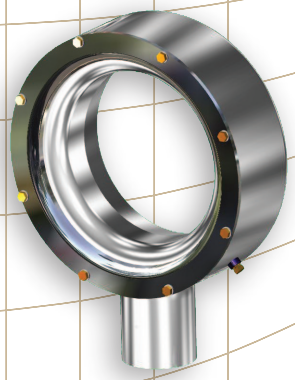
Exhaust Gas Diluters

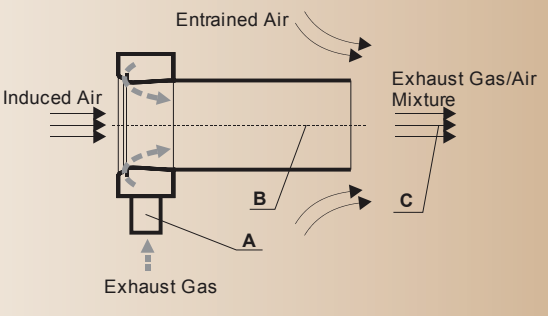


System Overview

The Nett Exhaust Gas or Fume Diluter is designed to dilute and cool exhaust gas by mixing ambient air with the exhaust gas in an approximately 10-1 ratio. It's often used in mining and tunneling applications where employees could be exposed to high temperature exhaust gas at the tailpipe of the machine. The Fume Diluter also reduces concentrations of hazardous gases by spreading the gases over a wider area. When emissions reductions are required is should be matched with a catalytic converter or diesel particulate filter.

Engine exhaust gases enter the circular manifold of the exhaust gas diluter, as shown in Figure 1. The gases are released from the manifold into the diffuser tube through an annular gap. The exhaust gases flow alongside the curved inside surface of the device, inducing quantities of ambient air into the diluter. This mechanism of air induction is known as the Coanda effect, named after Romanian discoverer Henri Marie Coandă.

Gas Flow in the Exhaust Gas Diluter



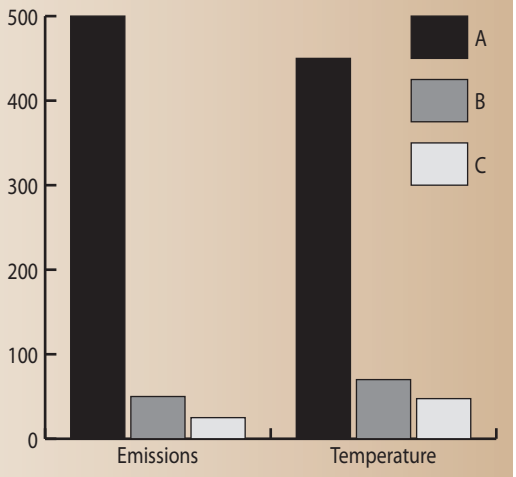
System Efficiency

Typical performance of the Nett exhaust gas diluter. The emissions and temperatures are sampled at three points, A, B, and C. The points represent the undiluted exhaust (A), the gases at the outlet from the diffuser tube (B), and gasses at 1m distance after the diluter (C, compare Figure 1).

The emissions are expressed in ppm. The same concentration reductions apply to all emissions, including diesel particulate matter (PM), carbon monoxide (CO), hydrocarbons (HC), and nitrogen oxides (NO_x).

The exhaust temperature is in degrees Celsius. The exhaust gas diluter can typically lower the exhaust temperature from 450°C to 70-80°C, measured at the gas discharge point, and to about 50°C measured 1 m from the vehicle.

Fume Diluter Performance



Both the emission dilutions and the exhaust cooling effect depend on the exhaust gas diluter gap setting. Smaller gaps produce higher exhaust gas velocities, higher dilutions and better cooling effects. However, they also result in a higher exhaust gas pressure drop in the diluter. Typical dilutions, as shown in Figure 2, are realized with the standard factory gap setting. The corresponding exhaust gas pressure drop is typically 5-7 kPa (20-28 in. H_2O). The gaps can be easily adjusted to change the dilutions and pressure losses by installing variable thickness shims underneath the diluter header.

NETT TECHNOLOGIES INC.
2-6707 Goreway Drive
Mississauga, ON L4V 1P7 Canada
web: http://www.nett.ca
e-mail: sales@nett.ca
tel: 905·672·5453 fax: 905·672·5949
toll-free (North America): 800·361·6388

...the emission control authority.

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