



# ICAO ENGINE nvPM EMISSIONS DATA SHEET

## SUBSONIC ENGINES

ENGINE IDENTIFICATION: Trent XWB-75  
UNIQUE ID NUMBER: 01P18RR121  
COMBUSTOR: Phase5 Tiled  
ENGINE TYPE: TF  
BYPASS RATIO (-): 9.3  
PRESSURE RATIO  $\pi_{co}$  (-): 36.8  
RATED OUTPUT  $F_{oo}$  (kN): 334.0

### REGULATORY DATA

CHARACTERISTIC VALUES:	$LTO_{mass}/F_{oo}$ (mg/kN)	$LTO_{num}/F_{oo}$ (particles/kN)	NVPM MASS CONCENTRATION ( $\mu\text{g}/\text{m}^3$ )
LTO/ $F_{oo}$ AND MAX nvPM <sub>mass</sub>	177.8	2.13E+15	2619
AS % OF CAEP/10 LIMIT	-	-	67.3
AS % OF CAEP/11 LIMIT (InP)	51.2	51.0	
AS % OF CAEP/11 LIMIT (NT)	83.1	76.5	

### MEASURED DATA

MODE	POWER SETTING (% $F_{oo}$ )	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK nvPM <sub>mass</sub> ( $\mu\text{g}/\text{m}^3$ )
				EI <sub>mass</sub> (mg/kg)	EI <sub>num</sub> (particles/kg)	
TAKE-OFF	100	0.7	2.411	53.3	2.49E+14	
CLIMB OUT	85	2.2	1.980	85.9	4.19E+14	
APPROACH	30	4.0	0.715	82.0	9.73E+14	
IDLE	7	26.0	0.270	25.4	7.78E+14	
LTO TOTAL (kg, mg, number of particles)			955	52614	6.29E+17	-
NUMBER OF ENGINES				3	3	3
NUMBER OF TESTS				4	4	4
AVERAGE LTO/ $F_{oo}$ VALUES (mg/kN, particles/kN)				157.5	1.88E+15	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ( $\mu\text{g}/\text{m}^3$ )				132.3	1.03E+15	2381

\* Emissions Indices are corrected for thermophoretic loss and fuel hydrogen content

### DATA FOR EMISSIONS INVENTORIES (ESTIMATIONS FOR ENGINE EXIT PLANE VALUES)

MODE	POWER SETTING (% $F_{oo}$ )	CORRECTED EMISSIONS INDICES	
		EI <sub>mass_SL</sub> (mg/kg)	EI <sub>num_SL</sub> (particles/kg)
TAKE-OFF	100	58.1	3.77E+14
CLIMB OUT	85	94.2	7.17E+14
APPROACH	30	94.4	2.13E+15
IDLE	7	31.3	1.82E+15

### AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	98.6	101.9	HEAT OF COMBUSTION (MJ/kg)	43.18
TEMPERATURE (K)	283.0	295.0	HYDROGEN CONTENT (%mass)	13.84
HUMIDITY (kg water/kg dry air)	0.0006	0.0096	AROMATICS CONTENT (%vol)	16.8
			NAPHTHALENE CONTENT (%vol)	1.23
			SULPHUR CONTENT (ppm by mass)	373

MANUFACTURER: Rolls-Royce plc  
TEST ORGANIZATION: Rolls-Royce plc  
TEST LOCATION: Derby  
TEST DATES: 03/07/2014-08/12/2018

### REMARKS

1. Certification report EDNS01000844195
2. The maximum EI<sub>mass</sub> occurs between 30% and 85%  $F_{oo}$
3. The maximum EI<sub>num</sub> occurs between 30% and 85%  $F_{oo}$
4. Corrected peak EI number value (fuel correction) since EEDB v30