

VOLVO

NOx correction

Presented at WHDC Beijing 16 October 2008

SCR Engine tested in ESC

How to correct NOx for Humidity?

No Correction of NOx

Humidity g/kg dry air	Corr- factor	Eng out	SCR out	Diff
13.8	No	8.1	2.2	5.9
7.5	No	9.0	3.1	5.9
4.3	No	9.5	3.7	5.8

With NOx Correction (WHDC §8.2.1 incl)

13.8	1.06 (1.05)	8.6	2.3	6.3
7.5	0.95 (0.95)	8.6	3.0	5.6
4.3	0.90 (0.90)	8.6	3.3	5.2

Remark: Engine inlet set temp at 25 °C

Humidity ref condition: 10.71 g/kg dry air (2005/78/ EC)

NO_x correction

2005/78/EC



5.3. NO_x correction for humidity and temperature

As the NO_x emission depends on ambient air conditions, the NO_x concentration shall be corrected for ambient air temperature and humidity with the factors given in the following formulae. The factors are valid in the range between 0 and 25 g/kg dry air.

(a) for compression ignition engines:

$$k_{h,D} = \frac{1}{1 - 0,0182 \times (H_a - 10,71) + 0,0045 \times (T_a - 298)}$$

with:

T_a = temperature of the intake air, K

H_a = humidity of the intake air, g water per kg dry air

NOx correction

WHDC



8.2. NO_x correction for humidity

As the NO_x emission depends on ambient air conditions, the NO_x concentration shall be corrected for humidity with the factors given in paragraph 8.2.1. or 8.2.2. The intake air humidity H_a may be derived from relative humidity measurement, dew point measurement, vapour pressure measurement or dry/wet bulb measurement using generally accepted equation.

8.2.1. Compression-ignition engines

$$k_{h,D} = \frac{15.698 \times H_a}{1,000} + 0.832 \quad (18)$$

where:

H_a is the intake air humidity, g water per kg dry air