



# ICAO ENGINE nvPM EMISSIONS DATA SHEET

## SUBSONIC ENGINES

ENGINE IDENTIFICATION: Trent XWB-79EP  
UNIQUE ID NUMBER: 07P27RR152  
COMBUSTOR: Phase5 Tiled  
ENGINE TYPE: TF  
BYPASS RATIO (-): 8.9  
PRESSURE RATIO  $\pi_{00}$  (-): 41.5  
RATED OUTPUT  $F_{00}$  (kN): 355.2

### REGULATORY DATA

CHARACTERISTIC VALUES:	$LTO_{mass}/F_{00}$ (mg/kN)	$LTO_{num}/F_{00}$ (particles/kN)	NVPM MASS CONCENTRATION ( $\mu\text{g}/\text{m}^3$ )
$LTO/F_{00}$ AND MAX $nvPM_{mass}$	134.3	$2.11\text{E}+15$	2233
AS % OF CAEP/10 LIMIT	-	-	58.7
AS % OF CAEP/11 LIMIT (InP)	38.6	50.6	
AS % OF CAEP/11 LIMIT (NT)	62.8	75.9	

### MEASURED DATA

MODE	POWER SETTING (% $F_{00}$ )	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK $nvPM_{mass}$ ( $\mu\text{g}/\text{m}^3$ )
				$EI_{mass}$ (mg/kg)	$EI_{num}$ (particles/kg)	
TAKE-OFF	100	0.7	2.564	38.0	$1.71\text{E}+14$	
CLIMB OUT	85	2.2	2.089	57.8	$3.57\text{E}+14$	
APPROACH	30	4.0	0.722	82.4	$1.24\text{E}+15$	
IDLE	7	26.0	0.243	21.0	$8.79\text{E}+14$	
LTO TOTAL (kg, mg, number of particles)			935	42254	$6.64\text{E}+17$	-
NUMBER OF ENGINES				3	3	3
NUMBER OF TESTS				3	3	3
AVERAGE $LTO/F_{00}$ VALUES (mg/kN, particles/kN)				119.0	$1.87\text{E}+15$	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ( $\mu\text{g}/\text{m}^3$ )				119.4	$1.30\text{E}+15$	2030

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

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

MODE	POWER SETTING (% $F_{00}$ )	CORRECTED EMISSIONS INDICES	
		$EI_{mass\_SL}$ (mg/kg)	$EI_{num\_SL}$ (particles/kg)
TAKE-OFF	100	41.3	$2.50\text{E}+14$
CLIMB OUT	85	63.6	$5.67\text{E}+14$
APPROACH	30	95.6	$2.60\text{E}+15$
IDLE	7	26.7	$2.00\text{E}+15$

### AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	98.6	102.2	HEAT OF COMBUSTION (MJ/kg)	43.26
TEMPERATURE (K)	283.0	295.0	HYDROGEN CONTENT (%mass)	13.93
HUMIDITY (kg water/kg dry air)	0.0050	0.0096	AROMATICS CONTENT (%vol)	16.4
			NAPHTHALENE CONTENT (%vol)	0.81
			SULPHUR CONTENT (ppm by mass)	350

MANUFACTURER: Rolls-Royce plc  
TEST ORGANIZATION: Rolls-Royce  
TEST LOCATION: Derby  
TEST DATES: 03/07/2014-30/03/2021

### REMARKS

1. Certification report EDNS01001039303 Issue 1
2. The maximum  $EI_{mass}$  occurs between 30% and 85%  $F_{00}$
3. The maximum  $EI_{num}$  occurs between 30% and 85%  $F_{00}$