

Intercooler test BMW N54 135i

When a Turbo engine is tuned, the boost levels will be higher and so will be the air temperature that is coming out of the turbos, to the intercooler.

After a certain boost level, it is fundamental to install a better intercooler for healthy and smooth power delivery. But not all aftermarket intercoolers are as good as they want you to believe. We did some testing to see what is on the market and we found some information that we had to share with BMW tuning enthusiasts.

We tested 4 different intercoolers:

- original BMW
- Wagner, EVO 1 Performance
- Horse Power Freaks
- Mosselman Turbo Systems

on a 135i N54 2008 (stock 306hp/400Nm).

We tested each intercooler with both stock software and a stage 2 tuned remap software on Euro 95 fuel (**non** premium, this was in the car at that moment). We strongly recommend premium fuel on tuned cars, in Europe Super 98 or higher.



Art. Nr.: 17517540035



EVO 1 PERFORMANCE



Art.nr.: 200001022



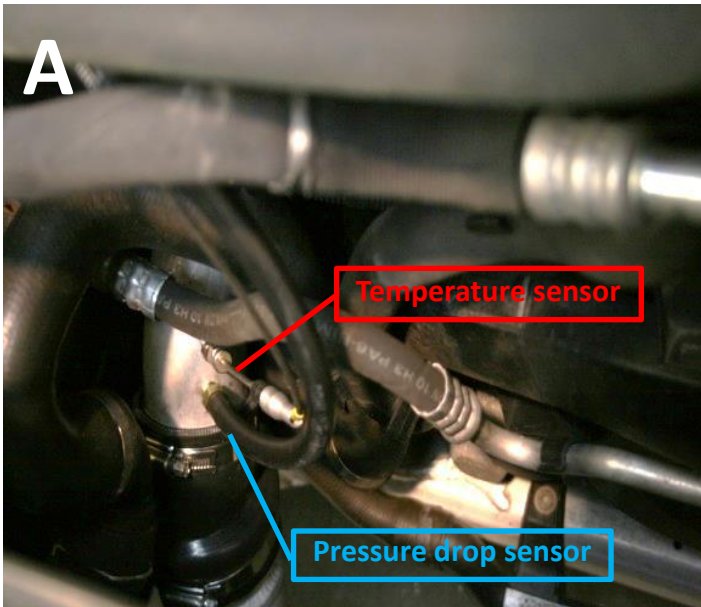
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MOSSELMAN
Turbo Systems



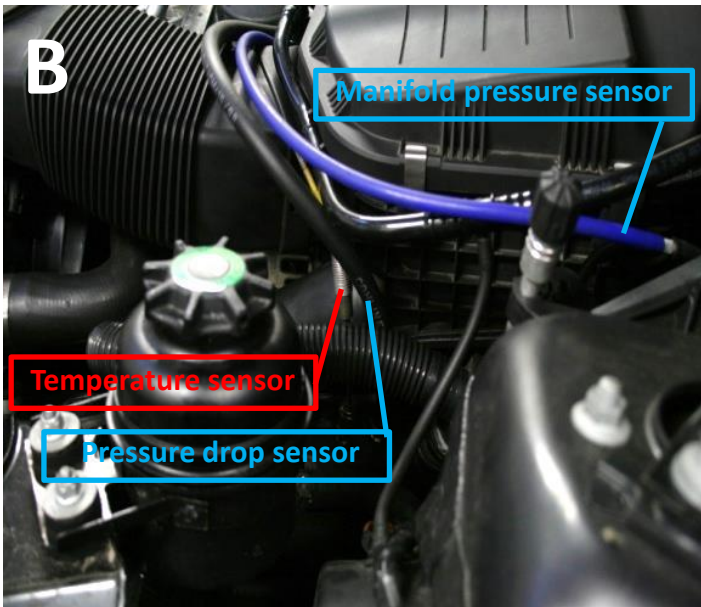
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A



Picture A: sensors before the intercooler

B



Picture B: sensors after the intercooler

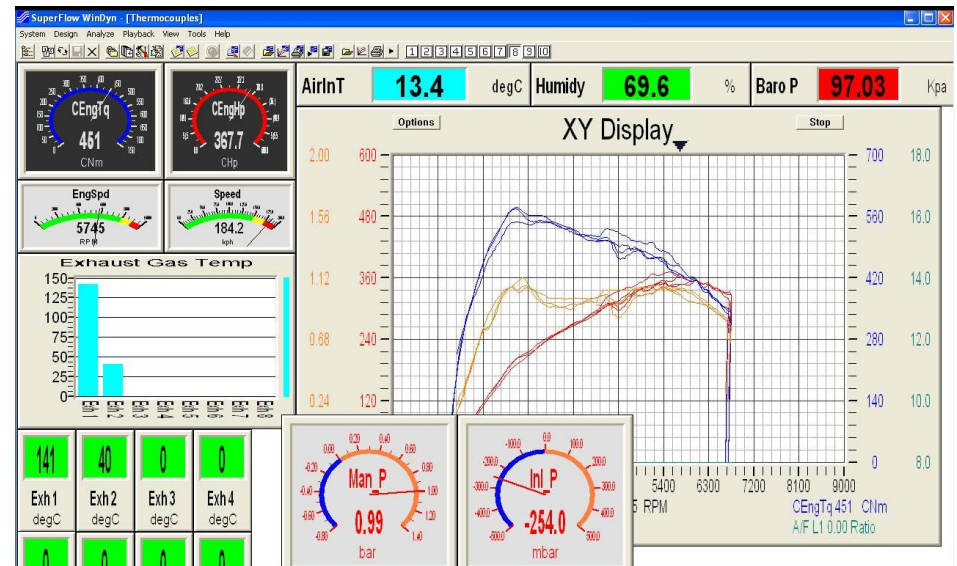
Where were the sensors located

To get the most reliable data, we installed the sensors in such a position that they could stay in place when changing the intercooler, even when it comes with an alternative hose kit.

We installed temperature and boost sensors in the in the aluminium pressure pipe before the intercooler, **(Picture A)** and the sensors after the intercooler were installed in the pressure pipe that connects to the throttle body **(Picture B)**.



On the dyno, sensors connected.



Dyno screen (Exh1= before, Exh2= after intercooler, Man_P=boost, Inl_P=pressure drop)

How to get reliable data

In order to get reliable data measurements, we made a protocol to ensure that the engine runs every session under the same conditions. Therefore, a driving cycle was made with right after 3 measurements per cycle.

All the measurements were done on the same day, with the same weather conditions (Humidity around 70%, Temperatures around 14°C/57°F).

Our dyno room is equipped with 2 times 30Kw cooling fans, plus 6 times 2,5Kw ventilation fans. Even this massive 75Kw on air speed and ventilation is still less than driving on the street at higher speeds, so temperature data should be used as reference, and can be slightly different on the street. The pressure drop is rock hard data, not influenced by external conditions.



Intercooler test protocol



The cycle was started when the oil temperature reached 105 °C (221 °F)

Step1

- 120sec 90km/h (56m/h) in 4th gear
- Cooling fan speed 70%
- Room ventilation 100%

Step2

- 60sec 50km/h (31m/h) in 3th gear
- Cooling fan speed 50%
- Room ventilation 100%

Step3

- 15sec 30km/h (19m/h) in 4th gear
- Cooling fan speed 30%
- Room ventilation 100%

Step4

1strun

- Full throttle run from 30km/h to rpm limiter@7000rpm in 4th gear
- Cooling fan speed 100%
- Room ventilation 100%

Step3b

- 15sec 30km/h (19m/h) in 4th gear
- Cooling fan speed 30%
- Room ventilation 100%

Step4b

2ndrun

- Full throttle run from 30km/h to rpm limiter@7000rpm in 4th gear
- Cooling fan speed 100%
- Room ventilation 100%

Step3c

- 15sec 30km/h (19m/h) in 4th gear
- Cooling fan speed 30%
- Room ventilation 100%

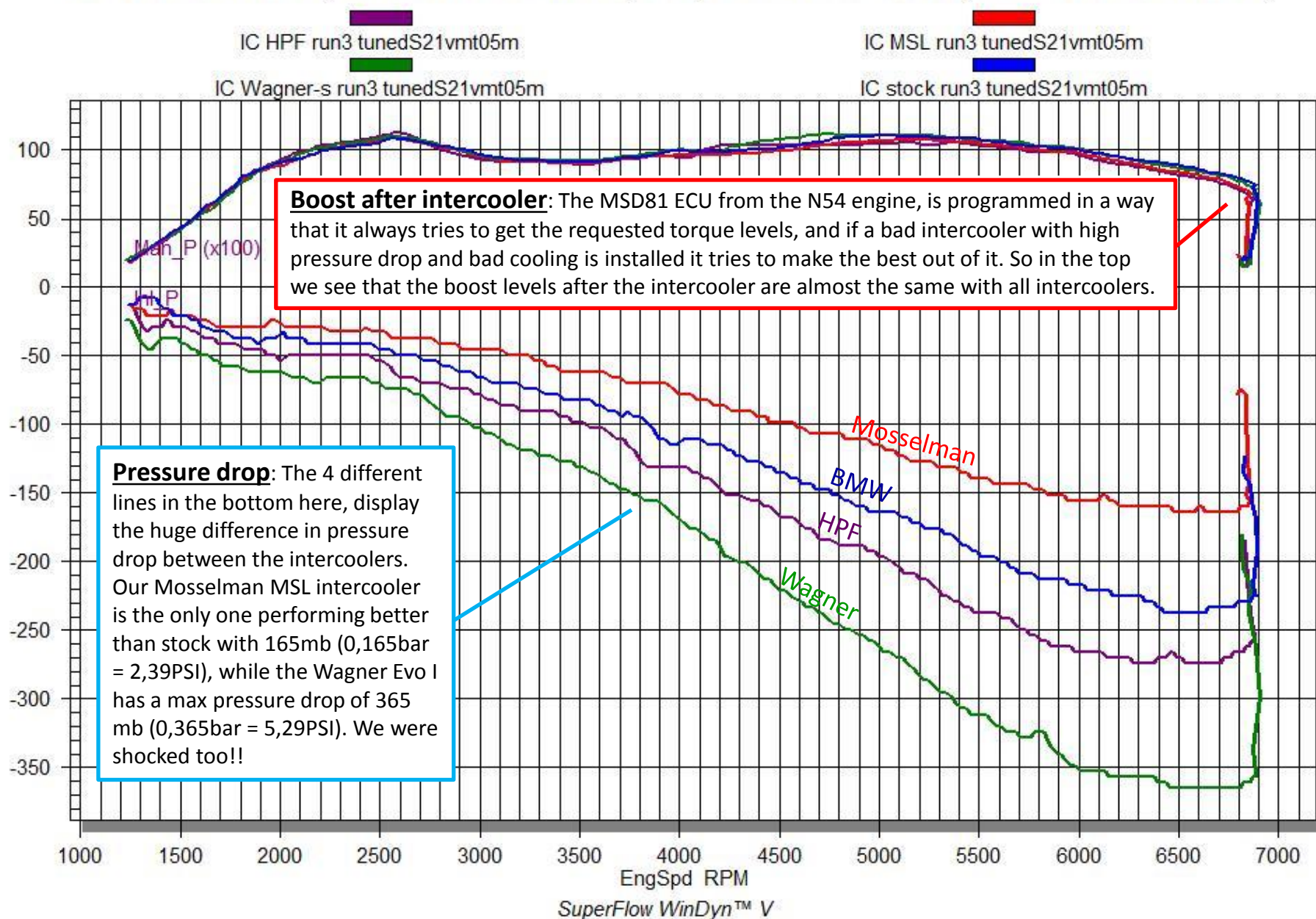
Step4c

3rdrun

- Full throttle run from 30km/h to rpm limiter@7000rpm in 4th gear
- Cooling fan speed 100%
- Room ventilation 100%

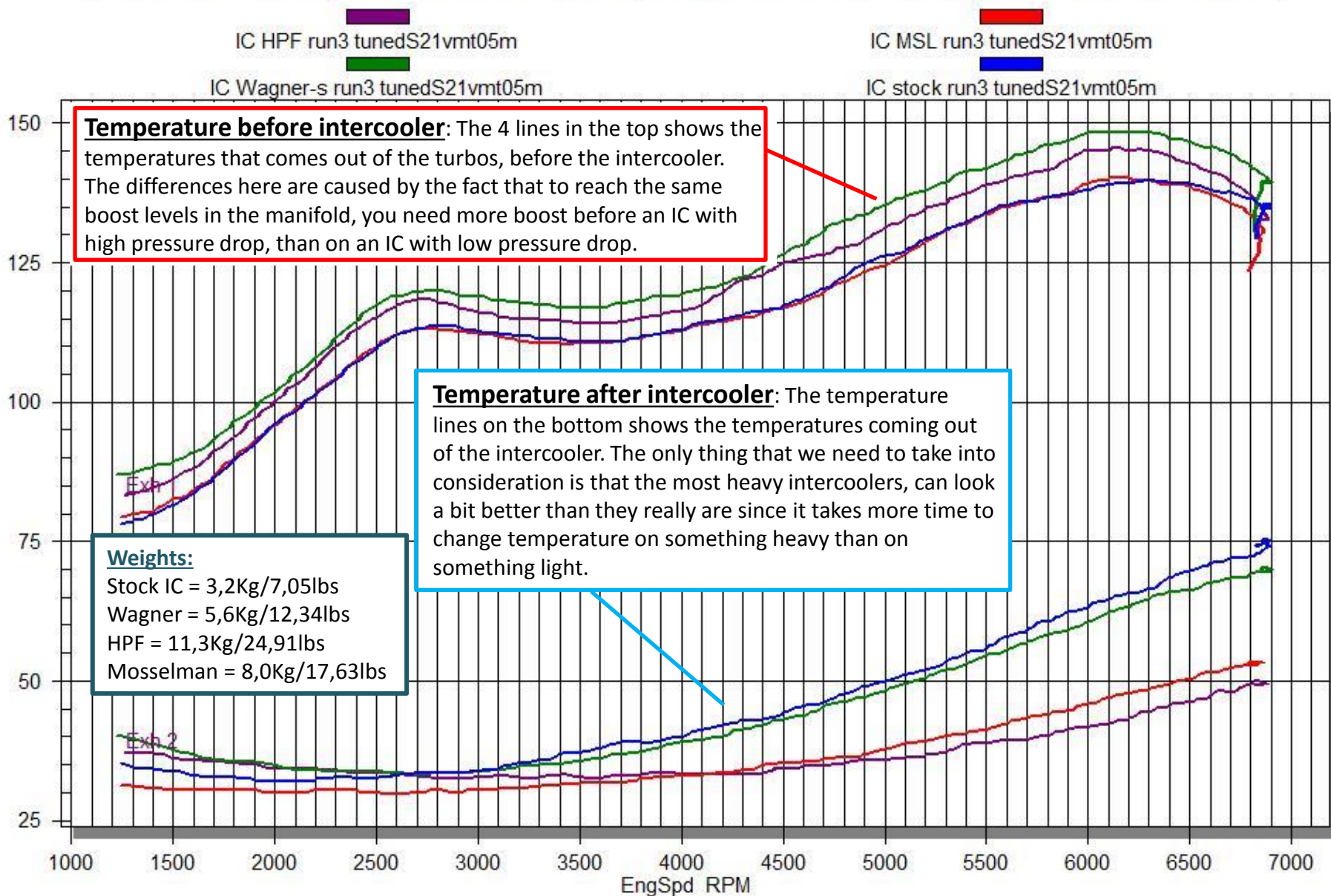
DIN corrected Engpower and torque vs. RPM

IC HPF run3 tunedS21vmt05m, IC MSL run3 tunedS21vmt05m, IC Wagner-s run3 tunedS21vmt05m, IC stock run3 tunedS21vmt05m,



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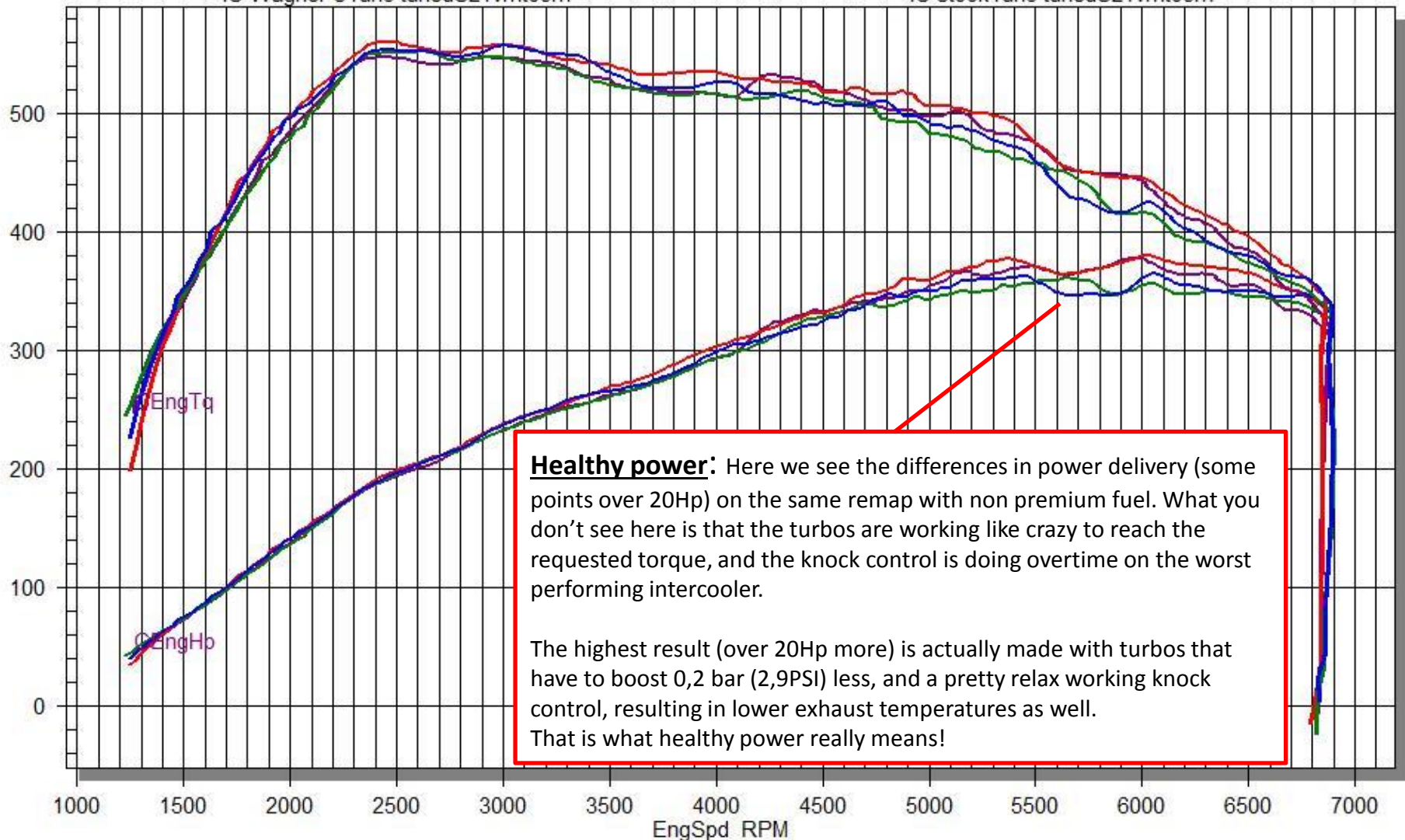
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IC HPF run3 tunedS21vmt05m

IC MSL run3 tunedS21vmt05m

IC Wagner-s run3 tunedS21vmt05m

IC stock run3 tunedS21vmt05m



Healthy power: Here we see the differences in power delivery (some points over 20Hp) on the same remap with non premium fuel. What you don't see here is that the turbos are working like crazy to reach the requested torque, and the knock control is doing overtime on the worst performing intercooler.

The highest result (over 20Hp more) is actually made with turbos that have to boost 0,2 bar (2,9PSI) less, and a pretty relax working knock control, resulting in lower exhaust temperatures as well. That is what healthy power really means!

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Conclusions on Intercooler test BMW N54 135i

We hope You enjoyed our research, that we started to do for our own information at first. This was caused by a customer that changed his Wagner intercooler for our latest Mosselman intercooler, so we decided to measure the differences, and compare the stock and Horsepower Freaks Intercooler that we used in the past as well.

The data that we showed, were all measured with the same remap. We measured all intercoolers with the stock mapping as well, but we concluded here that the stock intercooler was up for the job. The pressure drop on the stock cooler is not as bad as many want you to believe, and with the stock boost levels, the temperature was still reasonable.

How we would score them on a tuned car: (scale 1 – 10, where 1 = bad and 10 = excellent)

Stock cooler:

Pressure drop 7
Cooling capacity 2

Total points 9 (small plus is the mass with 3,2Kg/7,05lbs)

Wagner cooler:

Pressure drop 3
Cooling capacity 3

Total points 6 (performs actually less than the stock intercooler)

Horsepower Freaks cooler:

Pressure drop 6
Cooling capacity 9

Total points 15 (small minus is the mass with 11,3Kg/24,91lbs)

Mosselman MSL cooler:

Pressure drop 9
Cooling capacity 8

Total points 17 (throttle response best as well, due to low pressure drop and no unnecessary endtank volume)

Of course we are happy that our own intercooler comes out on top, but the real enthusiast can hopefully see that we did it seriously.

We hope You use this information wisely, and everybody appreciate our honest opinion, since it is unfiltered.

Not all “performance products” on the market are an actual improvement!