



# ICAO ENGINE nvPM EMISSIONS DATA SHEET

## SUBSONIC ENGINES

ENGINE IDENTIFICATION: Trent 772  
UNIQUE ID NUMBER: 01P14RR102  
COMBUSTOR: Phase5  
ENGINE TYPE: MTF  
BYPASS RATIO (-): 5.0  
PRESSURE RATIO  $\pi_{co}$  (-): 36.3  
RATED OUTPUT  $F_{oo}$  (kN): 320.3

### 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>	201.4	1.88E+15	490
AS % OF CAEP/10 LIMIT	-	-	12.4
AS % OF CAEP/11 LIMIT (InP)	57.9	45.2	
AS % OF CAEP/11 LIMIT (NT)	94.1	67.8	

### 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	3.139	72.7	2.38E+14	
CLIMB OUT	85	2.2	2.530	94.9	3.94E+14	
APPROACH	30	4.0	0.821	17.1	4.09E+14	
IDLE	7	26.0	0.270	4.1	4.52E+14	
LTO TOTAL (kg, mg, number of particles)			1085	46393	4.34E+17	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE LTO/ $F_{oo}$ VALUES (mg/kN, particles/kN)				144.9	1.36E+15	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ( $\mu\text{g}/\text{m}^3$ )				95.8	5.68E+14	381

\* 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	77.6	3.39E+14
CLIMB OUT	85	102.4	5.73E+14
APPROACH	30	20.2	8.71E+14
IDLE	7	6.1	1.66E+15

### AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	101.0	101.3	HEAT OF COMBUSTION (MJ/kg)	43.10
TEMPERATURE (K)	289.3	293.2	HYDROGEN CONTENT (%mass)	13.60
HUMIDITY (kg water/kg dry air)	0.0074	0.0086	AROMATICS CONTENT (%vol)	19.4
			NAPHTHALENE CONTENT (%vol)	2.00
			SULPHUR CONTENT (ppm by mass)	400

MANUFACTURER: Rolls-Royce plc  
TEST ORGANIZATION: Rolls-Royce plc  
TEST LOCATION: Derby  
TEST DATES: 02/06/2014

### REMARKS

1. Certification Report EDNS01000788666
2. Data valid for Trent 772B and 772C
3. The maximum EI<sub>mass</sub> occurs between 30% and 85%  $F_{oo}$
4. The maximum EI<sub>num</sub> occurs between 30% and 85%  $F_{oo}$
5. Corrected peak EI number value (fuel correction) since EEDB v30