Test results:

Capacity test - 60896 – 11 clause 14

C₁₀

Type: 6 OPzS 300

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<thead>
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<th>07.02.2017</th>
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<tbody>
<tr>
<td>Batt.</td>
<td>1</td>
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</tr>
<tr>
<td>Temperature</td>
<td>T [°C]</td>
<td>23.1</td>
</tr>
<tr>
<td>Discharge current</td>
<td>I [A]</td>
<td>32.0</td>
</tr>
<tr>
<td>Cut off voltage</td>
<td>U [V/cell]</td>
<td>1.80</td>
</tr>
<tr>
<td>Nominal capacity (20°C)</td>
<td>Cₙₚₚₚₚ [Ah]</td>
<td>320.0</td>
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<td>Measured capacity (20.0°C)</td>
<td>C [Ah]</td>
<td>348.2</td>
</tr>
<tr>
<td>Cₙₚₚₚₚₚ / Cₙₚₚₚₚ [Ah]</td>
<td>(%)</td>
<td>108.8</td>
</tr>
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</table>

Test was reviewed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)

C₅

Type: 6 OPzS 300

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<tr>
<td>Temperature</td>
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<td>22.8</td>
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<tr>
<td>Discharge current</td>
<td>I [A]</td>
<td>56.3</td>
</tr>
<tr>
<td>Cut off voltage</td>
<td>U [V/cell]</td>
<td>1.70</td>
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<tr>
<td>Nominal capacity (20°C)</td>
<td>Cₙₚₚₚₚ [Ah]</td>
<td>281.5</td>
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<tr>
<td>Measured capacity (20.0°C)</td>
<td>C [Ah]</td>
<td>322.8</td>
</tr>
<tr>
<td>Cₙₚₚₚₚ / Cₙₚₚₚ [Ah]</td>
<td>(%)</td>
<td>114.7</td>
</tr>
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Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
Test Report  Physical Test Laboratory

C₃

Type: 6 OPzS 300

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<tr>
<td>Discharge current</td>
<td>I [A] 82.7</td>
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<tr>
<td>Cut off voltage</td>
<td>U [V/cell] 1.70</td>
</tr>
<tr>
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<td>C [Ah] 280.7</td>
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<td>Cₙenn 20°C / Cₙenn</td>
<td>[%] 113.1</td>
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</table>

Test was reviewed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)

C₁

Type: 6 OPzS 300

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<tr>
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<td>U [V/cell] 1.60</td>
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<tr>
<td>Nominal capacity (20°C)</td>
<td>Cₙenn [Ah] 179.0</td>
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<tr>
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<td>C [Ah] 217.1</td>
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<tr>
<td>Cₙenn 20°C / Cₙenn</td>
<td>[%] 121.3</td>
</tr>
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</table>

Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
## Test Report  Physical Test Laboratory

### C₁₀

**Type:** 7 OPzS 490

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<td>Discharge current</td>
<td>I [A]</td>
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<td>54.6</td>
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<td>Cut off voltage</td>
<td>U [V/cell]</td>
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<tr>
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<td>Cₜₜₜₜ [Ah]</td>
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<td>C [Ah]</td>
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<tr>
<td>C₄₂₀.⁰°C / C₉₉₉₉₉₉₉₉ [ % ]</td>
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</table>

Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)

### C₅

**Type:** 7 OPzS 490

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<td>Discharge current</td>
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Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
C₃

Type: 7 OPzS 490

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<td>Cut off voltage</td>
<td>U [V/cell]</td>
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<tr>
<td>Nominal capacity (20°C)</td>
<td>C_{Nem} [Ah]</td>
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<td>C [Ah]</td>
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<tr>
<td>C_{20.0°C} / C_{Nom} (%)</td>
<td>103.3</td>
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Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)

C₁

Type: 7 OPzS 490

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<tr>
<td>Temperature</td>
<td>T [°C]</td>
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<tr>
<td>Discharge current</td>
<td>I [A]</td>
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<tr>
<td>Cut off voltage</td>
<td>U [V/cell]</td>
</tr>
<tr>
<td>Nominal capacity (20°C)</td>
<td>C_{Nem} [Ah]</td>
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<td>C [Ah]</td>
</tr>
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<td>C_{20.0°C} / C_{Nom} (%)</td>
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Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
C₁₀
Type: 6 OPzS 600

<table>
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<tr>
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<td>I [A]</td>
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<td>Cut off voltage</td>
<td>U [V/cell]</td>
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<td>Nominal capacity (20°C)</td>
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Test was reviewed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)

C₅
Type: 6 OPzS 600

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<td>Batt.</td>
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<tr>
<td>Temperature</td>
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<td>I [A]</td>
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<td>U [V/cell]</td>
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<td>C₇₇₇₇₇₇₇₇ [Ah]</td>
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<td>C [Ah]</td>
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<td>Cₑ₂₀.₀°C / C₇₇₇₇₇₇₇₇</td>
<td>[%]</td>
<td>108.3</td>
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Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
**C₃**

**Type:** 6 OPzS 600

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<td>Batt.</td>
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</tr>
<tr>
<td>Temperature</td>
<td>T [°C]</td>
</tr>
<tr>
<td>Discharge current</td>
<td>I [A]</td>
</tr>
<tr>
<td>Cut off voltage</td>
<td>U [V/cell]</td>
</tr>
<tr>
<td>Nominal capacity (20°C)</td>
<td>Cₙₚₐₜ [Ah]</td>
</tr>
<tr>
<td>Measured capacity (20.0°C)</td>
<td>C [Ah]</td>
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<tr>
<td>Cₚ₂₀.₀°C/Cₙₚₐₜ [%]</td>
<td>109.9</td>
</tr>
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Signed document Page 31

Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)

**C₁**

**Type:** 6 OPzS 600

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<td>Batt.</td>
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<tr>
<td>Temperature</td>
<td>T [°C]</td>
</tr>
<tr>
<td>Discharge current</td>
<td>I [A]</td>
</tr>
<tr>
<td>Cut off voltage</td>
<td>U [V/cell]</td>
</tr>
<tr>
<td>Nominal capacity (20°C)</td>
<td>Cₙₚₐₜ [Ah]</td>
</tr>
<tr>
<td>Measured capacity (20.0°C)</td>
<td>C [Ah]</td>
</tr>
<tr>
<td>Cₚ₂₀.₀°C/Cₙₚₐₜ [%]</td>
<td>120.6</td>
</tr>
</tbody>
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Signed document Page 32

Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
Test Report  Physical Test Laboratory

VS145_grid
Version: 6
Prepared by: Patrick Schluer
Date: 28.03.2019
Released by: Wilhelm Giller
Page 33 / 63

C₁₀

Type: 12 OPzS 1500

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<tr>
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<tr>
<td>Discharge current</td>
<td>I [A]</td>
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<tr>
<td>Cut off voltage</td>
<td>U [V/cell]</td>
</tr>
<tr>
<td>Nominal capacity (20°C)</td>
<td>C&lt;sub&gt;Wenn&lt;/sub&gt; [Ah]</td>
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<tr>
<td>Measured capacity (20.0°C)</td>
<td>C [Ah]</td>
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<tr>
<td>C₀₂₀.⁰°C / C&lt;sub&gt;Nom&lt;/sub&gt;</td>
<td>[%]</td>
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Test was reviewed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)

C₅

Type: 12 OPzS 1500

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<tr>
<td>Temperature</td>
<td>T [°C]</td>
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<tr>
<td>Discharge current</td>
<td>I [A]</td>
</tr>
<tr>
<td>Cut off voltage</td>
<td>U [V/cell]</td>
</tr>
<tr>
<td>Nominal capacity (20°C)</td>
<td>C&lt;sub&gt;Wenn&lt;/sub&gt; [Ah]</td>
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<tr>
<td>Measured capacity (20.0°C)</td>
<td>C [Ah]</td>
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<tr>
<td>C₀₂₀.⁰°C / C&lt;sub&gt;Nom&lt;/sub&gt;</td>
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Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
Test Report  Physical Test Laboratory

C₃
Type: 12 OPzS 1500

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<td>Cut off voltage</td>
<td>U [V/cell]</td>
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<td>Cₙₐ₂₀.₀°C / Cₙ₉ₙ₉ [%]</td>
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<td>116.3</td>
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</table>

Test was reviewed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)

C₁
Type: 12 OPzS 1500

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<td>Temperature</td>
<td>T [°C]</td>
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<tr>
<td></td>
<td>22.8</td>
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<tr>
<td>Discharge current</td>
<td>I [A]</td>
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<tr>
<td></td>
<td>829.5</td>
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<tr>
<td>Cut off voltage</td>
<td>U [V/cell]</td>
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<tr>
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<td>137.1</td>
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Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
Test Report  Physical Test Laboratory

www.hoppecke.com
Test of suitability for floating battery operation – 60896 – 11 clause 15

Capacity Test - C₁₀ before float voltage

<table>
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<th>22.02.2017</th>
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<tbody>
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<tr>
<td>Temperature T [°C]</td>
<td>22.3</td>
</tr>
<tr>
<td>Discharge current I [A]</td>
<td>54.6</td>
</tr>
<tr>
<td>Cut off voltage U [V/cell]</td>
<td>1.80</td>
</tr>
<tr>
<td>Nominal capacity (20°C) Cₐ₅₅ [Ah]</td>
<td>546.0</td>
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<tr>
<td>Measured capacity (20.0°C) C [Ah]</td>
<td>581.6</td>
</tr>
<tr>
<td>Cₐ20.0°C / Cₐ₅₅ [%]</td>
<td>106.5</td>
</tr>
<tr>
<td>Cₐ25_20.0°C / Cₐ₅₅ [%]</td>
<td>106.1</td>
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<tr>
<td>Cₐ26_20.0°C / Cₐ₅₅ [%]</td>
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</tr>
<tr>
<td>Cₐ27_20.0°C / Cₐ₅₅ [%]</td>
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<td>Cₐ28_20.0°C / Cₐ₅₅ [%]</td>
<td>108.9</td>
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<td>Cₐ29_20.0°C / Cₐ₅₅ [%]</td>
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<td>Cₐ₃₀_20.0°C / Cₐ₅₅ [%]</td>
<td>106.9</td>
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Test was reviewed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
### Test Report  
Physical Test Laboratory

<table>
<thead>
<tr>
<th>Date of measurement</th>
<th>Cell-number</th>
<th>Temperature °C</th>
<th>Cell-voltage in V</th>
<th>Voltage-variation 2.23V</th>
<th>Electrolyte-density in g/cm³ (corr. to 20°C)</th>
<th>Density-variation 1.24g/cm³</th>
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<tbody>
<tr>
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<td>25</td>
<td>20.3</td>
<td>2.224</td>
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<td>1.244</td>
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<td>26</td>
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<td>2.227</td>
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<td>1.244</td>
<td>+0.004</td>
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Test was started with Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
at 07.03.2017

**Evaluation criterion:**
(for 3 and 6 months)

- $\Delta U_{\text{Cell}}$ is within the range of -0.050 to +0.100 V
- $\Delta \text{density}$ is within the range of -0.010 to +0.010 g/cm³

**Variation after 3 months:**

- $\Delta U_{\text{Cell}} = -0.006$ to $+0.001$ V
- $\Delta \text{density} = 0.004$ to $+0.007$ g/cm³

**Variation after 6 months:**

- $\Delta U_{\text{Cell}} = -0.04$ to $+0.003$ V
- $\Delta \text{density} = +0.005$ to $+0.008$ g/cm³

**The data meet the required criteria!**
Water consumption in mm:

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Capacity Test - $C_{10}$ after float voltage

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Test was reviewed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
## Endurance in discharge-charge cycles – 60896 - 11 clause 16

### Capacity Test - C₁₀ before discharge-charge cycles

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Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)

Test passed > 100 cycles

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Document Page 46

Test was started with Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime) at 07.03.2017

www.hoppecke.com
Test Report  Physical Test Laboratory

Endurance in overcharge – 60896 – 11 clause 17

Capacity Test - C₁ before Endurance in overcharge

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Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)

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<td>13</td>
<td>12.06.2018</td>
<td>1.155</td>
<td>355.7</td>
<td>25.2</td>
<td>338.2</td>
<td>109.8</td>
<td>1.596</td>
<td>1.530</td>
<td>1.595</td>
<td>1.626</td>
<td>1.609</td>
<td>1.661</td>
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</tr>
<tr>
<td>14</td>
<td>17.07.2018</td>
<td>1.072</td>
<td>330.2</td>
<td>25.0</td>
<td>314.5</td>
<td>102.1</td>
<td>1.619</td>
<td>1.432</td>
<td>1.635</td>
<td>1.639</td>
<td>1.604</td>
<td>1.689</td>
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<tr>
<td>15</td>
<td>20.08.2018</td>
<td>0.995</td>
<td>306.5</td>
<td>25.4</td>
<td>290.8</td>
<td>94.4</td>
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<td>1.386</td>
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<td>16</td>
<td>25.09.2018</td>
<td>0.846</td>
<td>260.7</td>
<td>24.2</td>
<td>250.2</td>
<td>81.2</td>
<td>1.628</td>
<td>1.474</td>
<td>1.704</td>
<td>1.518</td>
<td>1.537</td>
<td>1.727</td>
<td></td>
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<tr>
<td>17</td>
<td>30.10.2018</td>
<td>0.778</td>
<td>239.7</td>
<td>25.0</td>
<td>228.3</td>
<td>74.1</td>
<td>1.607</td>
<td>1.421</td>
<td>1.699</td>
<td>1.599</td>
<td>1.565</td>
<td>1.730</td>
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<tr>
<td>18</td>
<td>04.12.2018</td>
<td>0.695</td>
<td>214.1</td>
<td>24.7</td>
<td>204.5</td>
<td>66.4</td>
<td>1.604</td>
<td>1.476</td>
<td>1.709</td>
<td>1.600</td>
<td>1.564</td>
<td>1.724</td>
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</tr>
</tbody>
</table>

Test was started with Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
at 07.03.2017

www.hoppecke.com
Charge retention test – 60896 - 11 clause 18

Capacity Test - C<sub>10</sub> before Charge retention test

<table>
<thead>
<tr>
<th>Date</th>
<th>07.03.2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batt.</td>
<td>5</td>
</tr>
<tr>
<td>Temperature</td>
<td>21.1 °C</td>
</tr>
<tr>
<td>Discharge current</td>
<td>54.6 A</td>
</tr>
<tr>
<td>Cut off voltage</td>
<td>1.80 V/cell</td>
</tr>
<tr>
<td>Nominal capacity (20°C)</td>
<td>546.0 Ah</td>
</tr>
<tr>
<td>Measured capacity (20.0°C)</td>
<td>588.5 Ah</td>
</tr>
<tr>
<td>C&lt;sub&gt;20.0°C&lt;/sub&gt; / C&lt;sub&gt;Nom&lt;/sub&gt;</td>
<td>107.8 %</td>
</tr>
<tr>
<td>C&lt;sub&gt;19, 20.0°C&lt;/sub&gt; / C&lt;sub&gt;Nom&lt;/sub&gt;</td>
<td>107.9 %</td>
</tr>
<tr>
<td>C&lt;sub&gt;20.0°C&lt;/sub&gt; / C&lt;sub&gt;Nom&lt;/sub&gt;</td>
<td>107.3 %</td>
</tr>
<tr>
<td>C&lt;sub&gt;21, 20.0°C&lt;/sub&gt; / C&lt;sub&gt;Nom&lt;/sub&gt;</td>
<td>108.3 %</td>
</tr>
<tr>
<td>C&lt;sub&gt;22, 20.0°C&lt;/sub&gt; / C&lt;sub&gt;Nom&lt;/sub&gt;</td>
<td>108.9 %</td>
</tr>
<tr>
<td>C&lt;sub&gt;23, 20.0°C&lt;/sub&gt; / C&lt;sub&gt;Nom&lt;/sub&gt;</td>
<td>109.1 %</td>
</tr>
<tr>
<td>C&lt;sub&gt;24, 20.0°C&lt;/sub&gt; / C&lt;sub&gt;Nom&lt;/sub&gt;</td>
<td>108.6 %</td>
</tr>
</tbody>
</table>

Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)

Capacity Test - C<sub>10</sub> after Charge retention test

<table>
<thead>
<tr>
<th>Date</th>
<th>08.06.2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batt.</td>
<td>5</td>
</tr>
<tr>
<td>Temperature</td>
<td>20.7 °C</td>
</tr>
<tr>
<td>Discharge current</td>
<td>54.6 A</td>
</tr>
<tr>
<td>Cut off voltage</td>
<td>1.80 V/cell</td>
</tr>
<tr>
<td>Nominal capacity (20°C)</td>
<td>546.0 Ah</td>
</tr>
<tr>
<td>Measured capacity (20.0°C)</td>
<td>569.9 Ah</td>
</tr>
<tr>
<td>C&lt;sub&gt;20.0°C&lt;/sub&gt; / C&lt;sub&gt;Nom&lt;/sub&gt;</td>
<td>104.4 %</td>
</tr>
<tr>
<td>C&lt;sub&gt;19, 20.0°C&lt;/sub&gt; / C&lt;sub&gt;Nom&lt;/sub&gt;</td>
<td>104.0 %</td>
</tr>
<tr>
<td>C&lt;sub&gt;20, 20.0°C&lt;/sub&gt; / C&lt;sub&gt;Nom&lt;/sub&gt;</td>
<td>104.9 %</td>
</tr>
<tr>
<td>C&lt;sub&gt;21, 20.0°C&lt;/sub&gt; / C&lt;sub&gt;Nom&lt;/sub&gt;</td>
<td>104.8 %</td>
</tr>
<tr>
<td>C&lt;sub&gt;22, 20.0°C&lt;/sub&gt; / C&lt;sub&gt;Nom&lt;/sub&gt;</td>
<td>104.1 %</td>
</tr>
<tr>
<td>C&lt;sub&gt;23, 20.0°C&lt;/sub&gt; / C&lt;sub&gt;Nom&lt;/sub&gt;</td>
<td>104.3 %</td>
</tr>
<tr>
<td>C&lt;sub&gt;24, 20.0°C&lt;/sub&gt; / C&lt;sub&gt;Nom&lt;/sub&gt;</td>
<td>105.5 %</td>
</tr>
</tbody>
</table>

Test was reviewed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
Capacity loss: \[ C_s = \frac{C_{a^1}}{C_a} \times 100\% \]

- with \( C_a \): 10 hour Initial capacity
- with \( C_{a^1} \): 10 hour capacity after 90 days self discharge

<table>
<thead>
<tr>
<th></th>
<th>U19</th>
<th>U20</th>
<th>U21</th>
<th>U22</th>
<th>U23</th>
<th>U24</th>
</tr>
</thead>
<tbody>
<tr>
<td>( C_a ) [%]</td>
<td>107.9</td>
<td>107.3</td>
<td>108.3</td>
<td>108.9</td>
<td>109.1</td>
<td>108.6</td>
</tr>
<tr>
<td>( C_{a^1} ) [%]</td>
<td>104.0</td>
<td>104.9</td>
<td>104.8</td>
<td>104.1</td>
<td>104.3</td>
<td>105.5</td>
</tr>
<tr>
<td>( C_R ) [%]</td>
<td>96.4</td>
<td>97.8</td>
<td>96.8</td>
<td>95.5</td>
<td>95.6</td>
<td>97.1</td>
</tr>
</tbody>
</table>

Thus results in an average capacity decrease of 1.2% per month.
Short circuit and D.C. internal resistance – 60896 – 11 clause 19

Type: 6 OPzS 300

<table>
<thead>
<tr>
<th>Short circuit current [Isc] and internal resistance test [Ri]</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>15.02.2017</td>
</tr>
<tr>
<td>Batt.</td>
<td>2</td>
</tr>
<tr>
<td>Temperature [°C]</td>
<td>22.3</td>
</tr>
<tr>
<td>Discharge current [A]</td>
<td>I1 = 4x I10 (128A)</td>
</tr>
<tr>
<td></td>
<td>t1 = 20 s</td>
</tr>
<tr>
<td></td>
<td>5 min pause</td>
</tr>
<tr>
<td></td>
<td>I2 = 20x I10 (640A)</td>
</tr>
<tr>
<td></td>
<td>t2 = 5 s</td>
</tr>
<tr>
<td>Ri [mOhm]</td>
<td>0.569</td>
</tr>
<tr>
<td>ISC [A]</td>
<td>3480</td>
</tr>
</tbody>
</table>

Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
## Test Report  Physical Test Laboratory

**Type:** 7 OPzS 490

<table>
<thead>
<tr>
<th>Short circuit current [I_{sc}] and internal resistance test [R_i]</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>15.02.2017</td>
</tr>
<tr>
<td>Batt.</td>
<td>4</td>
</tr>
<tr>
<td>Temperature [°C]</td>
<td>22.2</td>
</tr>
</tbody>
</table>
| Discharge current [A] | $l_1 = 4 \times l_{10} (218.4 \, \text{A})$  
$t_1 = 20 \, \text{s}$  
5 min pause  
$l_2 = 20 \times l_{10} (1092 \, \text{A})$  
$t_2 = 5 \, \text{s}$ |
| $R_i$ [mOhm] | 0.437 |
| ISC [A] | 4504 |

Signed document  
Page 59

Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
**Type:** 6 OPzS 600

<table>
<thead>
<tr>
<th>Short circuit current [I_{sc}] and internal resistance test [R_i]</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>15.02.2017</td>
</tr>
<tr>
<td>Batt.</td>
<td>11</td>
</tr>
<tr>
<td>Temperature [°C]</td>
<td>22.4</td>
</tr>
</tbody>
</table>
| Discharge current [A] | I_1 = 4x I_{10} (274.2 A)  
  t_1 = 20 s  
  5 min pause  
  I_2 = 20x I_{10} (1372 A)  
  t_2 = 5 s |
| R_{i} [mOhm] | 0.440 |
| ISC [A] | 4495 |

Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
Type: 12 OPzS 1500

<table>
<thead>
<tr>
<th>Short circuit current [Isc] and internal resistance test [Ri]</th>
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</thead>
<tbody>
<tr>
<td>Date</td>
<td>07.04.2017</td>
</tr>
<tr>
<td>Batt.</td>
<td>13</td>
</tr>
<tr>
<td>Temperature [°C]</td>
<td>19.6</td>
</tr>
<tr>
<td>Discharge current [A]</td>
<td></td>
</tr>
<tr>
<td>I1 = 4x I10 (644 A)</td>
<td></td>
</tr>
<tr>
<td>t1 = 20 s</td>
<td></td>
</tr>
<tr>
<td>5 min pause</td>
<td></td>
</tr>
<tr>
<td>I2 = 20x I10 (3220 A)</td>
<td></td>
</tr>
<tr>
<td>t2 = 5 s</td>
<td></td>
</tr>
<tr>
<td>Ri [mOhm]</td>
<td>0.218</td>
</tr>
<tr>
<td>ISC [A]</td>
<td>9072</td>
</tr>
</tbody>
</table>

Test was witnessed by Mr. C. Hoppe (Surveyor, Essen Operation, DNV GL Maritime)
V9145 - "Short circuit and D.C. internal resistance"
12 OPzS 1500

Test:
Type test according
IEC 60204-1
Issue 10

Short circuit and D.C.
Internal resistance

Table:
<table>
<thead>
<tr>
<th>Current (A)</th>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>1.5</td>
</tr>
<tr>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>1.5</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Result:

<table>
<thead>
<tr>
<th>Discharge time [min]</th>
<th>0.5</th>
<th>1.0</th>
<th>1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>U61 [V]</td>
<td>1.53</td>
<td>2.04</td>
<td>2.54</td>
</tr>
<tr>
<td>U62 [V]</td>
<td>2.04</td>
<td>2.54</td>
<td>3.04</td>
</tr>
<tr>
<td>U83 [V]</td>
<td>2.54</td>
<td>3.04</td>
<td>3.54</td>
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<tr>
<td>Rj [Ω]</td>
<td>0.223</td>
<td>0.215</td>
<td>0.210</td>
</tr>
</tbody>
</table>

Discharge energy [kJ]:

0.5 min: 1.5 [kJ]
1.0 min: 2.0 [kJ]
1.5 min: 2.5 [kJ]