

Effect on performance improvement of DPF by setting vacuum insulation device

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The activation temperature of the catalyst that coated DPF is 300°C or more, but the outside air temperature is 40°C or less, which cause the significant decreases of the temperature in the outer part of the DPF. In this study, at first, the distribution of the temperature DPF set up in the 214kW/3101min⁻¹ diesel engine is clarified and the functions required for DPF are shown. Next, it is clarified that the performance of DPF is improved by setting up the vacuum insulation device.

As a result, the followings are clarified.

- (1) Figure 1 shows the relation between DPF inlet temperature and DPF inlet pressure. The catalyst of DPF doesn't function if the temperature doesn't become 300°C or more. The DPF inlet pressure rises because the passage of exhaust gas narrows when PM piles up in DPF.
- (2) As shown in Figure 2, fuel oil consumption increases by 8% when exhaust line pressure increase up to 20 kPa. The function of turbo charger decreases because the flowing quantity of exhaust gas decreases when the passage of DPF narrows. As a result, combustion deteriorates and fuel oil consumption increases because the amount of the supply of oxygen necessary for combustion decreases.
- (3) Figure 3 shows the effect of the insulated structure. While the outer part temperature of normal DPF is about 50°C lower than inlet temperature of DPF, that of DPF assuming an vacuum insulated structure becomes almost the same as inlet temperature of DPF.

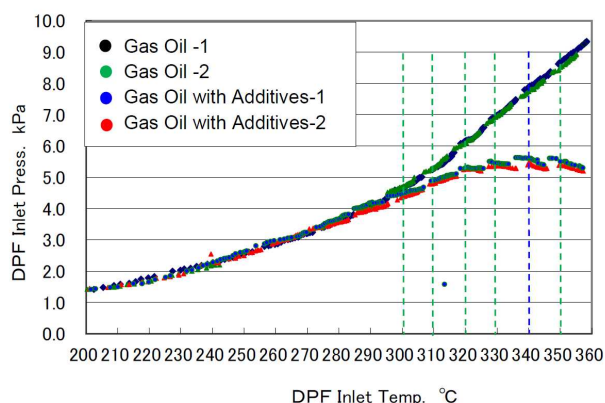


Fig. 1 Relation between DPF inlet temperature and DPF inlet pressure

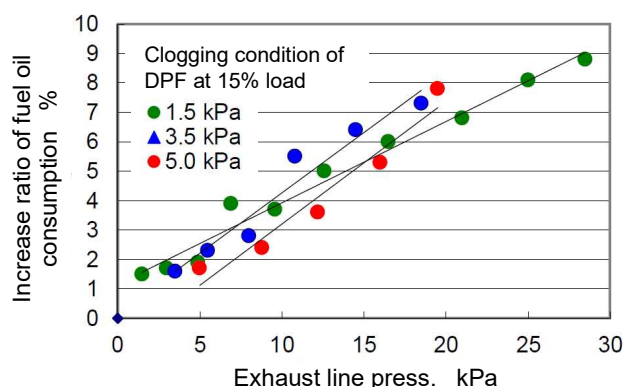
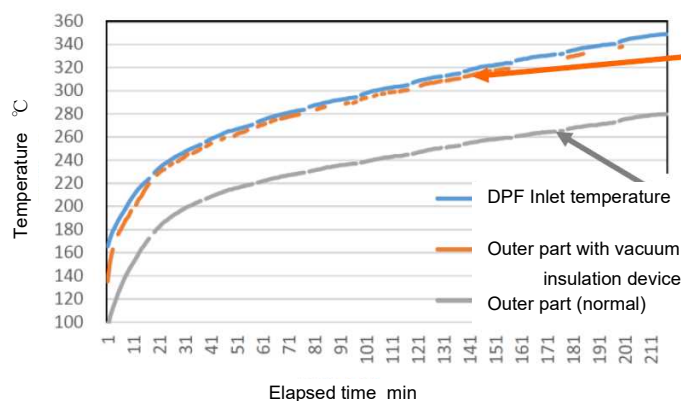


Fig. 2 Relation between exhaust line pressure and increase ratio of fuel oil consumption



Normal DPF



DPF with vacuum insulation device (The size of diameter and length is almost equal to normal DPF)

Fig. 3 Effect of vacuum insulation device