



# ICAO ENGINE nvPM EMISSIONS DATA SHEET

## SUBSONIC ENGINES

ENGINE IDENTIFICATION: Trent 1000-H3  
UNIQUE ID NUMBER: 01P19RR110  
COMBUSTOR: Phase5 Tiled  
ENGINE TYPE: TF

BYPASS RATIO (-): 9.3  
PRESSURE RATIO  $\pi_{co}$  (-): 40.3  
RATED OUTPUT  $F_{oo}$  (kN): 287.1

### 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 $nvPM_{mass}$	233.6	1.88E+15	3410
AS % OF CAEP/10 LIMIT	-	-	82.7
AS % OF CAEP/11 LIMIT (InP)	67.2	45.2	
AS % OF CAEP/11 LIMIT (NT)	109.2	67.8	

### MEASURED DATA

MODE	POWER SETTING (% $F_{oo}$ )	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	2.108	71.6	2.45E+14	
CLIMB OUT	85	2.2	1.732	114.0	4.09E+14	
APPROACH	30	4.0	0.598	64.2	8.10E+14	
IDLE	7	26.0	0.232	18.3	4.35E+14	
LTO TOTAL (kg, mg, number of particles)			823	48261	3.89E+17	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE $LTO/F_{oo}$ VALUES (mg/kN, particles/kN)				168.1	1.36E+15	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ( $\mu\text{g}/\text{m}^3$ )				150.4	9.58E+14	2649

\* 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	
		$EI_{mass,SL}$ (mg/kg)	$EI_{num,SL}$ (particles/kg)
TAKE-OFF	100	77.2	3.47E+14
CLIMB OUT	85	124.0	6.45E+14
APPROACH	30	74.7	1.82E+15
IDLE	7	22.2	8.78E+14

### AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	100.8	101.6	HEAT OF COMBUSTION (MJ/kg)	43.34
TEMPERATURE (K)	287.0	292.6	HYDROGEN CONTENT (%mass)	13.97
HUMIDITY (kg water/kg dry air)	0.0080	0.0090	AROMATICS CONTENT (%vol)	15.9
			NAPHTHALENE CONTENT (%vol)	0.11
			SULPHUR CONTENT (ppm by mass)	300

MANUFACTURER: Rolls-Royce plc  
TEST ORGANIZATION: Rolls-Royce plc  
TEST LOCATION: Derby  
TEST DATES: 04/10/2018

### REMARKS

1. Certification Report EDNS01000740804

\*\* DATA SUPERSEDED \*\*

SEE FOLLOWING UID FOR REVISED DATA:

02P23RR130