Technical Specification for Valve Regulated Lead-Acid Batteries (VRLA-GEL)

1. Application

BAE Secura PVV BLOCK solar batteries don’t need to be refilled with water during the whole service life. Therefore, this battery type is maintenance-free. This eliminates checking of electrolyte level.

The batteries are used to store electrical energy in smaller solar photovoltaic installations.

Due to the robust tubular plate design BAE PVV batteries are excellent suited for highest requirements regarding cycling ability and long lifetime.

2. Technical data (Reference temperature 20 °C)

<table>
<thead>
<tr>
<th>Voltage (V/cell)</th>
<th>Type 1</th>
<th>C1, Ah</th>
<th>C10, Ah</th>
<th>C20, Ah</th>
<th>C72, Ah</th>
<th>C100, Ah</th>
<th>C120, Ah</th>
<th>C240, Ah</th>
<th>R1, mΩ</th>
<th>I1, kA</th>
<th>I2, kA</th>
<th>Length (L), mm</th>
<th>Width (W), mm</th>
<th>Height (H), mm</th>
<th>Weight, kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 V 1 PVV</td>
<td>70</td>
<td>35</td>
<td>60</td>
<td>67</td>
<td>76</td>
<td>78</td>
<td>79</td>
<td>82</td>
<td>17.47</td>
<td>0.73</td>
<td>272</td>
<td>205</td>
<td>385</td>
<td>43.0</td>
<td></td>
</tr>
<tr>
<td>12 V 2 PVV</td>
<td>140</td>
<td>68</td>
<td>110</td>
<td>120</td>
<td>133</td>
<td>137</td>
<td>138</td>
<td>142</td>
<td>9.55</td>
<td>1.34</td>
<td>272</td>
<td>205</td>
<td>385</td>
<td>52.0</td>
<td></td>
</tr>
<tr>
<td>12 V 3 PVV</td>
<td>210</td>
<td>103</td>
<td>167</td>
<td>182</td>
<td>203</td>
<td>208</td>
<td>210</td>
<td>216</td>
<td>6.74</td>
<td>1.91</td>
<td>380</td>
<td>205</td>
<td>385</td>
<td>74.2</td>
<td></td>
</tr>
<tr>
<td>6 V 4 PVV</td>
<td>280</td>
<td>137</td>
<td>224</td>
<td>244</td>
<td>273</td>
<td>279</td>
<td>282</td>
<td>290</td>
<td>2.66</td>
<td>2.42</td>
<td>272</td>
<td>205</td>
<td>385</td>
<td>51.0</td>
<td></td>
</tr>
<tr>
<td>6 V 5 PVV</td>
<td>350</td>
<td>172</td>
<td>281</td>
<td>306</td>
<td>343</td>
<td>350</td>
<td>354</td>
<td>364</td>
<td>2.24</td>
<td>2.87</td>
<td>380</td>
<td>205</td>
<td>385</td>
<td>65.0</td>
<td></td>
</tr>
<tr>
<td>6 V 6 PVV</td>
<td>420</td>
<td>207</td>
<td>337</td>
<td>368</td>
<td>412</td>
<td>421</td>
<td>424</td>
<td>439</td>
<td>1.94</td>
<td>3.31</td>
<td>380</td>
<td>205</td>
<td>385</td>
<td>73.8</td>
<td></td>
</tr>
<tr>
<td>2 V 12 PVV</td>
<td>840</td>
<td>413</td>
<td>674</td>
<td>734</td>
<td>820</td>
<td>838</td>
<td>846</td>
<td>873</td>
<td>0.29</td>
<td>7.33</td>
<td>272</td>
<td>205</td>
<td>385</td>
<td>51.0</td>
<td></td>
</tr>
<tr>
<td>2 V 15 PVV</td>
<td>1050</td>
<td>517</td>
<td>844</td>
<td>920</td>
<td>1,029</td>
<td>1,050</td>
<td>1,062</td>
<td>1,094</td>
<td>0.24</td>
<td>8.81</td>
<td>380</td>
<td>205</td>
<td>385</td>
<td>65.0</td>
<td></td>
</tr>
<tr>
<td>2 V 18 PVV</td>
<td>1260</td>
<td>622</td>
<td>1,010</td>
<td>1,108</td>
<td>1,238</td>
<td>1,260</td>
<td>1,272</td>
<td>1,317</td>
<td>0.21</td>
<td>10.18</td>
<td>380</td>
<td>205</td>
<td>385</td>
<td>73.8</td>
<td></td>
</tr>
</tbody>
</table>

1. 2) Internal resistance R1 and short circuit current I2 according to IEC 60896-21

Height (H) is the maximum height between container bottom and top of the bolts in assembled condition.

All values given in the table correspond to 100 % DOD without voltage drop of connectors. Please consider item 7.

3. Terminal positions

Terminals are designed as female poles with brass inlay M10 for flexible insulated copper cables with cross-section 25, 35, 50, 70, 95 or 120 mm² or insulated solid copper connectors with cross-section 90, 150 or 300 mm².
4. Design
Positive electrode: tubular-plate with woven polyester gauntlet and solid grids in a corrosion-resistant PbCaSn-alloy
Negative electrode: grid-plate in PbCaSn-alloy with long-life expander material
Separation: microporous separator
Electrolyte: sulphuric acid with a density of 1.24 kg/l (20 °C), fixed as GEL by fumed silica
Container and lid: high impact SAN (Styrol-Acrylic-Nitrile), grey coloured (colour may vary slightly from given image), UL-94 rating: HB, on request also in UL-94 rating: V-0
Valve: one valve per cell with flame arrester, opening pressure approx. 120 mbar
Pole-bushing: 100 % gas- and electrolyte-tight, sliding, plastic-coated “Panzerpol”
Kind of protection: IP 25 regarding EN 60529, touch protected according to VBG 4
Horizontal operation: Please use BAE special type PVV “horizontal”. The construction and production of this type is adapted to the horizontal operation.

5. Installation
BAE Secura PVV BLOCK solar batteries are designed for indoor applications. For outdoor applications please contact BAE.

6. Maintenance
Every 6 months: check battery voltage, pilot block voltages, temperatures
Every 12 months: check connections, record battery voltage, block voltages and temperatures

7. Operational data
   Depth of discharge (DOD): max. 80 % (Ue = 1.91 V/cell for discharge times > 10 h; 1.80 V/cell for 1 h), deep discharges of more than 80 % DOD have to be avoided
   Initial charge current: unlimited, the minimal charge current has to be 1.5 A/100 Ah C10 (I or bulk phase)
   Charge voltage at cyclic operation: restricted from 2.30 V to 2.40 V per cell, operating instruction is to be observed
   Floating voltage/non cyclic voltage: 2.25 V per cell
   Adjustment of charge voltage: no adjustment necessary if battery temperature is between 10 °C and 45 °C (50 °F and 113 °F) in the monthly average, \[ \frac{\Delta U}{\Delta T} = 0.003 \text{ V/cell per K below 10 °C (50 °F)} \]
   Recharge to 100 %: within a period of 1 up to 4 weeks
   IEC 61427 cycles: 2,100 (A+B) at 40 °C (104 °F)
   Battery temperature: -20 °C to 45 °C (-4 °F to 113 °F), recommended temperature range 10 °C to 30 °C (50 °F to 86 °F)
   Self-discharge: approx. 2 % per month at 20 °C (68 °F)

8. Number of cycles as function of Depth of discharge

9. Transport
Batteries are not subject to ADR (road transport), if the conditions of Special Provisions 598 and 238 (Chapter 3.3) are observed. BAE cells/batteries are conform to the IMDG-Code, therefore these products are no dangerous goods on sea transport.

10. Standards
Test standards: IEC 60896-21, IEC 61427
Safety standard, ventilation: EN 50272-2
## 1. Application

**BAE Secura PVV solar** batteries don’t need to be refilled with water during the whole service life. Therefore, this battery type is maintenance-free. This eliminates checking of electrolyte level.

The batteries are used to store electric energy in medium and large solar photovoltaic installations.

Due to the robust tubular plate design BAE PVV Batteries are excellent suited for highest requirements regarding cycling ability and long lifetime.

## 2. Technical data (Reference temperature 20 °C)

<table>
<thead>
<tr>
<th>Type</th>
<th>U_e (V/cell)</th>
<th>C_1h (Ah)</th>
<th>C_20h (Ah)</th>
<th>C_72h (Ah)</th>
<th>C_100h (Ah)</th>
<th>C_240h (Ah)</th>
<th>R_i (I_1)</th>
<th>I_k (I_2)</th>
<th>Length (L) (mm)</th>
<th>Width (W) (mm)</th>
<th>Height (H) (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 PVV</td>
<td>1.67</td>
<td>1.71</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>105</td>
<td>208</td>
<td>420</td>
<td>589</td>
<td>12.4</td>
</tr>
<tr>
<td>3 PVV</td>
<td>1.72</td>
<td>2.02</td>
<td>2.02</td>
<td>2.02</td>
<td>2.02</td>
<td>2.02</td>
<td>2.02</td>
<td>115</td>
<td>208</td>
<td>420</td>
<td>589</td>
<td>17.1</td>
</tr>
<tr>
<td>4 PVV</td>
<td>1.81</td>
<td>2.36</td>
<td>2.36</td>
<td>2.36</td>
<td>2.36</td>
<td>2.36</td>
<td>2.36</td>
<td>128</td>
<td>208</td>
<td>420</td>
<td>589</td>
<td>19.4</td>
</tr>
<tr>
<td>5 PVV</td>
<td>1.91</td>
<td>2.68</td>
<td>2.68</td>
<td>2.68</td>
<td>2.68</td>
<td>2.68</td>
<td>2.68</td>
<td>131</td>
<td>208</td>
<td>420</td>
<td>589</td>
<td>23.3</td>
</tr>
<tr>
<td>6 PVV</td>
<td>2.11</td>
<td>3.14</td>
<td>3.14</td>
<td>3.14</td>
<td>3.14</td>
<td>3.14</td>
<td>3.14</td>
<td>134</td>
<td>208</td>
<td>420</td>
<td>589</td>
<td>27.4</td>
</tr>
<tr>
<td>7 PVV</td>
<td>2.21</td>
<td>3.60</td>
<td>3.60</td>
<td>3.60</td>
<td>3.60</td>
<td>3.60</td>
<td>3.60</td>
<td>134</td>
<td>208</td>
<td>420</td>
<td>589</td>
<td>31.4</td>
</tr>
<tr>
<td>8 PVV</td>
<td>2.31</td>
<td>4.16</td>
<td>4.16</td>
<td>4.16</td>
<td>4.16</td>
<td>4.16</td>
<td>4.16</td>
<td>134</td>
<td>208</td>
<td>420</td>
<td>589</td>
<td>36.9</td>
</tr>
<tr>
<td>9 PVV</td>
<td>2.42</td>
<td>4.74</td>
<td>4.74</td>
<td>4.74</td>
<td>4.74</td>
<td>4.74</td>
<td>4.74</td>
<td>134</td>
<td>208</td>
<td>420</td>
<td>589</td>
<td>42.4</td>
</tr>
</tbody>
</table>

1, 2) Internal resistance R_i and short circuit current I_k according to IEC 60896-21

Height (H) is the maximum height between container bottom and top of the bolts in assembled condition.

All values given in the table correspond to 100% DOD without voltage drop of connectors. Please consider item 7.

## 3. Terminal positions

Terminals are designed as female poles with brass inlay M10 for flexible insulated copper cables with cross-section 25, 35, 50, 70, 95 or 120 mm² or insulated solid copper connectors with cross-section 90, 150 or 300 mm².

![Terminal diagram](image-url)
Technical Specification for BAE Secura PVV solar

4. Design
- Positive electrode: tubular-plate with woven polyester gauntlet and solid grids in a corrosion-resistant PbCaSn-alloy
- Negative electrode: grid-plate in PbCaSn-alloy with long-life expander material
- Separation: microporous separator
- Electrolyte: sulphuric acid with a density of 1.24 kg/l (20 °C), fixed as GEL by fumed silica
- Container and lid: high impact ABS (Acrylonitrile-Butadiene-Styrene), grey coloured (colour may vary slightly from given image), UL-94 rating: HB, on request also in UL-94 rating V-0
- Valve: valve with flame arrester, opening pressure approx. 120 mbar
- Pole bushing: 100 % gas- and electrolyte-tight, sliding, plastic coated “Panzerpol”
- Kind of protection: IP 25 regarding EN 60529, touch protected according to VBG 4
- Horizontal operation: Please use BAE special type PVV “horizontal”. The construction and production of this type is adapted to the horizontal operation.

5. Installation
- BAE Secura PVV solar batteries are designed for indoor applications.
- For outdoor applications please contact BAE.

6. Maintenance
- Every 6 months: check battery voltage, pilot cell voltages and temperatures
- Every 12 months: check connections, record battery voltage, cell voltages and temperatures

7. Operational data
- Depth of discharge (DOD): max. 80 % (Ue = 1.91 V/cell for discharge times >10 h; 1.74 V/cell for 1 h), deep discharges of more than 80 % DOD have to be avoided
- Initial charge current: unlimited, the minimal charge current has to be 1.5 A/100 Ah C10 (I or bulk phase)
- Charge voltage at cyclic operation: restricted from 2.30 V to 2.40 V per cell, operating instruction is to be observed
- Float voltage/non cyclic operation: 2.25 V/cell
- Adjustment of charge voltage: no adjustment necessary if battery temperature is between 10 °C and 45 °C (50 °F and 113 °F) in the monthly average, \[ \frac{\Delta U}{\Delta T} = -0.003 \text{ V/cell per K below 10 °C (50 °F)} \]
- Recharge to 100 %: within a period of 1 up to 4 weeks
- IEC 61427 cycles: >3,000 (A+B) at 40 °C (104 °F)
- Battery temperature: -20 °C to 45 °C (-4 °F to 113 °F), recommended temperature range 10 °C to 30 °C (50 °F to 86 °F)
- Self-discharge: approx. 2 % per month at 20 °C (68 °F)

8. Number of cycles as function of Depth of discharge

9. Transport
- Batteries are not subject to ADR (road transport), if the conditions of Special Provisions 598 and 238 (Chapter 3.3) are observed.
- BAE cells/batteries are conform to the IMDG-Code, therefore these products are no dangerous goods on sea transport.

10. Standards
- Test standards: IEC 60896-21, IEC 61427
- Safety standard, ventilation: EN 50272-2
1. Application

BAE Secura PVS Block solar batteries need only low maintenance and are used to store electrical energy in smaller solar photovoltaic installations. Due to the robust tubular plate design BAE PVS batteries are excellent suited for highest requirements regarding cycling ability and long lifetime.

2. Technical data (Reference temperature 20 °C)

<table>
<thead>
<tr>
<th>Type</th>
<th>C1h Ah</th>
<th>C10h Ah</th>
<th>C20h Ah</th>
<th>C72h Ah</th>
<th>C100h Ah</th>
<th>C240h Ah</th>
<th>R1 1/mΩ</th>
<th>I2 2/kA</th>
<th>Length (L) mm</th>
<th>Width (W) mm</th>
<th>Height (H) mm</th>
<th>Weight dry kg</th>
<th>Weight filled kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 V 1 PVS</td>
<td>70</td>
<td>31</td>
<td>56</td>
<td>64</td>
<td>70</td>
<td>71</td>
<td>72</td>
<td>74</td>
<td>16.62</td>
<td>0.75</td>
<td>272</td>
<td>205</td>
<td>385</td>
</tr>
<tr>
<td>12 V 2 PVS</td>
<td>140</td>
<td>63</td>
<td>109</td>
<td>125</td>
<td>137</td>
<td>140</td>
<td>144</td>
<td>8.91</td>
<td>1.40</td>
<td>272</td>
<td>205</td>
<td>385</td>
<td>38.0</td>
</tr>
<tr>
<td>12 V 3 PVS</td>
<td>210</td>
<td>95</td>
<td>167</td>
<td>192</td>
<td>211</td>
<td>215</td>
<td>217</td>
<td>222</td>
<td>6.27</td>
<td>1.99</td>
<td>380</td>
<td>205</td>
<td>385</td>
</tr>
<tr>
<td>6 V 4 PVS</td>
<td>280</td>
<td>127</td>
<td>223</td>
<td>254</td>
<td>282</td>
<td>287</td>
<td>289</td>
<td>295</td>
<td>2.47</td>
<td>2.52</td>
<td>272</td>
<td>205</td>
<td>385</td>
</tr>
<tr>
<td>6 V 5 PVS</td>
<td>350</td>
<td>159</td>
<td>279</td>
<td>318</td>
<td>352</td>
<td>359</td>
<td>361</td>
<td>369</td>
<td>2.09</td>
<td>2.98</td>
<td>380</td>
<td>205</td>
<td>385</td>
</tr>
<tr>
<td>6 V 6 PVS</td>
<td>420</td>
<td>191</td>
<td>334</td>
<td>382</td>
<td>424</td>
<td>431</td>
<td>434</td>
<td>444</td>
<td>1.82</td>
<td>3.42</td>
<td>380</td>
<td>205</td>
<td>385</td>
</tr>
</tbody>
</table>

1, 2) Internal resistance R1 and short circuit current I2 according to IEC 60896-11
Height (H) is the maximum height between container bottom and top of the bolts in assembled condition.

BAE Secura PVS Block solar batteries are also available as dry pre-charged version. They are titled with additional “TG”, e.g. 12 V 3 PVS 210 TG.

All values given in the table correspond to 100 % DOD without voltage drop of connectors. Please consider item 7.

3. Terminal positions

12 V 1 PVS 70 to 12 V 3 PVS 210
6 V 4 PVS 280 to 6 V 6 PVS 420

Terminals are designed as female poles with brass inlay M10 for flexible insulated copper cables with cross-section 25, 35, 50, 70, 95 or 120 mm² or insulated solid copper connectors with cross-section 90, 150 or 300 mm².
Technical Specification for BAE **Secura PVS BLOCK solar**

4. **Design**
   - Positive electrode: tubular-plate with woven polyester gauntlet and solid grids in a corrosion-resistant PbSbSnSe-low antimony alloy
   - Negative electrode: grid-plate in a low antimony alloy with long-life expander material
   - Separation: microporous separator
   - Electrolyte: sulphuric acid with a density of 1.24 kg/l at 20 °C (68 °F)
   - Container: high impact, transparent SAN (Styrol-Acrylic-Nitrile), UL-94 rating: HB
   - Lid: high impact, grey coloured SAN (colour may vary slightly from given image), UL-94 rating: HB
   - Plugs: labyrinth plugs for arresting aerosols, optional ceramic plugs or ceramic funnel plugs according to DIN 40740
   - Pole-bushing: 100% gas- and electrolyte-tight, sliding, plastic-coated “Panzerpol”
   - Kind of protection: IP 25 regarding EN 60529, touch protected according to VBG 4

5. **Installation**
   - BAE **Secura PVS BLOCK solar** batteries are designed for indoor applications. For outdoor applications please contact BAE.

6. **Maintenance**
   - Every 6 months: check battery voltage, pilot block voltages, temperatures
   - Every 12 months: check connections, record battery voltage, block voltages and temperatures

7. **Operational data**
   - **Depth of discharge (DOD)**
     - Initial charge current (I or bulk phase): unlimited, the minimal charge current has to be 5 A/100 Ah C₁₀
     - Charge voltage at cyclic operation: restricted from 2.30 V to 2.40 V per cell, operation instruction is to be observed
     - Floating voltage/non cycle voltage: 2.23 V per cell
     - Adjustment of charge voltage: no adjustment necessary if battery temperature is between 10 °C and 30 °C (50 °F and 86 °F) in the monthly average, otherwise \( \Delta U / \Delta T = -0.003 \) V/cell per K
     - Recharge to 100%: within a period of 1 up to 4 weeks
     - IEC 61427 cycles: 2,700 (A+B) at 40 °C (104 °F)
     - Battery temperature: -20 °C to 55 °C (-4 °F to 131 °F), recommended temperature range 10 °C to 30 °C (50 °F to 86 °F)
     - Self-discharge: approx. 3% per month at 20 °C (68 °F)

8. **Number of cycles as function of Depth of discharge**

9. **Transport**
   - Batteries are not subject to ADR (road transport), if the conditions of Special Provision 598 (Chapter 3.3) are observed.
   - These cells/batteries are dangerous goods on sea transport. Declaration and packaging must comply with the requirements of IMDG-Codes.

10. **Standards**
    - Test standards: IEC 60896-11, IEC 61427
    - Safety standard, ventilation: EN 50272-2
BAE Secura PVS solar

Technical Specification for Vented Lead-Acid Batteries (VLA)

1. Application

BAE Secura PVS solar batteries need only low maintenance and are used to store electric energy in medium and large solar photovoltaic installations.

Due to the robust tubular plate design BAE PVS batteries are excellent suited for highest requirements regarding cycling ability and long lifetime.

2. Technical data (Reference temperature 20 °C)

<table>
<thead>
<tr>
<th>Type</th>
<th>C1h Ah</th>
<th>C10h Ah</th>
<th>C20h Ah</th>
<th>C50h Ah</th>
<th>C100h Ah</th>
<th>C120h Ah</th>
<th>C240h Ah</th>
<th>R1 1) mΩ</th>
<th>I2 2) kA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 PVS</td>
<td>140</td>
<td>63</td>
<td>111</td>
<td>127</td>
<td>141</td>
<td>143</td>
<td>144</td>
<td>148</td>
<td>1.52</td>
</tr>
<tr>
<td>3 PVS</td>
<td>210</td>
<td>95</td>
<td>167</td>
<td>211</td>
<td>215</td>
<td>217</td>
<td>222</td>
<td>2.06</td>
<td>1.96</td>
</tr>
<tr>
<td>4 PVS</td>
<td>280</td>
<td>127</td>
<td>223</td>
<td>254</td>
<td>282</td>
<td>287</td>
<td>289</td>
<td>295</td>
<td>0.84</td>
</tr>
<tr>
<td>5 PVS</td>
<td>350</td>
<td>159</td>
<td>279</td>
<td>318</td>
<td>359</td>
<td>361</td>
<td>369</td>
<td>0.70</td>
<td>2.98</td>
</tr>
<tr>
<td>6 PVS</td>
<td>420</td>
<td>191</td>
<td>334</td>
<td>382</td>
<td>424</td>
<td>431</td>
<td>434</td>
<td>444</td>
<td>0.60</td>
</tr>
<tr>
<td>5 PVS</td>
<td>550</td>
<td>223</td>
<td>389</td>
<td>486</td>
<td>496</td>
<td>500</td>
<td>513</td>
<td>0.57</td>
<td>3.61</td>
</tr>
<tr>
<td>6 PVS</td>
<td>660</td>
<td>267</td>
<td>467</td>
<td>518</td>
<td>583</td>
<td>605</td>
<td>616</td>
<td>0.49</td>
<td>4.18</td>
</tr>
<tr>
<td>7 PVS</td>
<td>770</td>
<td>310</td>
<td>544</td>
<td>604</td>
<td>681</td>
<td>700</td>
<td>720</td>
<td>0.44</td>
<td>4.69</td>
</tr>
<tr>
<td>6 PVS</td>
<td>900</td>
<td>352</td>
<td>665</td>
<td>748</td>
<td>856</td>
<td>887</td>
<td>916</td>
<td>0.47</td>
<td>4.41</td>
</tr>
<tr>
<td>7 PVS</td>
<td>1050</td>
<td>415</td>
<td>777</td>
<td>872</td>
<td>996</td>
<td>1,137</td>
<td>1,160</td>
<td>1,178</td>
<td>1,216</td>
</tr>
<tr>
<td>8 PVS</td>
<td>1200</td>
<td>473</td>
<td>866</td>
<td>996</td>
<td>1,137</td>
<td>1,160</td>
<td>1,178</td>
<td>1,216</td>
<td>0.33</td>
</tr>
<tr>
<td>9 PVS</td>
<td>1350</td>
<td>522</td>
<td>992</td>
<td>1,116</td>
<td>1,274</td>
<td>1,300</td>
<td>1,320</td>
<td>1,365</td>
<td>0.33</td>
</tr>
<tr>
<td>10 PVS</td>
<td>1500</td>
<td>585</td>
<td>1,100</td>
<td>1,240</td>
<td>1,418</td>
<td>1,450</td>
<td>1,464</td>
<td>1,516</td>
<td>0.28</td>
</tr>
<tr>
<td>11 PVS</td>
<td>1650</td>
<td>635</td>
<td>1,210</td>
<td>1,362</td>
<td>1,555</td>
<td>1,590</td>
<td>1,608</td>
<td>1,665</td>
<td>0.28</td>
</tr>
<tr>
<td>12 PVS</td>
<td>1800</td>
<td>698</td>
<td>1,320</td>
<td>1,486</td>
<td>1,699</td>
<td>1,740</td>
<td>1,752</td>
<td>1,816</td>
<td>0.24</td>
</tr>
<tr>
<td>11 PVS</td>
<td>2090</td>
<td>790</td>
<td>1,470</td>
<td>1,636</td>
<td>1,836</td>
<td>1,870</td>
<td>1,884</td>
<td>1,941</td>
<td>0.24</td>
</tr>
<tr>
<td>12 PVS</td>
<td>2280</td>
<td>869</td>
<td>1,600</td>
<td>1,784</td>
<td>2,001</td>
<td>2,040</td>
<td>2,052</td>
<td>2,116</td>
<td>0.22</td>
</tr>
<tr>
<td>13 PVS</td>
<td>2470</td>
<td>978</td>
<td>1,740</td>
<td>1,938</td>
<td>2,174</td>
<td>2,210</td>
<td>2,232</td>
<td>2,292</td>
<td>0.16</td>
</tr>
<tr>
<td>14 PVS</td>
<td>2660</td>
<td>1,051</td>
<td>1,880</td>
<td>2,080</td>
<td>2,332</td>
<td>2,380</td>
<td>2,400</td>
<td>2,448</td>
<td>0.15</td>
</tr>
<tr>
<td>15 PVS</td>
<td>2850</td>
<td>1,123</td>
<td>2,010</td>
<td>2,220</td>
<td>2,498</td>
<td>2,550</td>
<td>2,568</td>
<td>2,640</td>
<td>0.14</td>
</tr>
<tr>
<td>16 PVS</td>
<td>3040</td>
<td>1,195</td>
<td>2,140</td>
<td>2,380</td>
<td>2,664</td>
<td>2,710</td>
<td>2,736</td>
<td>2,808</td>
<td>0.13</td>
</tr>
<tr>
<td>17 PVS</td>
<td>3230</td>
<td>1,280</td>
<td>2,290</td>
<td>2,540</td>
<td>2,858</td>
<td>2,910</td>
<td>2,940</td>
<td>3,000</td>
<td>0.12</td>
</tr>
<tr>
<td>18 PVS</td>
<td>3420</td>
<td>1,352</td>
<td>2,420</td>
<td>2,680</td>
<td>3,024</td>
<td>3,080</td>
<td>3,108</td>
<td>3,192</td>
<td>0.11</td>
</tr>
<tr>
<td>19 PVS</td>
<td>3610</td>
<td>1,425</td>
<td>2,560</td>
<td>2,840</td>
<td>3,195</td>
<td>3,250</td>
<td>3,276</td>
<td>3,360</td>
<td>0.11</td>
</tr>
<tr>
<td>20 PVS</td>
<td>3800</td>
<td>1,496</td>
<td>2,690</td>
<td>2,980</td>
<td>3,355</td>
<td>3,420</td>
<td>3,444</td>
<td>3,528</td>
<td>0.11</td>
</tr>
<tr>
<td>22 PVS</td>
<td>4180</td>
<td>1,635</td>
<td>2,950</td>
<td>3,280</td>
<td>3,686</td>
<td>3,750</td>
<td>3,780</td>
<td>3,888</td>
<td>0.10</td>
</tr>
<tr>
<td>24 PVS</td>
<td>4560</td>
<td>1,777</td>
<td>3,220</td>
<td>3,560</td>
<td>4,010</td>
<td>4,090</td>
<td>4,128</td>
<td>4,224</td>
<td>0.09</td>
</tr>
<tr>
<td>26 PVS</td>
<td>4940</td>
<td>1,917</td>
<td>3,480</td>
<td>3,860</td>
<td>4,341</td>
<td>4,420</td>
<td>4,464</td>
<td>4,584</td>
<td>0.08</td>
</tr>
</tbody>
</table>

1) Internal resistance $R_1$ and short circuit current $I_2$ according to IEC 60896-11

Height (H) is the maximum height between container bottom and top of the bolts in assembled condition.

BAE Secura PVS solar batteries are also available as dry pre-charged version. They are titled with additional “TG”, e.g. 4 PVS 280 TG.

All values given in the table correspond to 100 % DOD without voltage drop of connectors. Please consider item 7.

3. Terminal positions

Terminals are designed as female poles with brass inlay M10 for flexible insulated copper cables with cross-section 25, 35, 50, 70, 95 or 120 mm² or insulated solid copper connectors with cross-section 90, 150 or 300 mm².

2 PVS 140 to 6 PVS 900
7 PVS 1050 to 12 PVS 2280
13 PVS 2470 to 16 PVS 3040
17 PVS 3230 to 26 PVS 4940

Energy from Batteries

1 2) Internal resistance $R_1$ and short circuit current $I_2$ according to IEC 60896-11

Height (H) is the maximum height between container bottom and top of the bolts in assembled condition.

BAE Secura PVS solar batteries are also available as dry pre-charged version. They are titled with additional “TG”, e.g. 4 PVS 280 TG.

All values given in the table correspond to 100 % DOD without voltage drop of connectors. Please consider item 7.
4. Design
Positive electrode: tubular-plate with a woven polyester gauntlet and solid grids in a corrosion-resistant PbSbSnSe-low antimony alloy
Negative electrode: grid-plate in a low antimony alloy with long-life expander material
Separation: microporous separator
Electrolyte: sulphuric acid with a density of 1.24 kg/l at 20 °C (68 °F)
Container: high impact, transparent SAN (Styrol-Acrylic-Nitrile), UL-94 rating: HB
Lid: high impact SAN in dark grey colour (colour may vary slightly from given image), UL-94 rating: HB
Plugs: labyrinth plugs for arresting aerosols, optional ceramic plugs or ceramic funnel plugs according to DIN 40740
Pole-bushing: 100 % gas- and electrolyte-tight, sliding, plastic-coated “Panzerpol”
Kind of protection: IP 25 regarding EN 60529, touch protected according to VBG 4

5. Installation
BAE Secura PVS solar batteries are designed for indoor applications.
For outdoor applications please contact BAE.

6. Maintenance
Every 6 months: check battery voltage, pilot cell voltages, temperatures
Every 12 months: check connections, record battery voltage, cell voltages and temperatures
Every 3 years: average water-refilling interval (depending on utilization and ambient temperature)

7. Operational data
Depth of discharge (DOD) max. 80 % (Ue = 1.91 V/cell for discharge times >10 h; 1.74 V/cell for 1 h)
derived discharges of more than 80 % DOD have to be avoided
Initial charge current: unlimited, the minimal charge current has to be 5 A/100 Ah C10 (I or bulk phase)
Charge voltage at cyclic operation: restricted from 2.30 V to 2.40 V per cell, operating instruction is to be observed
Float voltage/non cyclic voltage: 2.23 V/cell
Adjustment of charge voltage: no adjustment necessary if battery temperature is between 10 °C and 30 °C
Recharge to 100 %: within a period of 1 up to 4 weeks
IEC 61427 cycles: 3,150 (A+B) at 40 °C (104 °F)
Battery temperature: -20 °C to 55 °C (-4 °F to 131 °F), recommended temperature range 10 °C to 30 °C (50 °F to 86 °F)
Self-discharge: approx. 3 % per month at 20 °C (68 °F)

8. Number of cycles as function of Depth of discharge

9. Transport
Batteries are not subject to ADR (road transport), if the conditions of Special Provision 598 (Chapter 3.3) are observed.
These cells/batteries are dangerous goods on sea transport. Declaration and packaging must comply with the requirements of IMDG-Codes.

10. Standards
Test standards: IEC 60896-11, IEC 61427
Safety standard, ventilation: EN 50272-2
BAE Secura PVVM solar

Technical Specification for Valve Regulated Lead-Acid Cells (VRLA-GEL)

1. Application

BAE Secura PVVM solar batteries don’t need to be refilled with water during the whole operational life. Therefore, this battery type is maintenance-free. This eliminates checking of electrolyte level.

The batteries are used to store electric energy in small solar photovoltaic installations.

Due to the robust tubular plate design BAE PVVM batteries are excellent suited for highest requirements regarding cycling ability and long lifetime.

2. Technical data (Reference temperature 20 °C)

<table>
<thead>
<tr>
<th>Type</th>
<th>U_e (V/cell)</th>
<th>C_1h (Ah)</th>
<th>C_10h (Ah)</th>
<th>C_20h (Ah)</th>
<th>C_72h (Ah)</th>
<th>C_100h (Ah)</th>
<th>C_240h (Ah)</th>
<th>R_i (mΩ)</th>
<th>I_k (kA)</th>
<th>Length (L) (mm)</th>
<th>Width (W) (mm)</th>
<th>Height (H) (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 PVVM</td>
<td>1.67</td>
<td>1.78</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.57</td>
<td>1.37</td>
<td>47</td>
<td>198</td>
<td>370</td>
<td>8.8</td>
</tr>
<tr>
<td>3 PVVM</td>
<td>1.10</td>
<td>1.96</td>
<td>65</td>
<td>198</td>
<td>370</td>
<td>12.5</td>
<td>16.3</td>
<td>1.09</td>
<td>1.96</td>
<td>83</td>
<td>198</td>
<td>370</td>
<td>12.5</td>
</tr>
<tr>
<td>4 PVVM</td>
<td>0.86</td>
<td>2.52</td>
<td>65</td>
<td>198</td>
<td>370</td>
<td>16.2</td>
<td>19.9</td>
<td>0.86</td>
<td>2.52</td>
<td>65</td>
<td>198</td>
<td>370</td>
<td>16.2</td>
</tr>
<tr>
<td>5 PVVM</td>
<td>0.71</td>
<td>3.05</td>
<td>101</td>
<td>198</td>
<td>370</td>
<td>19.9</td>
<td>23.6</td>
<td>0.71</td>
<td>3.05</td>
<td>101</td>
<td>198</td>
<td>370</td>
<td>19.9</td>
</tr>
<tr>
<td>6 PVVM</td>
<td>0.61</td>
<td>3.54</td>
<td>119</td>
<td>198</td>
<td>370</td>
<td>23.6</td>
<td>23.6</td>
<td>0.61</td>
<td>3.54</td>
<td>119</td>
<td>198</td>
<td>370</td>
<td>23.6</td>
</tr>
<tr>
<td>7 PVVM</td>
<td>0.54</td>
<td>4.00</td>
<td>137</td>
<td>198</td>
<td>370</td>
<td>23.6</td>
<td>27.3</td>
<td>0.54</td>
<td>4.00</td>
<td>137</td>
<td>198</td>
<td>370</td>
<td>27.3</td>
</tr>
<tr>
<td>8 PVVM</td>
<td>0.47</td>
<td>4.53</td>
<td>155</td>
<td>198</td>
<td>370</td>
<td>31.2</td>
<td>31.2</td>
<td>0.47</td>
<td>4.53</td>
<td>155</td>
<td>198</td>
<td>370</td>
<td>31.2</td>
</tr>
<tr>
<td>9 PVVM</td>
<td>0.43</td>
<td>4.96</td>
<td>173</td>
<td>198</td>
<td>370</td>
<td>34.9</td>
<td>34.9</td>
<td>0.43</td>
<td>4.96</td>
<td>173</td>
<td>198</td>
<td>370</td>
<td>34.9</td>
</tr>
<tr>
<td>10 PVVM</td>
<td>0.40</td>
<td>5.36</td>
<td>191</td>
<td>198</td>
<td>370</td>
<td>38.6</td>
<td>38.6</td>
<td>0.40</td>
<td>5.36</td>
<td>191</td>
<td>198</td>
<td>370</td>
<td>38.6</td>
</tr>
</tbody>
</table>

1, 2) Internal resistance R_i and short circuit current I_k according to IEC 60896-21

Height (H) is the maximum height between container bottom and top of the bolts in assembled condition.

Please observe needed headroom for installation and maintenance.

All values given in the table correspond to 100 % DOD without voltage drop of connectors. Please consider item 7.

3. Terminal positions

Terminals are designed as female poles with brass inlay M10 for flexible insulated copper cables with cross-section 25, 35, 50, 70, 95 or 120 mm².
**Technical Specification for BAE Secura PVVM solar**

4. **Design**
   - Positive electrode: tubular-plate with woven polyester gauntlet and solid grid in a corrosion-resistant PbCaSn-alloy
   - Negative electrode: grid-plate in PbCaSn-alloy with long-life expander material
   - Separation: microporous separator
   - Electrolyte: sulphuric acid with a density of 1.24 kg/l (20 °C), fixed as GEL by fumed silica
   - Container and lid: impact-resistant polypropylene, UL-94 rating: HB
   - Valve: with flame arrester, opening pressure approx. 120 mbar
   - Pole-bushing: 100 % gas- and electrolyte-tight
   - Kind of protection: IP 25 regarding EN 60529, touch protected according to VBG 4

5. **Installation**
   BAE PVVM cells have to be installed in racks or trays with lateral force on the sidewalls in order to avoid an excessive bulging of the battery cell containers.

6. **Maintenance**
   - Every 6 months: check battery voltage, pilot cell voltages and temperatures
   - Every 12 months: check of mechanical and electrical connections, record battery voltage, cell voltages and temperatures
   - Please refer to the operational instruction for details.

7. **Operational data**
   - Depth of discharge (DOD) restricted to 80 % according to final voltage per cell and discharge time as per item 2, deep discharges of more than 80 % DOD have to be avoided
   - Initial charge current unlimited, the minimal charge current has to be 1.5 A/100 Ah C₁₀ (until voltage limit is reached)
   - Charge voltage restricted from 2.30 V to 2.40 V per cell, operating instruction is to be observed
   - DOD per day < 40 % C₁₀: 2.30 V – 2.35 V per cell
   - DOD per day 40 % - 60 % C₁₀: 2.35 V – 2.40 V per cell
   - Adjustment of charge voltage: no adjustment necessary if battery temperature is between 10 °C and 45 °C (50 °F and 113 °F) in the monthly average, \( \Delta U/\Delta T = -0.003 \text{ V/cell per K below 10 °C} \) (50 °F)
   - Recharge to 100 %: within a period of 1 up to 4 weeks
   - Operational temperature: -20 °C to 45 °C (-4 °F to 113 °F), recommended temperature range 10 °C to 30 °C (50 °F to 86 °F) approx. 2 % per month at 20 °C (68 °F)

8. **Number of cycles as function of Depth of discharge**

![Graph showing cycles vs. depth of discharge (DOD) in %](image)

9. **Transport**
   Batteries are not subject to ADR (road transport), if the conditions of Special Provisions 598 and 238 (Chapter 3.3) are observed.
   BAE cells/batteries conform to the IMDG-Code, therefore these products are no dangerous goods on sea transport.

10. **Standards**
    - Test standards: IEC 60896-21, IEC 61427
    - Safety standard, ventilation: EN 50272-2
Efficient consumption of PV-energy where it is generated

The BAE SunDepot stores the generated PV energy locally and increases the degree of self consumed energy significantly. It is designed especially for use in small industrial, commercial and private applications. The compact and modular design enables fast and easy assembling on site. The BAE SunDepot comprises of a robust fully insulated battery rack with front cover and lid, a modern maintenance free solar battery of 6 or 12 V blocks in tubular plate design, the junction box with fuse switch disconnector for NH-1 fuses and all components to connect the system up to the fuse terminal output.

1. BAE SunDepot 24 & BAE SunDepot 48 (Reference temperature 20 °C)

<table>
<thead>
<tr>
<th>Type</th>
<th>Battery</th>
<th>Energy kWh $C_{100}$</th>
<th>Energy kWh $C_{10}$</th>
<th>Nominal voltage V</th>
<th>Tiers</th>
<th>Length mm</th>
<th>Width mm</th>
<th>Height mm</th>
<th>Weight incl. battery kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>SunDepot 24-280</td>
<td>4 x 6V 4PV280</td>
<td>6.7</td>
<td>5.3</td>
<td>24</td>
<td>1</td>
<td>1129</td>
<td>465</td>
<td>631</td>
<td>256</td>
</tr>
<tr>
<td>SunDepot 24-350</td>
<td>4 x 6V 5PV350</td>
<td>8.4</td>
<td>6.6</td>
<td>24</td>
<td>1</td>
<td>1129</td>
<td>465</td>
<td>631</td>
<td>312</td>
</tr>
<tr>
<td>SunDepot 24-420</td>
<td>4 x 6V 6PV420</td>
<td>10.0</td>
<td>7.8</td>
<td>24</td>
<td>1</td>
<td>1129</td>
<td>465</td>
<td>631</td>
<td>347</td>
</tr>
<tr>
<td>SunDepot 48-210</td>
<td>4 x 12V 3PV210</td>
<td>10.1</td>
<td>7.9</td>
<td>48</td>
<td>1</td>
<td>1129</td>
<td>465</td>
<td>631</td>
<td>348</td>
</tr>
<tr>
<td>SunDepot 48-280</td>
<td>8 x 6V 4PV280</td>
<td>13.4</td>
<td>10.5</td>
<td>48</td>
<td>2</td>
<td>1129</td>
<td>465</td>
<td>1210</td>
<td>492</td>
</tr>
<tr>
<td>SunDepot 48-350</td>
<td>8 x 6V 5PV350</td>
<td>16.8</td>
<td>13.2</td>
<td>48</td>
<td>2</td>
<td>1129</td>
<td>465</td>
<td>1210</td>
<td>604</td>
</tr>
<tr>
<td>SunDepot 48-420</td>
<td>8 x 6V 6PV420</td>
<td>20.2</td>
<td>15.9</td>
<td>48</td>
<td>2</td>
<td>1129</td>
<td>465</td>
<td>1210</td>
<td>675</td>
</tr>
</tbody>
</table>

2. Easy assembling

The modular design makes it easy to assemble the BAE SunDepot quickly. Only three parts are to be connected by screws.

Additionally a cover for back side is available as option.
Technical Specification of BAE **SuNDEpOT**

3. **Design**
   - **Rack**
     Coated steel rack, floor unit and side walls screwed; lid and front cover hooked in
   - **Battery**
     Maintenance free solar battery with highest cyclic ability via tubular plate technology; electrolyte fixed as GEL
   - **Connector**
     Fully insulated block connectors, pre assembled end terminal cables for junction box (included)
   - **Junction box**
     Fuse switch disconnector inside the junction box with flip cover suited for NH-1 fuse (not included)

4. **Dimension**
   - 1-tier:
     ![1-tier SuNDEpOT diagram](image)
   - 2-tier:
     ![2-tier SuNDEpOT diagram](image)

5. **Number of cycles as function of Depth of discharge**

![Graph showing number of cycles vs. Depth of discharge](image)

6. **Transport**
   As standard packaging the BAE **SuNDEpOT** will be shipped as one system per pallet.

7. **Standards**
   - **Test standards**
     IEC 60896-21, IEC 61427
   - **Safety standard, ventilation**
     EN 50272-2