Charge Air Coolers

Heat Transfer Technology from Bowman

Bowman
A World Leader in Heat Exchanger Technology
Reducing temperature. Improving performance!

Bowman Charge Air Coolers

For turbocharged marine and stationary land based engines

Charge air coolers cool the compressed combustion air from the turbocharger. By reducing the temperature, the incoming air is much denser, enabling increased air mass to be supplied to the engine. The result is better combustion efficiency providing improved engine performance, plus reduced fuel consumption and emissions.

Bowman offer a comprehensive range of charge air coolers, which are suitable for marine and land based stationary engines up to 800kW. Based on Bowman’s renowned ‘shell and tube’ design, these liquid cooled units enable temperatures to be precisely controlled.

Bowman charge air coolers are renowned for their quality, thermal transfer efficiency and long life durability.

Applications include marine propulsion, CHP power generation, automotive engine testing and fire pumps used in emergency fire protection systems.

For applications requiring higher flow rates for the cooling medium, single and two pass versions are available in a choice of cast iron or Naval brass end covers.

Available for fast delivery, Bowman charge air coolers are also supported with a comprehensive range of replacement parts.

Marine and land based versions
Whether the cooling medium is salt water, fresh water or mineral rich/contaminated water, Bowman has a range of charge air coolers to suit virtually any marine or land based stationary engine application.

Outstanding reliability
Designed and built to the highest standards, Bowman units provide outstanding levels of operational reliability and durability.

High efficiency thermal transfer
Bowman charge air coolers deliver extremely high levels of thermal transfer efficiency, due to the innovative design of the tube stack and baffle plates. To ensure maximum heat transfer performance, the units must always be installed with the air and water in a counter flow arrangement. See page 7 for more details.

Simple to maintain
The easily removable tubestack and end covers makes routine cleaning and maintenance simple and straightforward.
**Titanium tube stacks**
Titanium is the ultimate ‘fit and forget’ material for applications where aggressive water conditions exist. Bowman now offer titanium tube stacks on many of our charge air coolers. See page 7 for more details.

**Easy product selection**
At Bowman, we have developed a technical programme to make it easy to select the correct charge air coolers for your application. Simply by supplying us with the following information we can advise the correct specification unit;

1: Charge air mass flow rate from turbo
2: Charge air pressure
3: Max. acceptable charge air pressure drop (if known)
4: Charge air cooler inlet and outlet temperature, or heat load & 1 temperature
5: Cooling water temperature in °C
6: Type of cooling water used, i.e. fresh, sea or glycol, including concentration
7: Cooling water flow rate (if known)

**Bespoke designs for specific engines**
Within our range are a number of charge air coolers designed for specific engines. You can find out more information on these units by contacting our technical sales team.
The tables below show the performance characteristics that can be achieved from our Charge Air Coolers in either marine or land based operation.

### Marine

<table>
<thead>
<tr>
<th>Type</th>
<th>Charge Air Flow</th>
<th>Pressure Drop</th>
<th>Water Flow</th>
<th>Pressure Drop</th>
<th>Heat Rejection</th>
<th>Engine Power</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(kg/min)</td>
<td>(kpa)</td>
<td>(lit/min)</td>
<td>(kpa)</td>
<td>(kW)</td>
<td>(kW)</td>
</tr>
<tr>
<td>EC140-4218-4</td>
<td>2.5</td>
<td>2.2</td>
<td>30</td>
<td>10</td>
<td>6.5</td>
<td>50</td>
</tr>
<tr>
<td>FC100-4074-2</td>
<td>4.3</td>
<td>3.1</td>
<td>50</td>
<td>8</td>
<td>11.2</td>
<td>90</td>
</tr>
<tr>
<td>FG100-4075-2</td>
<td>9.8</td>
<td>5.4</td>
<td>80</td>
<td>12</td>
<td>25.4</td>
<td>190</td>
</tr>
<tr>
<td>GL140-4076-2</td>
<td>15.4</td>
<td>7.4</td>
<td>140</td>
<td>12</td>
<td>40</td>
<td>300</td>
</tr>
<tr>
<td>GK190-4877-3</td>
<td>20.3</td>
<td>9.6</td>
<td>180</td>
<td>11</td>
<td>52</td>
<td>350</td>
</tr>
<tr>
<td>JK190-4078-3</td>
<td>30.1</td>
<td>9.4</td>
<td>270</td>
<td>12</td>
<td>65</td>
<td>500</td>
</tr>
<tr>
<td>PK190-4079-3</td>
<td>40.3</td>
<td>8.6</td>
<td>400</td>
<td>12</td>
<td>100</td>
<td>800</td>
</tr>
</tbody>
</table>

### Land

<table>
<thead>
<tr>
<th>Type</th>
<th>Charge Air Flow</th>
<th>Pressure Drop</th>
<th>Water Flow</th>
<th>Pressure Drop</th>
<th>Heat Rejection</th>
<th>Engine Power</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(kg/min)</td>
<td>(kpa)</td>
<td>(lit/min)</td>
<td>(kpa)</td>
<td>(kW)</td>
<td>(kW)</td>
</tr>
<tr>
<td>EC140-4217-4</td>
<td>2.5</td>
<td>2.2</td>
<td>30</td>
<td>10</td>
<td>6.5</td>
<td>50</td>
</tr>
<tr>
<td>FC100-5174-2</td>
<td>4.3</td>
<td>3.1</td>
<td>50</td>
<td>8</td>
<td>11.2</td>
<td>90</td>
</tr>
<tr>
<td>FG100-5175-2</td>
<td>9.8</td>
<td>5.4</td>
<td>80</td>
<td>12</td>
<td>25.4</td>
<td>190</td>
</tr>
<tr>
<td>GL140-5176-2</td>
<td>15.4</td>
<td>7.4</td>
<td>140</td>
<td>12</td>
<td>40</td>
<td>300</td>
</tr>
<tr>
<td>GK190-5177-3</td>
<td>20.3</td>
<td>9.6</td>
<td>180</td>
<td>11</td>
<td>52</td>
<td>350</td>
</tr>
<tr>
<td>JK190-5178-3</td>
<td>30.1</td>
<td>9.4</td>
<td>270</td>
<td>12</td>
<td>65</td>
<td>500</td>
</tr>
<tr>
<td>PK190-5179-3</td>
<td>40.3</td>
<td>8.6</td>
<td>400</td>
<td>12</td>
<td>100</td>
<td>800</td>
</tr>
</tbody>
</table>

The above figures are based on air temperature from 180°C to 50°C at 1.75 bar g, using water temperature at 20°C. Maximum air inlet temperature is 250°C. For higher air temperatures please contact the sales department.

Bowman charge air coolers must not be operated without adequate water flow and must be mounted so that the water outlet is uppermost.
Charge Air Cooler Dimensions

**EC140 / FC100**

4 x mounting holes
M8 x 12mm

<table>
<thead>
<tr>
<th>TYPE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>BSP</td>
<td>mm</td>
<td>mm</td>
<td></td>
</tr>
<tr>
<td>EC140</td>
<td>444</td>
<td>312</td>
<td>288</td>
<td>52</td>
<td>94</td>
<td>55</td>
<td>85</td>
<td>20</td>
<td>52</td>
<td>¼”</td>
<td>47</td>
<td>53</td>
</tr>
<tr>
<td>FC100</td>
<td>358</td>
<td>190</td>
<td>190</td>
<td>52</td>
<td>112</td>
<td>63</td>
<td>100</td>
<td>25</td>
<td>76</td>
<td>1”</td>
<td>59</td>
<td>67</td>
</tr>
</tbody>
</table>

**FG100 / GL140 / GK190**

4 x mounting holes
FG100 - M8 x 12mm
GL140 - M10 x 15mm
GK190 - M12 x 18mm

<table>
<thead>
<tr>
<th>TYPE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>BSP</td>
<td>L</td>
</tr>
<tr>
<td>FG100</td>
<td>472</td>
<td>272</td>
<td>190</td>
<td>76</td>
<td>132</td>
<td>70</td>
<td>110</td>
<td>32</td>
<td>76</td>
<td>1 ¼”</td>
<td>132</td>
<td></td>
</tr>
<tr>
<td>GL140</td>
<td>502</td>
<td>272</td>
<td>108</td>
<td>76</td>
<td>166</td>
<td>90</td>
<td>130</td>
<td>38</td>
<td>120</td>
<td>1 ½”</td>
<td>170</td>
<td></td>
</tr>
<tr>
<td>GK190</td>
<td>674</td>
<td>370</td>
<td>236</td>
<td>89</td>
<td>206</td>
<td>110</td>
<td>180</td>
<td>50</td>
<td>120</td>
<td>2”</td>
<td>206</td>
<td></td>
</tr>
</tbody>
</table>
Charge Air Cooler Dimensions

**JK190**

![Diagram of JK190](image1)

<table>
<thead>
<tr>
<th>TYPE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>JK190</td>
<td>704</td>
<td>350</td>
<td>236</td>
<td>102</td>
<td>240</td>
<td>130</td>
<td>210</td>
<td>60</td>
<td>150</td>
<td>2 ½”</td>
<td>240</td>
</tr>
</tbody>
</table>

**PK190**

![Diagram of PK190](image2)

<table>
<thead>
<tr>
<th>TYPE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>PK190</td>
<td>706*</td>
<td>330</td>
<td>236</td>
<td>108</td>
<td>278</td>
<td>155</td>
<td>170</td>
<td>70</td>
<td>180</td>
<td>3”</td>
<td>286</td>
</tr>
</tbody>
</table>

*PK190-4079-3 land based versions – dimension A: 754mm.
Installation

Bowman Charge Air Coolers must always be mounted so that the water outlet is uppermost (see diagram below). They must not be operated without an adequate water flow and when used in conjunction with our header tank heat exchangers, they should be positioned in the circuit so that they always receive the full flow of the engines water pump.

**IMPORTANT:** to achieve maximum thermal transfer efficiency, Bowman charge air coolers must always be installed in a counter flow arrangement – i.e. where the cooling medium flows in a counter direction to the air being cooled. Please see the below diagram for reference.

For further guidance on installation, contact our technical sales team on +44 121 350 5401 or email: info@ejbowman.co.uk

Servicing the unit

By simply unscrewing the end cover retaining bolts, the tube stack can be removed from its outer ‘shell’ for routine cleaning and maintenance. On reassembly, it is always recommended that the “O” rings are replaced to ensure a reliable, water tight seal.

Replacement Parts

A comprehensive range of replacement parts is available for all Bowman charge air coolers. This includes end covers, “O” ring seals, tube stacks, bodies and end cover fixings.

Total Engine Cooling Solutions

For nearly 100 years, Bowman has provided efficient, reliable cooling solutions for normally aspirated and forced induction engines. During that time the company has amassed a wealth of expertise and can provide a complete cooling solution for both marine and land based stationary engines, including:

- **Header Tank Heat Exchangers**
  Bowman’s unique design combines high efficiency engine cooling, with long life durability. Suitable for engines up to 1800kW.

- **Exhaust Gas Heat Exchangers**
  Recovers valuable ‘waste heat’ from the engines exhaust stream for use as a valuable ‘free’ energy resource.

- **Engine & Gearbox Oil Coolers**
  A range of compact units suitable for engine or transmission oil cooling.

- **Fuel Coolers**
  Bowman in line plate fuel coolers are compact, easy to install and suitable for use with all fuel types – including Ethanol rich fuels.

Titanium Tube Stacks

Titanium is the ultimate ‘fit and forget’ solution for any application where super aggressive water conditions exist, including salt water, or contaminated/mineral rich fresh water. It resists chemical attack indefinitely and also eliminates the possibility of ‘galvanic reaction’ between dissimilar materials – often the cause of premature failure in certain operating conditions.

Bowman now offer titanium tube stacks as an option for our charge air cooler range, providing a highly durable, long life solution for the most demanding applications.

Bowman titanium tube stacks come with a full 10 year guarantee on all titanium in contact with cooling water.

**GUARANTEED 10 YEARS**

Full 10 year guarantee on all titanium material in contact with cooling water.

All material contained in this brochure is the intellectual property of EJ Bowman (Birmingham) Ltd. It is protected under copyright and may not be reproduced without prior written consent of the company.
Bowman charge air coolers have been tested and proven in some of the most extreme operating conditions around the world, from icy depths of a Northern Canadian winter, to the searing heat of an Australian summer, plus just about everything in between. Here are just a few examples:

**Marine Engineering**
In Portugal, Bowman FG100 charge air coolers have been used to convert two John Deere engines for marine use. The installation, on the Catamaran 'Independencia', helped reduce temperatures in the engine room from over 50°C to just 25°C.

**Power Generation**
In Canada, Bowman FG100 charge air coolers are playing a vital part in a cogeneration system that has halved energy costs in the remote community of Fort Providence in the Northwest Territories, where temperatures in winter can fall to -40°C.

**Irrigation Systems**
Bowman GK190 charge air coolers are being used to cool Iveco irrigation pumps sets at a 165 hectare vineyard in New South Wales, Australia, where, with vines 800 metres long, particularly high operating pressures and temperatures are experienced.

**Active Fire Protection**
This leading Australian fire pump manufacturer exclusively specifies Bowman charge air coolers for all of its fire pumps, with literally hundreds of units now installed throughout the country.

With over 50 years’ experience cooling marine engines, generating sets, co-generation equipment, active fire protection systems and engine test equipment, you can rely on Bowman charge air coolers to deliver optimum charge cooling efficiently and reliably, whatever the operating conditions.

EJ Bowman (Birmingham) Ltd
Chester Street, Birmingham B6 4AP, UK
Tel: +44 (0) 121 359 5401
Fax: +44 (0) 121 359 7495
Email: info@ejbowman.co.uk
www.ejbowman.co.uk

A World Leader in Heat Exchanger Technology