DNV·GL

Certificate No:
**TAP00001X3**

# TYPE APPROVAL CERTIFICATE

## This is to certify:

**That the 5 ppm Bilge Water Separator**

with type designation(s)
**ULTRA-SEP US250, ULTRA-SEP US500, US500C, US500G, ULTRA-SEP US1000, US1000C, US1000G, ULTRA-SEP US2000, ULTRA-SEP US3000, ULTRA-SEP US5000, ULTRA-SEP US7500, ULTRA-SEP US10000**

Issued to
## Compass Water Solutions
**Tustin, CA, USA**

is found to comply with
**DNV GL class programme DNVGL-CP-0208 – Type approval – 5 ppm bilge water separators**

## Application :

**Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**

| Type: | Capacity: |
|---|---|
| **ULTRA-SEP US250** | **0.25 m3/h** |
| **ULTRA-SEP US500, US500C, US500G** | **0.5 m3/h** |
| **ULTRA-SEP US1000, US1000C, US1000G** | **1.0 m3/hr** |
| **ULTRA-SEP US2000** | **2.0 m3/hr** |
| **ULTRA-SEP US3000** | **3.0 m3/h** |
| **ULTRA-SEP US5000** | **5.0 m3/h** |
| **ULTRA-SEP US7500** | **7.5 m3/h** |
| **ULTRA-SEP US10000** | **10.0 m3/h** |

Issued at **Høvik** on **2019-07-08**

This Certificate is valid until **2024-07-07**.
DNV GL local station: **Long Beach**

Approval Engineer: **Thomas Grafton**

for **DNV GL**
Digitally Signed By: Sæle-Nilsen, Dag
Location: DNV GL Høvik, Norway

**Dag Sæle-Nilsen**
**Head of Section**

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

## Product description

The 5 ppm Bilge Water Separation System Type 'ULTRA-SEP' is intended for installation onboard ships or other marine units to reduce the oil content in bilge water to less than 5 ppm. The equipment is designed and tested to meet the requirements of DNVGL-CP-0208.

The 'ULTRA-SEP' system uses a duel stage separation process: i) incoming bilge water passes through a 'HELI-SEP' unit consisting of coalescers and a polishing pack, ii) the feed pump then pressurizes the partly treated bilge water for processing through a process filter. Then, the pressure and flow rate are adjusted by the process pump which drives the partly treated water into the 'SPIR-O-LATOR' membrane units at high velocity. The output is processed water with oil content less than 5ppm.

The waste oil from the 'HELI-SEP' unit is held in an oil separation chamber which is discharged occasionally through an oil discharge line. The concentrate with rejected oils and waste from the 'SPIR-O-LATER' units is recirculated back to the inlet of the process filter for reprocessing. A small proportion of this recirculate is continuously bled off to the bilge/bilge water holding tank.

## Application/Limitation

Application:

| ***Model:*** | ***Max. Flowrate ($m^3/h$)*** | ***Supply Pump Capacity (*) ($m^3/h$)*** |
|---|---|---|
| US250 | 0.25 | 0.25 |
| US500, US500C, US500G | 0.50 | 0.50 |
| US1000, US1000C, US1000G | 1.00 | 1.00 |
| US2000 | 2.00 | 2.00 |
| US3000 | 3.00 | 3.00 |
| US5000 | 5.00 | 5.00 |
| US7500 | 7.50 | 7.50 |
| US10000 | 10.00 | 10.00 |

| ***Applicable to all Models*** | |
|---|---|
| Operating Pressure: | 345 – 690 kPa |
| Operating Temperature of Bilge Water: | 1 – 50 °C |
| Power Supply: | 440 – 480 V / 60 Hz, 3-phase<br>380 – 415 V / 50 Hz, 3-phase |
| Inclination Range: | 0 to 22.5 degrees |

(*) The 'ULTRA-SEP' Series are fitted with an integral centrifugal supply pump and associated control valves. The pump capacity is configured by adjustments to the control valves and the correct values are set during the factory acceptance test.

Limitations :

The equipment is not permitted to be installed in spaces subject to explosion hazards.

The 'ULTRA-SEP' Series are fitted with an integrated 5ppm Oil Content Monitor required by DNV GL optional Class Notation **Clean(Design)**. The 5ppm Oil Content Monitor shall be provided with separate DNV GL Type Approval Certificates (to standard DNVGL-CP-0485).

Pumps listed in the Type Examination Documentation may be exchanged for another manufacturer with the same pump speed delivery characteristics curve. The new and old pump speed delivery characteristics curve shall be included with the copy of this certificate delivered with the Separator.

Installation:

The following shall be verified after installation: -

1. An alarm in the 5ppm Oil Content Monitor is always activated whenever clean water is used for cleaning or zeroing purposes.
2. An alarm in the 5ppm Oil Content Monitor is always activated whenever no flow of sample through the oil content monitor is detected by the flow sensor
3. Any alarm in the 5ppm Oil Content Monitor will activate the automatic stopping device preventing overboard discharge and lead to recirculation
4. The overall response time (including the response time of the 5 ppm Bilge Monitor) between an effluent discharge from the 15 ppm Bilge Separator exceeding 5 ppm, and the operation of the Automatic Stopping Device preventing overboard discharge, shall be not more than 20 seconds.
5. Every access of the alarm (beyond check on instrument drift, repeatability of the instrument reading, and the ability to re-zero the instrument) requires breaking of a seal.

A copy of the Operation, installation and maintenance manual shall be available on-board the ship/marine unit at all times.

## Type Approval documentation

Listed drawings/ documents refer to all capacities, except as indicated.

***Model US250:***

| *Dwg. No.:* | *Date:* | *Rev.:* | *Title:* |
|---|---|---|---|
| US200 | 2015-05-15 | G | Installation |
| US201 | 2005-09-12 | E | General assembly |
| US515-TSP | 2012-11-13 | H | Control panel assembly |
| US516-TSP | 2012-11-13 | D | Motor control center |
| US536 | 2007-03-08 | A | Spir-o-lator assembly |
| US540-TSP | 2008-02-14 | H | Schematic |
| US541 | 2005-03-08 | B | Single line diagram |
| US550 | 2015-05-18 | G | Process flow diagram |
| US251 | 2015-05-15 | G | P&id |
| USMN250 | 2015-05 | 1.1 | Installation, operation and maintenance manual |

***Model US500, US500C, US500G:***

| *Dwg. No.:* | *Date:* | *Rev.:* | *Title:* |
|---|---|---|---|
| US500-C | 2015-05-15 | L | Installation |
| US502-C | 2015-05-18 | G | General assembly |
| US515-C | 2013-05-09 | C | Control panel assembly |
| US519-C | 2007-08-02 | - | Cable schedule |
| US536-C | 2010-05-04 | A | Spir-o-lator assembly |
| US540-C | 2013-05-08 | B | Schematic |
| US541-C | 2013-05-06 | A | Single line diagram |
| US550-C | 2015-05-15 | C | Process flow diagram |
| US551-C | 2015-05-15 | K | P&id |
| USMN-SERIES C | 2015-05 | 7 | Installation, operation and maintenance manual |

***Model US1000, US1000C, US1000G:***

| *Dwg. No.:* | *Date:* | *Rev.:* | *Title:* |
|---|---|---|---|
| US1000-C | 2015-05-15 | L | Installation |
| US1002-C | 2015-05-18 | I | General assembly |
| US1015-C | 2013-05-09 | A | Control panel assembly |
| US1019-C | 2007-08-07 | - | Cable schedule |
| US536-C | 2010-05-04 | A | Spir-o-lator assembly |
| US540-C | 2013-05-08 | B | Schematic |
| US541-C | 2013-05-06 | A | Single line diagram |
| US550-C | 2015-05-15 | C | Process flow diagram |
| US1051-C | 2015-05-15 | K | P&id |
| USMN-SERIES C | 2015-05 | 7 | Installation, operation and maintenance manual |

***Model US2000:***

| *Dwg. No.:* | *Date:* | *Rev.:* | *Title:* |
|---|---|---|---|
| US2000 | 2015-05-15 | K | Installation |
| US2001 | 2015-05-15 | L | General layout |
| US2005 | 2006-06-16 | A | Spir-o-lator layout |
| US-UCB2015 | 2017-06-28 | B | Control panel assembly |
| US2016-STD4 | 2014-07-10 | A | Motor control center |
| US2019-STD4 | 2014-12-02 | - | Cable schedule |
| US2036 | 2018-05-07 | D | Spir-o-lator assembly |
| US2040-STD4 | 2013-05-07 | - | Schematic |
| US2041-STD4 | 2013-05-07 | - | Single line diagram |
| US550 | 2015-05-18 | G | Process flow diagram |
| US2051 | 2015-05-15 | J | P&id |
| USMN2000 | 2015-05 | 1.1 | Installation, operation and maintenance manual |

***Model US3000:***

| *Dwg. No.:* | *Date:* | *Rev.:* | *Title:* |
|---|---|---|---|
| US3000 | 2015-05-15 | J | Installation |
| US3001 | 2015-05-15 | J | General layout |
| US3005 | 2005-09-27 | - | Spir-o-lator layout |
| US-UCB2015 | 2017-06-28 | B | Control panel assembly |
| US2016-STD4 | 2014-07-10 | A | Motor control center |
| US2019-STD4 | 2014-12-02 | - | Cable schedule |
| US2036 | 2018-05-07 | D | Spir-o-lator assembly |
| US2040-STD4 | 2013-05-07 | - | Schematic |
| US2041-STD4 | 2013-05-07 | - | Single line diagram |
| US550 | 2015-05-18 | G | Process flow diagram |
| US3051 | 2015-05-15 | J | P&id |
| USMN3000 | 2015-05 | 1.1 | Installation, operation and maintenance manual |

***Model US5000:***

| *Dwg. No.:* | *Date:* | *Rev.:* | *Title:* |
|---|---|---|---|
| US5000 | 2015-05-15 | L | Installation |
| US5001 | 2015-05-15 | H | General layout |
| US5005 | 2006-06-23 | B | Spir-o-lator layout |
| US-UCB2015 | 2017-06-28 | B | Control panel assembly |
| US2016-STD4 | 2014-07-10 | A | Motor control center |
| US2019-STD4 | 2014-12-02 | - | Cable schedule |

| | | | |
|---|---|---|---|
| US5036 | 2018-05-07 | C | Spir-o-lator assembly |
| US2040-STD4 | 2013-05-07 | - | Schematic |
| US2041-STD4 | 2013-05-07 | - | Single line diagram |
| US550 | 2015-05-18 | G | Process flow diagram |
| US5051 | 2015-05-15 | J | P&id |
| USMN5000 | 2015-05 | 1.1 | Installation, operation and maintenance manual |

***Model US7500:***

| *Dwg. No.:* | *Date:* | *Rev.:* | *Title:* |
|---|---|---|---|
| US7500 | 2015-05-15 | H | Installation |
| US7501 | 2015-05-15 | G | General layout |
| US7505 | 2008-09-15 | - | Spir-o-lator layout |
| US-UCB2015 | 2017-06-28 | B | Control panel assembly |
| US2016-STD4 | 2014-07-10 | A | Motor control center |
| US2019-STD4 | 2014-12-02 | - | Cable schedule |
| US2036 | 2006-06-29 | C | Spir-o-lator assembly |
| US5036 | 2018-05-07 | C | Spir-o-lator assembly |
| US2040-STD4 | 2013-05-07 | - | Schematic |
| US2041-STD4 | 2013-05-07 | - | Single line diagram |
| US550 | 2015-05-18 | G | Process flow diagram |
| US7551 | 2015-05-15 | J | P&id |
| USMN7500 | 2015-05 | 1.1 | Installation, operation and maintenance manual |

***Model US10000:***

| *Dwg. No.:* | *Date:* | *Rev.:* | *Title:* |
|---|---|---|---|
| US10000 | 2015-05-15 | J | Installation |
| US10001 | 2015-05-15 | H | General layout |
| US10005 | 2009-09-09 | A | Spir-o-lator layout |
| US-UCB2015 | 2017-06-28 | B | Control panel assembly |
| US2016-STD4 | 2014-07-10 | A | Motor control center |
| US2019-STD4 | 2014-12-02 | - | Cable schedule |
| US5036 | 2018-05-07 | C | Spir-o-lator assembly |
| US2040-STD4 | 2013-05-07 | - | Schematic |
| US2041-STD4 | 2013-05-07 | - | Single line diagram |
| US550 | 2015-05-18 | G | Process flow diagram |
| US10051 | 2015-05-15 | J | P&id |
| USMN10000 | 2015-05 | 1.1 | Installation, operation and maintenance manual |

## Tests carried out

- TEi – Testing Services-Plumbing Laboratory, *Report of Test,* Report No.: *TS-P00322*, dated 2004-05-24.

## Marking of product

The marking shall give the following information: -

- Identification of manufacturer.
- Equipment type designation or model identification.
- Maximum throughput and maximum influent pressure at which the separator is designed to operate.

- Serial number.
- Revision information, as applicable, for all firmware or software modules installed per hardware unit, necessary to identify the equipment.

## Periodical assessment

Retention survey to be performed according to Type approval program DNVGL-CP-0338:

- This certificate is valid for five years and periodical assessments will be required after 2 years (+/- 90 days) and 3.5 years (+/- 90 days).

*This certificate replaces previous Type Approval Certificate No. P-15303.*

# APPENDIX – ULTRA-SEP 500

Test data and results of tests conducted on a 5 ppm Bilge Separator in accordance with DNVGL-CP-0208.

| | |
|---|---|
| 5 ppm Bilge Separator submitted by: | **Coffin World Water Systems, LLC (now Compass Water Solutions)** |
| Tested type: | **ULTRA-SEP 500** |
| Test location: | **TEi-Testing Services – Plumbing Laboratory, 4121 South 500 West, Salt Lake City, UT 84123, USA.** |
| Date: | **20th April 2004** |
| Organisation conducting the test: | **TEi-Testing Services – Plumbing Laboratory, 4121 South 500 West, Salt Lake City, UT 84123, USA.** |
| Test rig according to drawing:<br>Diagram of sampling arrangement: | **Test Rig Flow Diagram, ULTRA-SEP Bilge Separator, United States Coast Guard Certification Per MEPC.107(49). Drawing 559, Rev.D, date 03.11.2003.** |
| Method of sample analysis: | **ISO 9377-2:2000** |
| Samples sealed and labelled by: | **TEi-Testing Services** |
| Samples analysed by: | **TEi-Testing Services** |

Environmental testing of the electrical and electronic sections of the 5 ppm Bilge Separator has been carried out in accordance with Appendix B of DNVGL-CP-0208. The equipment functioned satisfactorily on completion of each test specified on the environmental test protocol.

Environmental test carried out at **TEI-Testing Services**, Test report No: **TS-P00322**, issued at **Salt Lake City** on **24.05.2004**.

Manufacturer's recommendations and information concerning the use of cleansing agents:
**See Installation, Operation and Maintenance Manual: Recommended cleaners are 10% Sodium Hypochlorite, CWS Alkaline Orange Cleaner and Muruatic Acid or CWS Acid Cleaner.**

## Test fluid "A"

| | |
|---|---|
| Density at 15 °C: | **989 kg/m³** |
| Viscosity at 100 °C: | **35.0 Centistokes** |
| Flashpoint: | **60.0 °C** |
| Ash content: | **0.12 Weight %** |
| Water content at start of test: | **0.5 Weight %** |

## Test fluid "B"

| | |
|---|---|
| Density at 15 °C: | **845 kg/m³** |
| Viscosity at 40 °C: | **5.5 Centistokes** |
| Flashpoint: | **62 °C** |
| Ash content: | **<0.01 Weight %** |
| Water content at start of test: | **0.2 Weight %** |

## Test fluid "C"

| | |
|---|---|
| Surfactant: | Sodium salt of dodecylbenzene sulfonic acid in dry form. |
| Iron Oxides: | Black ferroferric oxide (Fe3 O4) with particle size distribution of which 90% is less than 10 microns, the remainder having maximum particle size of 100 microns. |

## Test water

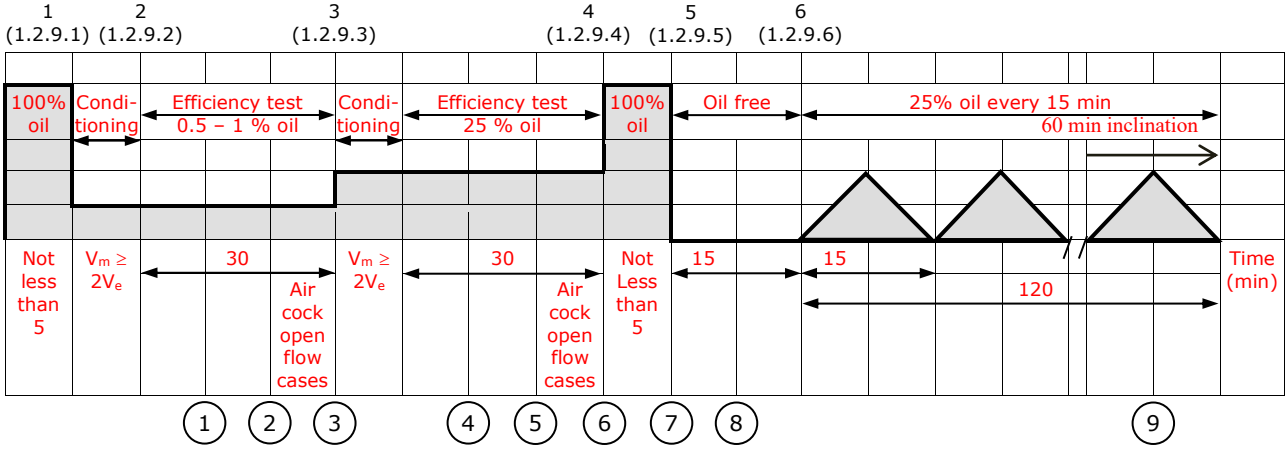
| | |
|---|---|
| Density at 20 °C: | **1012 kg/m³** |
| Solid matter present: | **0.05%** |

## Test temperature

| | |
|---|---|
| Ambient: | **25 – 28 °C** |
| Test fluid "A": | **34 – 35 °C** |
| Test fluid "B": | **28 – 29 °C** |
| Test fluid "C": | **22 – 23 °C** |
| Test water: | **18 – 20 °C** |

# TEST RESULTS AND TEST PROCEDURES

## TEST FLUID "A"

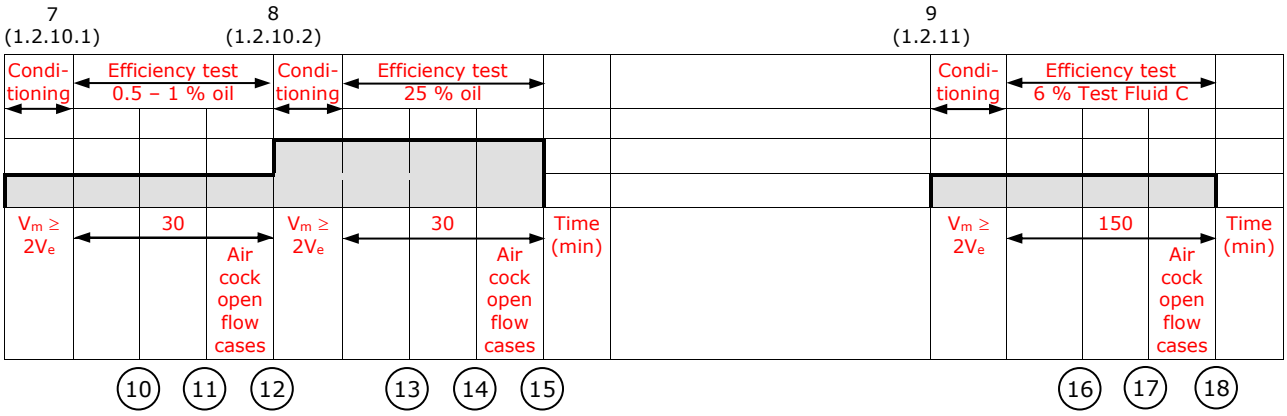



Test sample 9 (taken at the end of auto test, paragraph 2.9 item (6) in Appendix A of DNVGL-CP-0208)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Influent (%) | **1.0** | **1.0** | **-** | **25** | **25** | **-** | **0** | **0** | **25** |
| Effluent (ppm) | **5.0** | **4.5** | **4.0** | **3.5** | **3.5** | **3.0** | **4.5** | **1.5** | **1.5** |

## TEST FLUID "B"

## TEST FLUID "C"




| | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|
| Influent (%) | **1.0** | **1.0** | **-** | **25** | **25** | **-** | **6.0** | **6.0** | **-** |
| Effluent (ppm) | **2.5** | **2.0** | **2.0** | **1.5** | **1.5** | **2.5** | **1.5** | **1.5** | **1.5** |

$V_e$ - volume of oily water separator (OWS)
$V_m$ - oil/water mixture passed through OWS

# APPENDIX – ULTRA-SEP 7500

Test data and results of tests conducted on a 5 ppm Bilge Separator in accordance with DNVGL-CP-0208.

| | |
|---|---|
| 5 ppm Bilge Separator submitted by: | **Coffin World Water Systems, LLC (now Compass Water Solutions)** |
| Tested type: | **ULTRA-SEP 7500** |
| Test location: | **TEi-Testing Services – Plumbing Laboratory, 4121 South 500 West, Salt Lake City, UT 84123, USA.** |
| Date: | **13th May 2004** |
| Organisation conducting the test: | **TEi-Testing Services – Plumbing Laboratory, 4121 South 500 West, Salt Lake City, UT 84123, USA.** |
| Test rig according to drawing:<br>Diagram of sampling arrangement: | **Test Rig Flow Diagram, ULTRA-SEP Bilge Separator, United States Coast Guard Certification Per MEPC.107(49). Drawing 559, Rev.D, date 03.11.2003.** |
| Method of sample analysis: | **ISO 9377-2:2000** |
| Samples sealed and labelled by: | **TEi-Testing Services** |
| Samples analysed by: | **TEi-Testing Services** |

Environmental testing of the electrical and electronic sections of the 5 ppm Bilge Separator has been carried out in accordance with Appendix B of DNVGL-CP-0208. The equipment functioned satisfactorily on completion of each test specified on the environmental test protocol.

Environmental test carried out at **TEI-Testing Services**, Test report No: **TS-P00322**, issued at **Salt Lake City** on **24.05.2004**.

Manufacturer's recommendations and information concerning the use of cleansing agents:
**See Installation, Operation and Maintenance Manual: Recommended cleaners are 10% Sodium Hypochlorite, CWS Alkaline Orange Cleaner and Muruatic Acid or CWS Acid Cleaner.**

## Test fluid "A"

| | |
|---|---|
| Density at 15 °C: | **989 kg/m³** |
| Viscosity at 100 °C: | **35.0 Centistokes** |
| Flashpoint: | **60.0 °C** |
| Ash content: | **0.12 Weight %** |
| Water content at start of test: | **0.5 Weight %** |

## Test fluid "B"

| | |
|---|---|
| Density at 15 °C: | **845 kg/m³** |
| Viscosity at 40 °C: | **5.5 Centistokes** |
| Flashpoint: | **62 °C** |
| Ash content: | **<0.01 Weight %** |
| Water content at start of test: | **0.2 Weight %** |

## Test fluid "C"

| | |
|---|---|
| Surfactant: | Sodium salt of dodecylbenzene sulfonic acid in dry form. |
| Iron Oxides: | Black ferroferric oxide (Fe3 O4) with particle size distribution of which 90% is less than 10 microns, the remainder having maximum particle size of 100 microns. |

## Test water

| | |
|---|---|
| Density at 20 °C: | **1012 kg/m³** |
| Solid matter present: | **0.05%** |

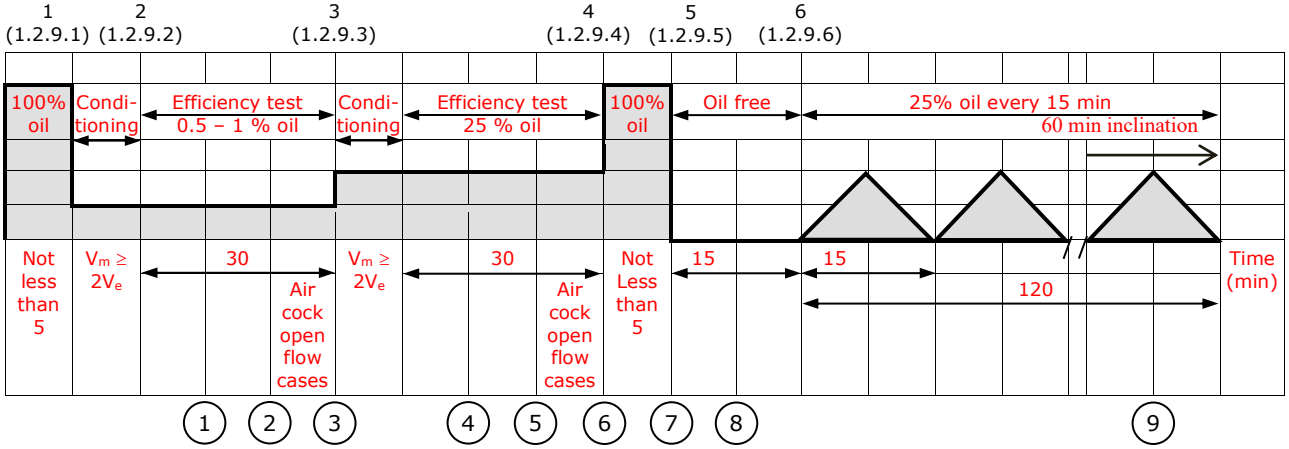
## Test temperature

| | |
|---|---|
| Ambient: | **25 – 28 °C** |
| Test fluid "A": | **34 – 35 °C** |
| Test fluid "B": | **28 – 29 °C** |
| Test fluid "C": | **22 – 23 °C** |
| Test water: | **18 – 20 °C** |

Job Id: **262.1-019148-3**
Certificate No: **TAP00001X3**

# TEST RESULTS AND TEST PROCEDURES

## TEST FLUID "A"

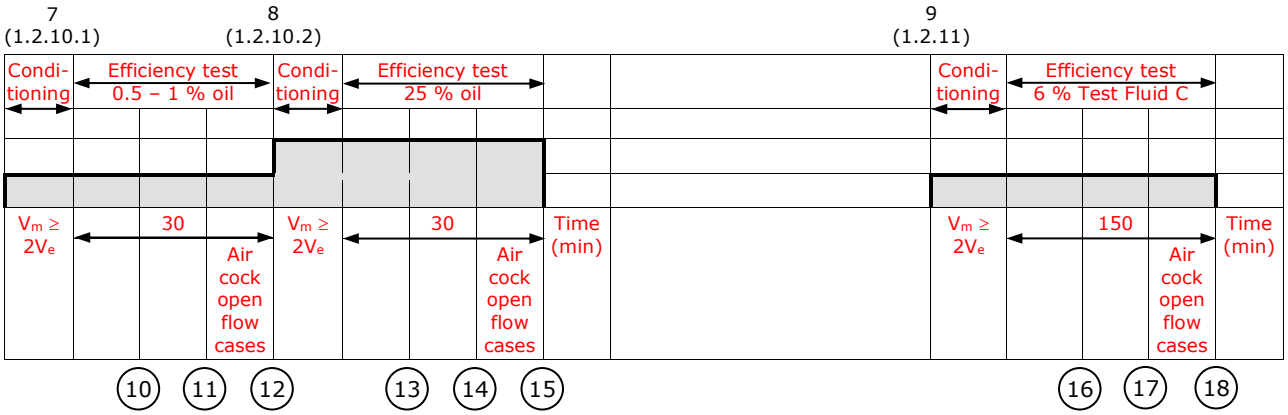



Test sample 9 (taken at the end of auto test, paragraph 2.9 item (6) in Appendix A of DNVGL-CP-0208)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Influent (%) | **1.0** | **1.0** | **-** | **25** | **25** | **-** | **0** | **0** | **25** |
| Effluent (ppm) | **4.5** | **4.5** | **4.5** | **4.0** | **4.0** | **4.5** | **3.5** | **2.5** | **3.5** |

## TEST FLUID "B"

## TEST FLUID "C"




| | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|
| Influent (%) | **1.0** | **1.0** | **-** | **25** | **25** | **-** | **6.0** | **6.0** | **-** |
| Effluent (ppm) | **3.5** | **3.0** | **2.5** | **3.5** | **3.0** | **2.5** | **2.5** | **1.5** | **2.0** |

$V_e$ - volume of oily water separator (OWS)
$V_m$ - oil/water mixture passed through OWS