



# ICAO ENGINE nvPM EMISSIONS DATA SHEET

## SUBSONIC ENGINES

ENGINE IDENTIFICATION: Trent7000-72 BYPASS RATIO (-): 8.9  
UNIQUE ID NUMBER: 01P19RR119 PRESSURE RATIO  $\pi_{co}$  (-): 45.8  
COMBUSTOR: Phase5 Tiled  
ENGINE TYPE: TF RATED OUTPUT  $F_{oo}$  (kN): 327.9

### 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 $nvPM_{mass}$	200.1	1.74E+15	3410
AS % OF CAEP/10 LIMIT	-	-	87.0
AS % OF CAEP/11 LIMIT (InP)	57.6	41.8	
AS % OF CAEP/11 LIMIT (NT)	93.5	62.7	

### 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	2.502	48.1	1.33E+14	
CLIMB OUT	85	2.2	2.040	84.1	2.91E+14	
APPROACH	30	4.0	0.671	74.0	8.57E+14	
IDLE	7	26.0	0.259	18.8	4.48E+14	
LTO TOTAL (kg, mg, number of particles)			939	47203	4.11E+17	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE $LTO/F_{oo}$ VALUES (mg/kN, particles/kN)				143.9	1.25E+15	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ( $\mu\text{g}/\text{m}^3$ )				152.5	9.67E+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	51.6	1.80E+14
CLIMB OUT	85	90.9	4.23E+14
APPROACH	30	85.5	1.92E+15
IDLE	7	22.7	8.95E+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\*\* DATA SUPERSEDED \*\*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:

02P23RR141