurs and you are automatically returned to the upper menu.

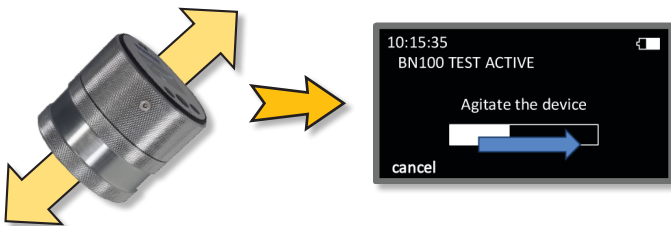


- All steps are also shown on the display of the device. “Next” for next step, “skip” to proceed with shaking: Open the device. Fill **chamber “R”** up to the mark with **TBN Reagent**.

Add **3.2 ml** of the **oil sample** to the remaining chamber, using a reusable **3 ml syringe**. For this, gently pull the syringe piston towards the end of the syringe till a **noticeable resistance** occurs

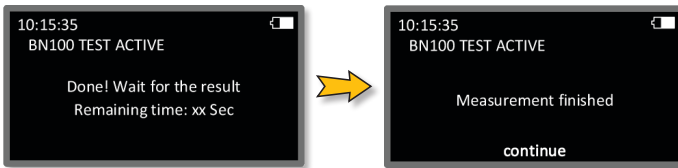


- Close the device **tightly** and confirm to start the measuring process.
- “*BNXXX TEST ACTIVE*” is shown. Agitate the device. The intensity of agitation is indicated in the progress bar. Agitate the device until the progress bar achieves its maximum.

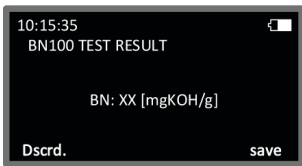


While agitating move the device in a **vertical** direction to **maximize** the turbulences inside the fluid!

7. Leave the sample to stand for **30** seconds. The remaining time is displayed on the device. After 30 seconds the display shows the end of the test.

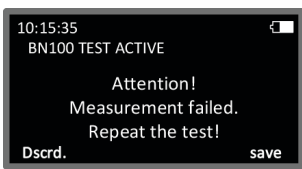


8. To view the result, confirm by pressing **continue**.



9. The result can be saved directly on the device. For this, press **save**. If you like to discard the value press **Dscrd.**

If the below message is shown, please repeat the test by pressing any key. You will return to the main menu.



After each testing the device should be cleaned carefully to assure proper function and accurate measurement. Use a lint-free cloth to avoid any damage on the unit!

6. Troubleshooting 1/5

User guidance is intuitive to prevent mistakes in operation. In exceptional cases, however, the following error messages will be displayed.

WiO results are 20 % higher than the results of my shore lab¹

- The device was not closed properly
- Close the device tightly before starting the measuring procedure

- The seal is damaged
- If the seal is badly distorted or damaged, it should be replaced with a new seal, as pressure inside the measuring chamber will be released

- The used oil amount was not accurate
- Use exactly **3.2 ml** of your representative oil sample. For this, gently pull the syringe piston towards the end of the syringe till a **noticeable resistance** occurs.

- The used reagent amount was not accurate
- Fill **chamber R** up to the mark (12.2ml) with the reagent.

- The water content of your sample is not homogeneously distributed in your sample.

- Draw a **representative** sample and agitate the sample vigorously for several minutes to **homogenize** the content!

WiO results are 20 % lower than the results of my shore lab¹

- The device was not closed properly
- Close the device tightly before starting the measuring procedure

- The seal is damaged
- If the seal is badly distorted or damaged, it should be replaced with a new seal, as pressure inside the measuring chamber will be released

- The used oil amount was not accurate
- Use exactly **3.2 ml** of your representative oil sample. For this, gently pull the syringe piston towards the end of the syringe till a **noticeable resistance** occurs.

6. Troubleshooting 2/5

- The used reagent amount was not accurate
- Fill **chamber R** up to the mark (12.2ml) with the reagent.
- The water content of your sample is not homogeneously distributed in your sample.
- Draw a **representative** sample and agitate the sample vigorously for several minutes to **homogenize** the content!

¹ *Water determination according to Karl-Fischer-titration*

BN results are 15 % higher than the results of my shore lab²

- The selected BN reference is incorrect
- Ensure that the chosen BN reference is the correct one
- Repeat the calibration process
- The device was not closed properly
- Close the device tightly before starting the measuring procedure
- The seal is damaged
- If the seal is badly distorted or damaged, it should be replaced with a new seal, as pressure inside the measuring chamber will be released
- The used oil amount was not accurate
- Use exactly **3.2 ml** of your representative oil sample. For this, gently pull the syringe piston towards the end of the syringe till a **noticeable resistance** occurs.
- The used reagent amount was not accurate
- Fill **chamber R** up to the mark (12.2ml) with the reagent.
- The water content of your sample is not homogeneously distributed in your sample.
- Draw a **representative** sample and agitate the sample vigorously for several minutes to **homogenize** the content!

6. Troubleshooting 3/5

BN results are 15 % lower than the results of my shore lab²

- The selected BN reference is incorrect
 - Ensure that the chosen BN reference is the correct one
 - Repeat the calibration process
- The device was not closed properly
 - Close the device tightly before starting the measuring procedure
- The seal is damaged
 - If the seal is badly distorted or damaged, it should be replaced with a new seal, as pressure inside the measuring chamber will be released
- The used oil amount was not accurate
 - Use exactly **3.2 ml** of your representative oil sample. For this, gently pull the syringe piston towards the end of the syringe till a **noticeable resistance** occurs.
- The used oil amount was not accurate
 - Fill **chamber R** up to the mark (12.2ml) with the reagent.
- The water content of your sample is not homogeneously distributed in your sample.
 - Draw a **representative** sample and agitate the sample vigorously for several minutes to **homogenize** the content!

² *determination of base number - perchloric acid by potentiometric titration method according to ISO 3771*

6. Troubleshooting 4/5

The device is leaking while the measuring process

- The device was not closed properly
- Close the device tightly before starting the measuring procedure.
- The seal is damaged
- If the seal is badly distorted or damaged, it should be replaced with a new seal, as pressure inside the measuring chamber will be released.

The device turns off while the measuring process

- The rechargeable battery of the device is empty.
- To charge the battery, plug in the provided USB cable. Connect the plug-in power supply to a 120V or 240V outlet.
- The rechargeable battery of the device is defect.
- Contact the service department of Wilhelmsen or exchange with new rechargeables (2x AA 2100mAh).

Note: DO NOT USE single-use BATTERIES. In case of PC-connection or plugged with power supply they will be charged and cause severe damage to the device.

- The device was not used in the last 20 minutes.
- To reduce the energy consumption the device will switch off automatically after 20 minutes without interaction.

The device does not start

- The battery of the device is empty.
- To charge the battery, plug in the provided USB cable. Connect the plug-in power supply to a 120V or 240V outlet.
- The battery of the device is defect.
- Contact the service department of Wilhelmsen (or see above)
- Press the left selection button for at least 5 seconds

6. Troubleshooting 5/5

The lower chamber can not be opened after testing

- The inner threads of the chamber are not cleaned properly
- Ensure that the threads are always free of reagent and oil parts. Clean with a soft rag and some cell cleaner after usage



7. Maintenance

After each testing the device should be cleaned carefully to assure proper function and accurate measurement. Especially the inner and outer threads need to be free of reagent and oil parts.

Make sure that it is only used the delivered cell cleaner and a soft rag to avoid any damage on the unit!

Do not use compressed air for cleaning!

Do not use any cleaning chemicals which are not recommended!

Do not use any tools like screw driver, needle or knife for cleaning!

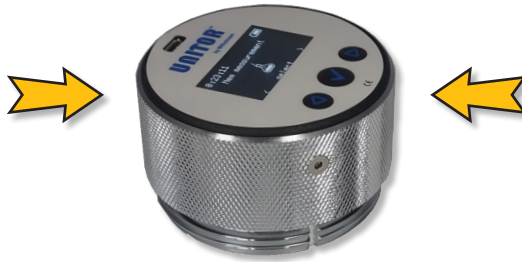


Considering all these hints will help the user to make this device a long lasting tool for your oil management on site.

Changing the Rechargeable Batteries

Only replace with rechargeable batteries

1. Switch off the device, open the device and place the upper part of the device on an even place.
2. Use a screwdriver to remove the two screws on both sides of the device.



3. Gently remove the top of the device. Take care of the wiring, place the body next to the device. Replace the batteries and screw it together again.



To ensure a proper function WSS recommends using 2x AA 2100mAh or higher **rechargeable** batteries!

Waste Disposal

Syringes, pipettes and cuvettes with their content have to be disposed according to the waste management plan required by MARPOL regulations. The oil-reagent mixture can be poured into a suitable container to drain it into the sludge tank. The remaining items can be treated as mixed waste.

8. Consumables & Service

For consumables and necessary service like training on the test or FAQ and repairs please contact:

**Wilhelmsen Ships Service AS**

P.O. Box 33, NO-1324,

Lysaker, NORWAY

Tel: +47 67 58 40 00

wilhelmsen.com

4

ViscoStick - Manual



Introduction

The viscosity of lubricants in the industry and in shipping is one of most important parameters to know for an engineer. All kind of systems has a lubricant in use with a certain viscosity grade adjusted for the needs of the machinery. All kind of lubricated machineries need correct viscosity of the lubricant in place to have minimum wear and ideal operational conditions. Onsite it is difficult to obtain this kind of data without a laboratory nearby. To be aware of the quality of the operational fluids a simple and easy to use tool is needed to check this parameter – like the ViscoStick.



Technical Specification

Viscosity range	Go / No Go (low, acceptable, high)
Size	305 x 39 x 20 mm
Weight	59 g

Content

- 1x ViscoStick Tool
- 2x 5 ml syringes
- 1x Manual

General

The ViscoStick device is intended for the quality check of the oil viscosity. The viscosity is tested by comparing fresh oil and used oil.

Safety

When working with lubricants, fuels and chemicals read the safety data sheets of materials in use! Take care that the place of testing is clean. Wear eye protection (goggles) and protection gloves. Protect your environment!


Checking the Viscosity

Before starting the test procedure, make sure that you are drawing a representative sample for testing.

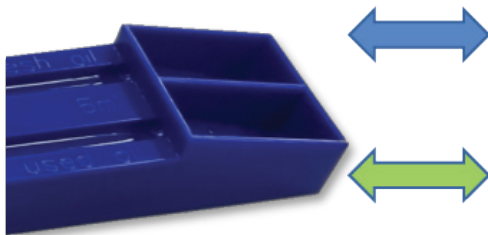
Place all needed items on a free space where you can easily perform the test.

The oil samples “used” and “fresh” have to be on the same temperature level! Do not perform the test for checking the viscosity with different sample temperatures!

In the bottom of the ViscoStick are clipped two 5 ml syringes. One syringe is taken for the fresh oil, the other for the used oil.

Place 5 ml of fresh oil into the chamber named “fresh oil” 

Place 5 ml of used oil into the chamber named “used oil” 



Execute Test

Tilt the ViscoStick according following figures to start the test



Fig. 2

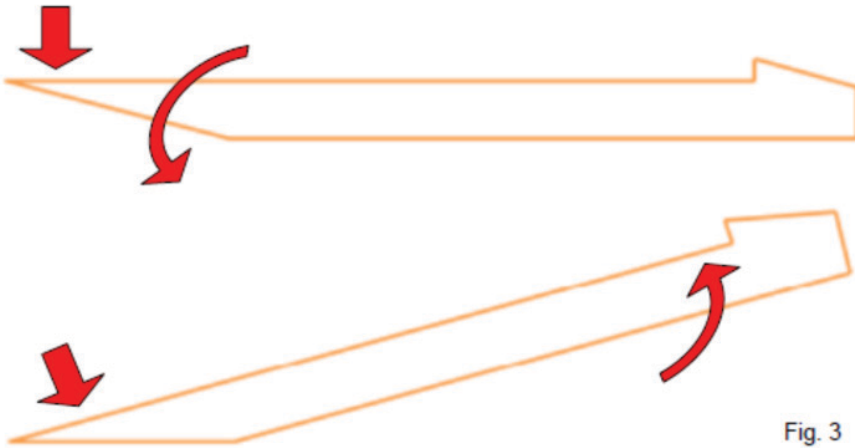


Fig. 3

After tilting the ViscoStick the oil in the reservoirs are starting to flow through the holes down the grooves [fig. 4].

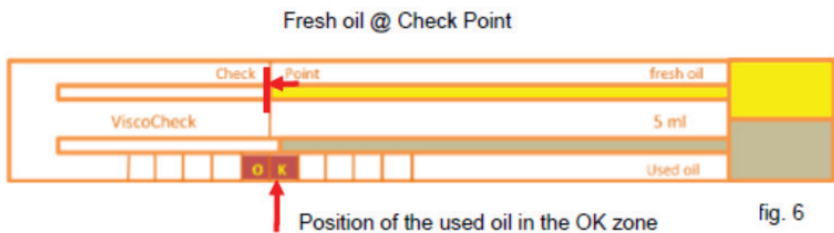
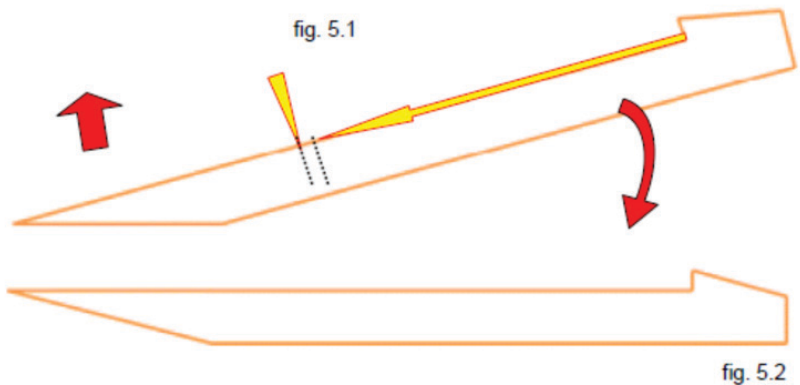


Fig. 4

Execute Test

Hold the position of the ViscoStick until the fresh oil is close to reach the “Check Point” [fig. 5.1].

Return the ViscoStick into the horizontal position that the fresh oil stops moving [fig. 5.2].



Note the position of the used oil after the fresh oil has reached the “Check Point” [fig. 6].

The used oil has reached the OK Zone. This indicates that the viscosity of the used oil is still in the limits.

Interpretation

If the used oil is outside the OK zone:

The used oil stops before the OK zone. Viscosity is too high!

Example: Contamination with heavy fuel oil (HFO) [fig. 7].



fig. 7

The used oil stops behind the OK zone. Viscosity is too low!

Example: Contamination with gas oil [fig. 8].



fig. 8

Maintenance

After each testing the device should be cleaned carefully to assure proper function and accurate measurement.

Make sure that it is only used the delivered cell cleaner and a soft rag to avoid any damage on the unit!

Do not use compressed air for cleaning!

Do not use any cleaning chemicals which are not recommended!

Do not use any tools like screw driver, needle or knife for cleaning!



Consumables & Service

For consumables and necessary service like training on the test or FAQ and repairs please contact:



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wilhelmsen.com



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Salt Test - Manual



Introduction

The Salt Test determines the presence of salt in your oil. An easy to use and quick test for getting a prompt indication about the nature of water contamination.

In case of water ingress into the fuel or lubricant it is important to learn the source of the contamination. By getting an indication about the nature of the water – salty or not salty - it can be clearly identified, if sea water or fresh water had entered into the system or tank.

The Salt Test provides a reliable statement to react with the correct and immediate measures.

Technical Specification

Test Go / No Go
Determination time less than 30 minutes

Content

- 1x SALTESMO Box with pads and one needle (25 tests in one box)
- 1x Reagent for salt determination “SALT REAGENT”
- 1x Conical test tube
- 1x Petri dish
- 4x Pipette
- 1x Manual



Safety

Please make always sure, to read carefully the instructions including the SDS (safety data sheet) of chemicals involved in the measurement procedure. Wear goggles and gloves while testing to protect your health. Perform the testing in suitable and safe places to protect the people around you and the environment. Provide good ventilation with fresh air while testing!

Determination of Salt Content

- Draw a representative sample of the fluid for testing the salt determination!
- Open the SALTESMO box and take out one pad and the needle and close the box.
- Place the pad into the petri dish!



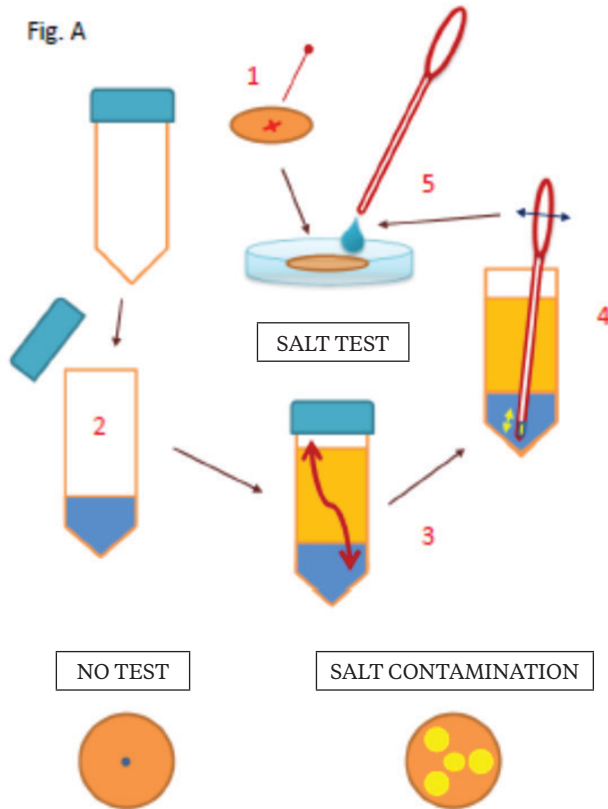
The box has to be kept closed!
Avoid any light ingress to the box content!

Determination of Salt Content

- Pierce several times (>5x) the pad with the needle!
- Open the conical tube and fill up to the 10 ml mark with Salt Reagent.
- Top up with the oil sample up to the 40 ml mark.
- Close the screw cap and start intensively shaking the tube to mix both liquids.
- Let the fluid rest for at least 25 minutes in the closed tube. You will note that both liquids are separating.
- After the time has passed, take the pipette and flush it with the Salt Reagent and keep some drops in the opening end.
- Open the tube and lower the opening end of the pipette through the oil to the bottom of the conical tube.
- Release the drops of the Reagent by pressing the bulb.
- By releasing the bulb it is sucked some amount of the sample water into the pipette.
- Flush the pierced pad in the petri dish with the content of the pipette until it is fully covered!
- Move the pad inside the liquid from time to time to support the water entering the piercing holes for better reaction of the chemicals involved.
- Latest after five (5) minutes take the pad by the tweezers out of the petri dish. Check the pad for any color changes. If you recon light yellow spots around the piercing holes the salt test is positive! The bigger the spot of color change the more salt is present!
- In case no color change can be observed, the water contamination of the oil sample is salt free!

Determination of Salt Content

Quick Guide



Test procedure in short:

1. Pierce one pad
2. Fill conical tube with reagent and sample
3. Close and shake the conical tube
4. Draw a water sample from the bottom of the tube by the pipette
5. Flush the pad in the Petri dish

Maintenance

After each testing the device should be cleaned carefully to assure proper function and accurate measurement.

Make sure that it is only used the delivered cell cleaner and a soft rag to avoid any damage on the unit!

Do not use compressed air for cleaning!

Do not use any cleaning chemicals which are not recommended!

Do not use any tools like screw driver, needle or knife for cleaning!



Consumables & Service

For consumables and necessary service like training on the test or FAQ and repairs please contact:



Wilhelmsen Ships Service AS

P.O. Box 33, NO-1324,

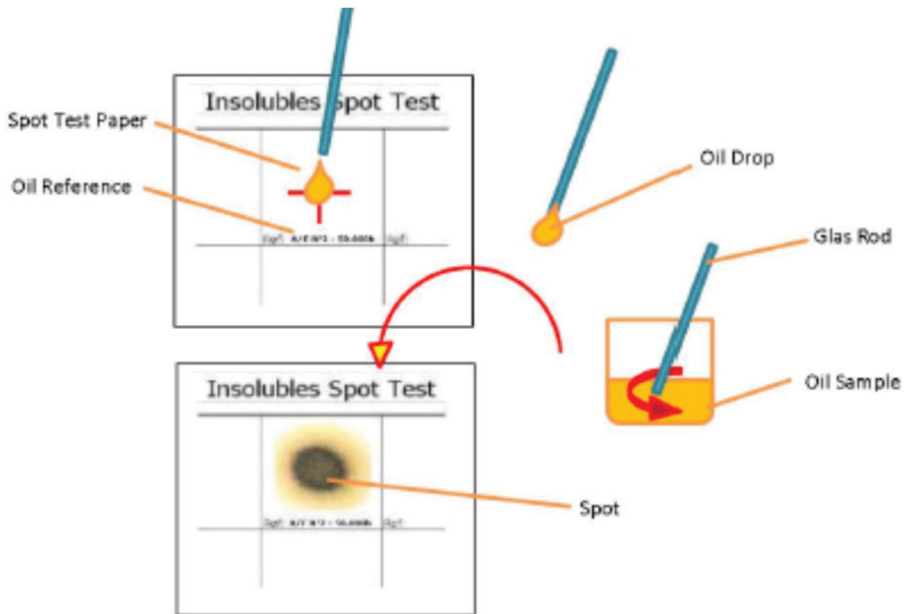
Lysaker, NORWAY

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wilhelmsen.com

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Insolubles Spot Test - Manual



Introduction

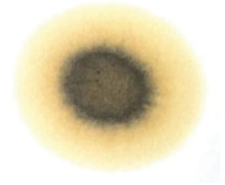
The Insolubles Spot Test determines the grade of contamination with insolubles, water and/or fuel. The power of the dispersant additives in the engine oil can be easily read to identify the remaining additive reserve of the lube oil and the efficiency of your purifiers and filters.

An easy to use and quick test for getting a prompt indication about the quality and condition of your engine oil.

The Insoluble Spot Test from Unitor provides a reliable statement to react with the correct and immediate measures.

Technical Specification

- Chromatographic spot test paper acc. ASTM recommendations
- 15 spot test fields per sheet

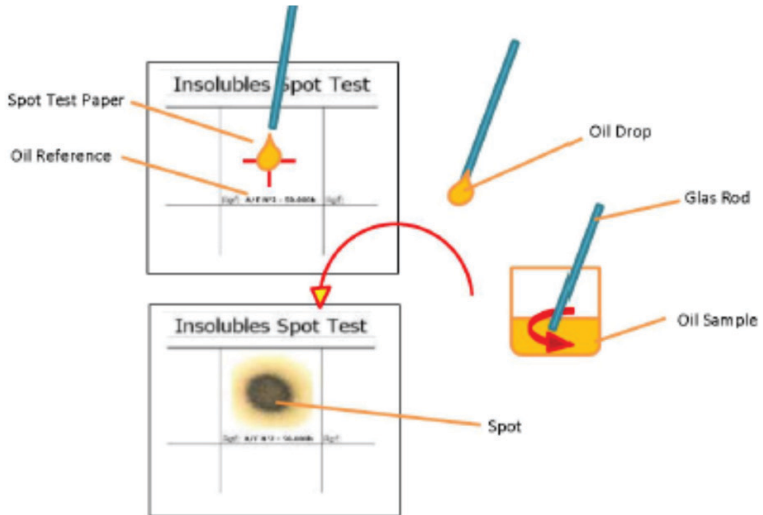


Content

- 1x Insolubles Spot Test paper (10 x A5 sheet with 15 spot fields)
- 1x Glass rod
- 1x Manual

Safety

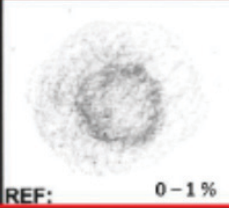
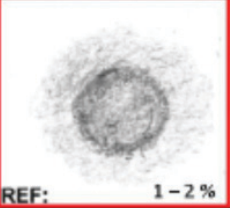
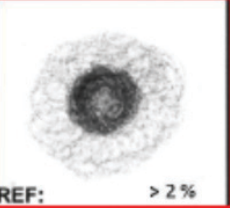
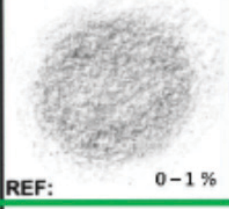
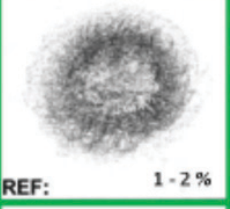
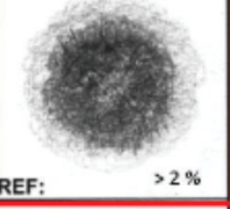
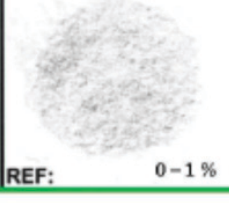
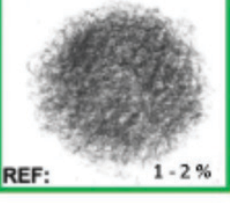
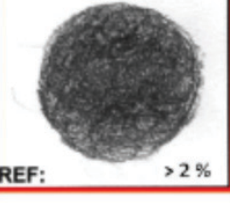
Please make always sure, to read carefully the instructions including the SDS (safety data sheet) of chemicals involved in the measurement procedure. Wear goggles and gloves while testing to protect your health. Perform the testing in suitable and safe places to protect the people around you and the environment. Provide good ventilation with fresh air while testing!



Step-By-Step Instruction

- Draw a representative sample of the lube oil for testing!
- Take one sheet of spot test paper and place it on a plain and dry place. It is recommended to keep a little space / distance between the paper and the underground to avoid any interference which could disturb the development of the oil spot.
- Write the correct reference for the test spot onto the paper before testing!
- Shake or stir the sample before testing!
- Take the glass rod and dip it into the oil.
- Let fall one drop into the center of the spot test paper.
- Wait for at least six (6) hours before examining the appearance and the character of the spot.
- To get an indication about the quality of your engine oil additive (dispersant) and the contamination with insolubles the spot has to be compared with the reference table according interpretation table on next page.

Interpretation Table

REF: Insolubles → weight %				
 REF: 0-1%	 REF: 1-2%	 REF: > 2%	Poor	
 REF: 0-1%	 REF: 1-2%	 REF: > 2%		Acceptable Dispersing Reserve
 REF: 0-1%	 REF: 1-2%	 REF: > 2%		

Interpretation Guide

- INSOLUBLES in weight % indicates the contamination with particles like soot in the engine oil. The higher the concentration of insolubles the darker the spot.
- DISPERSING RESERVE indicates the remaining active additives of an engine oil. If the additives are depleted the spot is inhomogeneous → dark inner spot, bright circle outside.
- If the additives are still in an active state, the spot is homogeneous.

Maintenance

After each testing the device should be cleaned carefully to assure proper function and accurate measurement.

Make sure that it is only used the delivered cell cleaner and a soft rag to avoid any damage on the unit!

Consumables & Service

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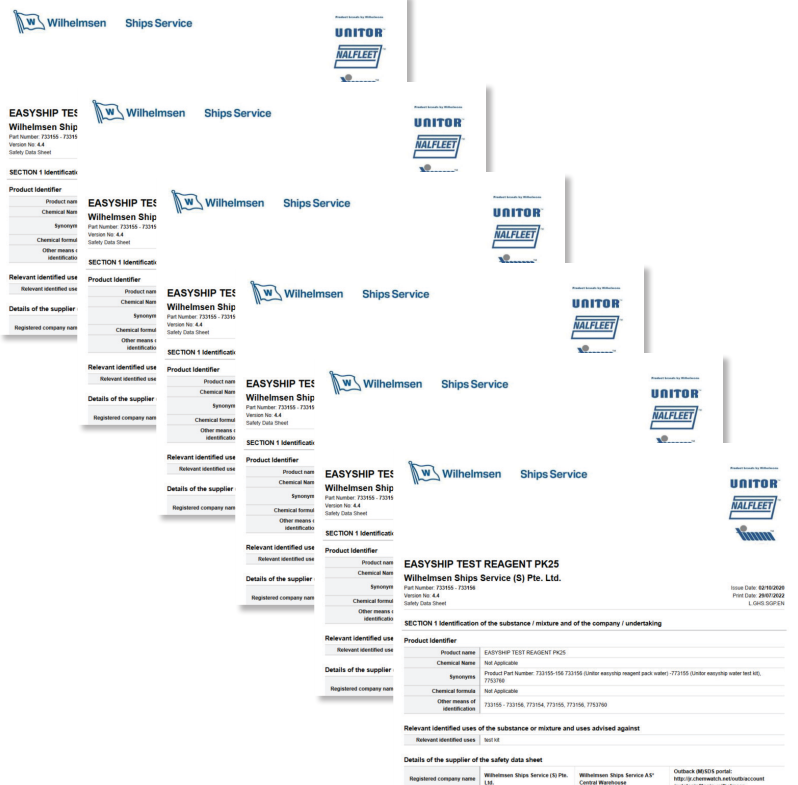
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7

Safety Data Sheets

- SDS WR Safe
- SDS WR Releaser
- SDS TBN Reagent
- SDS Cell Cleaner
- SDS Saltesmo
- SDS Salt



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V1.0-102023

