

Operating Manual

EML 4551C

Dr. Amin

**Team 4: Alternative material for compressor casing in turbocharger**

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# Diagram and explanation of how a turbocharger operates

*Fig.1 Schematic of how a turbocharger operates and its different components. 1*

## Functional Analysis of operation

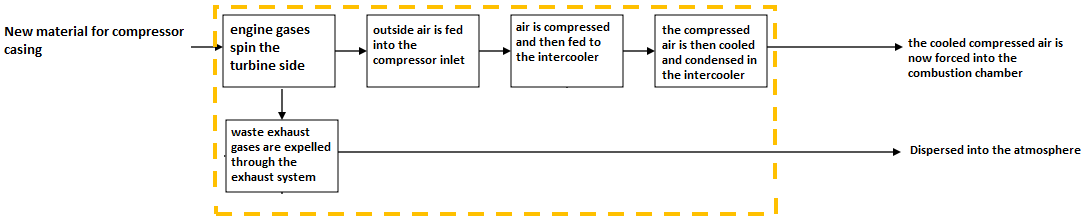
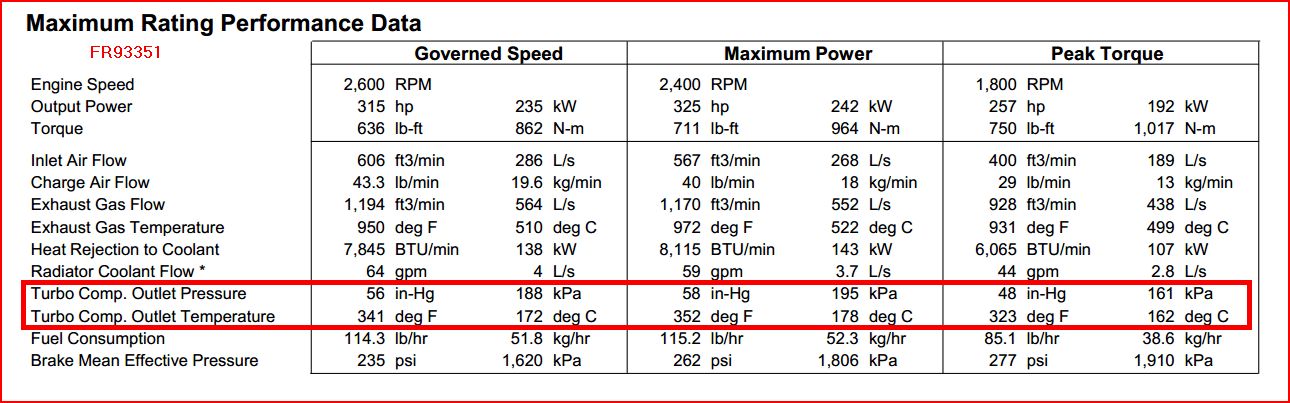


Fig.2 Functional analysis of how a turbocharger operates.

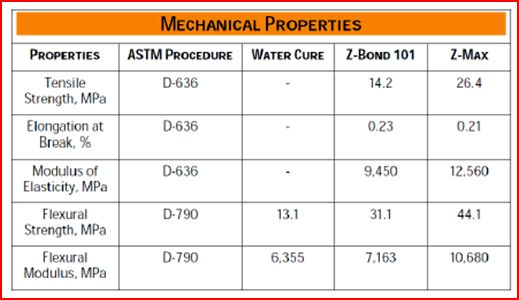
## 1.2 Maximum performance conditions for compressor



*Figure 2. Experimental data of turbocharger supplied by sponsor.*

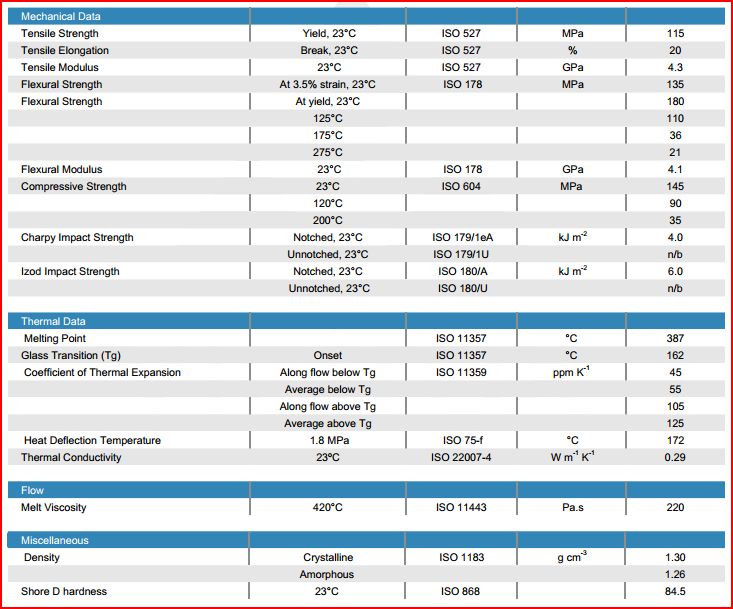
# Compressor casing prototype and mechanical properties

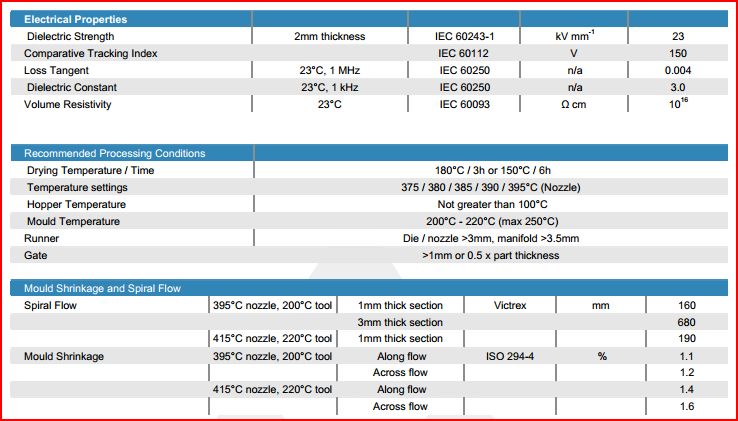
## 2.1 3-D printed prototype for demonstration

*Fig.4 3-D printed compressor casing based on Z-max a proprietary material. (For demonstration purposes only).*

## 2.2 Material properties of casing based on selected alternate material (PEEK).





*Fig.5 Material properties of PEEK obtained from Victrex for VICTREX® 45GL30*.2

# Brief outline for regular / routine maintenance

The routine maintenance that would be required for the turbocharger compressor casing would be very minimal. It would most likely include the following. After every other oil change interval, roughly 10,000 miles, it would require the operator to perform a visual inspection of the turbocharger compressor casing. The operator would check for any cracks or physical damage that compressor casing may have endured, which would result in loss of pressure and engine performance. Also the operator would check to make sure that both intake hoses are firmly secured to the casing and have come loose or been compromised in any way.

# 4.References

1. "Turbo Torque." *Turbo Torque*. N.p., n.d. Web. 21 Oct. 2013. <http://www.mazdarotary.net/turbo.htm>.

2. "Victrex.com." *Victrex.com*. N.p., n.d. Web. 27 Mar. 2014. <http://www.victrex.com/en/datasheets/datasheets.php?setUserId=91893&>.