

# Impact of increased back pressure by exhaust gas treatment systems

Date: 2019-02-01

Reference No.: 21349/RH0008/006-1

## Contents

1	Background .....	1
2	Exhaust system back pressure .....	1
3	Influence on engine performance .....	2
4	Test procedure on testbed .....	3

## 1 Background

This Technical Information Note (TIN) outlines the engine performance and related handling of the engine specifications when the exhaust back pressure is increased due to the installation of an exhaust gas treatment system (SO<sub>x</sub> scrubber or LP-SCR system).

## 2 Exhaust system back pressure

### 2.1 Standard back pressure

The reference back pressure for WinGD engines is 300 mmWC at 100 % power and ISO ambient conditions. This is the standard back pressure which incorporates pressure drop from piping, economiser etc. of the exhaust gas system. It does not include any exhaust gas treatment systems as described in the next section.

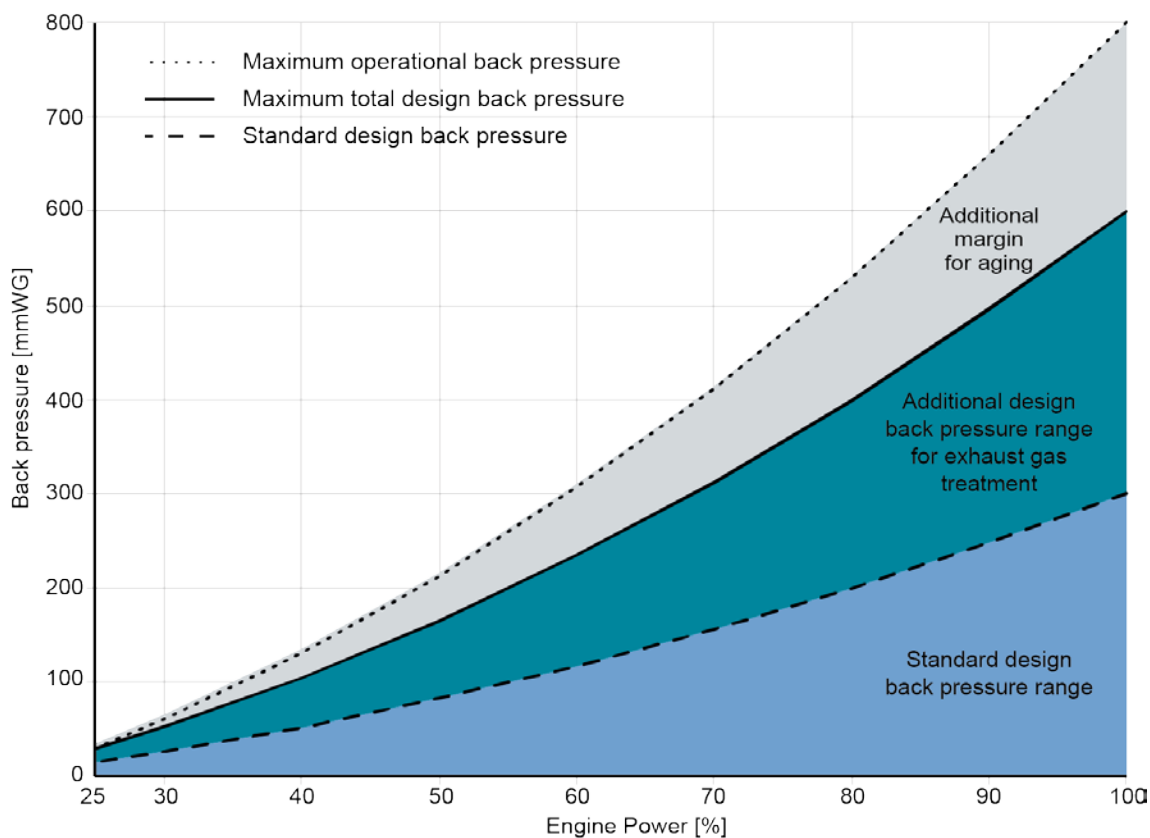
### 2.2 Additional back pressure

Exhaust gas treatment systems (SO<sub>x</sub> scrubbers or LP-SCR systems) are installed in the exhaust gas system after the engine and may increase the back pressure beyond the standard limit of 300 mmWC at 100 % operating power.

As such, the maximum allowable back pressure increase when an exhaust gas treatment system is installed is 300 mmWC at 100 % power and ISO ambient conditions.

### 2.3 Total exhaust gas system back pressure

The total exhaust gas system back pressure is generated by combining the standard back pressure of the exhaust system with the additional back pressure generated by an exhaust gas treatment system. The maximum allowable design back pressure is 600 mmWC.



SM-0413

Figure 2-1: Exhaust gas system back pressure range

### 3 Influence on engine performance

The installation of an exhaust gas treatment system will influence the engine performance (specific fuel oil consumption, exhaust gas flow and temperature). The expected data with increased back pressure can be calculated in GTD.

## 4 Test procedure on testbed

### 4.1 LP-SCR installations

In Tier II mode, the back pressure is set to 300 mmWC and the turbocharger is matched to this. In case Tier III mode is tested with the LP-SCR in operation, no further adjustments are done. The total maximum back pressure of 600 mmWC must not be exceeded. In case Tier III is just simulated without LP-SCR, the back pressure is adjusted to the maximum Tier III back pressure of 600mmWC.

Member engines shall be tested using the same back pressure as the parent engine.

### 4.2 SO<sub>x</sub> scrubber installations

For scrubber installations, the following shop test procedure is recommended:

1. The back pressure is set to 300 mmWC plus the design values of the scrubber pressure drop at 100 % power. As an example: if the scrubber pressure drop is 150 mmWC at 100 % power, the back pressure shall be set to 450 mmWC (300 + 150 mmWC). When the design value is unknown, 600 mmWC back pressure shall be set.
2. The turbocharger matching is done using the total back pressure (exhaust gas system + scrubber).
3. The total back pressure must not exceed 600 mmWC
4. For the ISO correction, the total back pressure (exhaust gas system + scrubber pressure drop) is used as the reference back-pressure. The reference performance data can be created in the GTD using the scrubber option.
5. Member engines shall be tested using the same back-pressure as the parent engine.