



Senior Flexonics Launch Finned Co-axial Cooler.

With Stage V legislation on the horizon, 2019 can look like a daunting prospect for some engine manufacturers. This solution will reduce temperatures in both engines and boardrooms.

The anticipated EU Stage V non-road emission legislation is expected to come into force in 2019. For some engine manufacturers it will mean minimal change, but for those operating in the 19-36kW range it brings a whole new set of challenges.

The existing EU Stage IV legislation is limited to engines operating in the 57-559kW power range. For many years engine manufacturers operating in this range have been following ever-tightening legislation to reduce PM, NOx and HC emissions. This latest transition from EU Stage IV to Stage V requires only an improvement in PM emissions, with no additional improvements required for NOx or HC's.

However, those operating in the 19-36kW range face a much larger task. Until now, engines in this range have needed only to comply with the 2005 introduced, EU Stage IIIa. The introduction of EU Stage V will mean engines of all power ranges will be covered by the latest legislation. For the 19-36kW range the change is most dramatic, as engine manufacturers will need to improve PM emissions by 85% and NOx and HC by 37%. For the 0-18kW range, EU Stage V will be the first time engine manufacturers will need to consider emissions legislation.

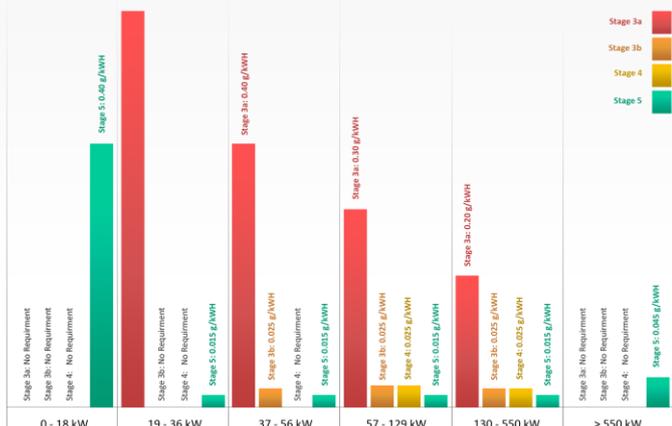
OFF-HIGHWAY EU EMISSIONS LEGISLATION

Power Range	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
0 - 18 kW	Not Regulated								Stage V	
19 - 36 kW	Stage IIIa								Stage V	
37 - 56 kW	Stage IIIa		Stage IIIb						Stage V	
57 - 129 kW	Stage IIIa		Stage IIIb		Stage IV				Stage V	
130 - 559 kW	Stage IIIb		Stage IV				Stage V			
> 560 kW	Not Regulated								Stage V	

PROGRESSION OF TIGHTENING EU EMISSION LEGISLATION

PARTICULATE MATTER

The 19 - 36kW power range requires 85% reduction in PM emissions compared to previous legislation



PROGRESSION OF TIGHTENING EU EMISSION LEGISLATION

NOx & HYDROCARBONS

The 19 - 36kW power range requires 37% reduction in NOx & HC emissions compared to previous legislation



These emissions targets will not be attainable without the correct tools. Fortunately, Senior Flexonics has a novel new solution; the **Finned Co-axial Cooler**.

Senior Flexonics has many years' experience of successfully developing bespoke EGR coolers for its customers. Three years ago Senior launched its patented Co-axial Cooler – a novel design, which incorporated a transfer tube, flex and a heat exchanger into one compact, lightweight, routable design. Since then the product has been successfully meeting customers' needs and has returned zero warranties in the entirety of its production.

But now, due to ever-increasing customer demands, Senior has taken the Co-axial Cooler to the next level, allowing even greater temperature drops to be achieved in an even smaller package space. The latest innovation involves the introduction of a patent pending fin design inside the cooled length of the cooler. This gives an even greater temperature drop with a further reduced pressure drop. In customer trials this technology has given a temperature drop of over 150°C in as little as 8cm of cooled length. The small size and high effectiveness of this design means the finned Co-axial Cooler can be designed and routed to meet the customer's exact needs. It is this that makes it the perfect solution for many manufacturers operating in the 0-56kW power range, when package space and weight are at a premium.

The finned Co-axial Cooler offers significant benefits over traditional cooler designs. With it, Senior can offer its customers:

- The ability to meet EU Stage V legislation whilst reducing size, weight and cost, compared to traditional cooler designs. This compact, lightweight, routable design allows Senior to offer unrivalled cooling in an extremely tight space.
- A product which acts to protect the vulnerable EGR valve from excessive thermal loads, reducing the time, cost and damage to customers brand associated with warranty claims.
- A design which is highly resistant to fouling, has high thermal cycle durability even when empty of coolant, and is highly resistant to coolant boiling. Senior's zero warranty record over the life of the product is testament to this.



The beauty of the finned Co-axial Cooler is its flexibility. Not only can it act as a stand-alone cooler for lower power engines, it can act as an addition to existing engines to protect existing coolers and valves from extreme temperatures. Alternatively it can be combined with a Senior Flexonics Shell and Tube or Plate cooler to meet customers' requirements in much higher power applications.

To find out more about how Senior can fix your Stage V problems, email StageV@seniorflexonics.co.uk or visit www.seniorflexonics.co.uk

Senior Flexonics is a division of Senior Plc – a company with over 100 years dedicated to innovation. Senior combines European and North American centres of engineering excellence with a global, low cost, manufacturing base, to mirror the needs of its customers. Senior offer world class APQP project management support, as well as a full engineering service, from design to full scale production.