



# ICAO ENGINE nvPM EMISSIONS DATA SHEET

## SUBSONIC ENGINES

ENGINE IDENTIFICATION: AE3007A1E BYPASS RATIO (-): 4.8  
UNIQUE ID NUMBER: 01P06AL032 PRESSURE RATIO  $\pi_{co}$  (-): 18.6  
COMBUSTOR: Type 3 (reduced emissions)  
ENGINE TYPE: MTF RATED OUTPUT  $F_{oo}$  (kN): 37.4

### 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 $nvPM_{mass}$	158.5	2.86E+15	289
AS % OF CAEP/10 LIMIT	-	-	2.4
AS % OF CAEP/11 LIMIT (InP)	4.1	12.7	
AS % OF CAEP/11 LIMIT (NT)	16.0	24.1	

### 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	0.415	45.7	2.60E+14	
CLIMB OUT	85	2.2	0.347	38.0	3.01E+14	
APPROACH	30	4.0	0.125	9.7	3.17E+14	
IDLE	7	26.0	0.051	17.9	6.12E+14	
LTO TOTAL (kg, mg, number of particles)			174	4267	7.69E+16	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE $LTO/F_{oo}$ VALUES (mg/kN, particles/kN)				114.1	2.06E+15	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ( $\mu\text{g}/\text{m}^3$ )				45.7	6.12E+14	224

\* 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	50.8	6.00E+14
CLIMB OUT	85	43.0	7.52E+14
APPROACH	30	12.6	1.20E+15
IDLE	7	24.9	2.37E+15

### AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	98.8	99.9	HEAT OF COMBUSTION (MJ/kg)	43.20
TEMPERATURE (K)	272.8	283.2	HYDROGEN CONTENT (%mass)	13.69
HUMIDITY (kg water/kg dry air)	0.0018	0.0067	AROMATICS CONTENT (%vol)	16.2
			NAPHTHALENE CONTENT (%vol)	0.42
			SULPHUR CONTENT (ppm by mass)	81

MANUFACTURER: Rolls-Royce Corporation  
TEST ORGANIZATION: MS&T  
TEST LOCATION: Indianapolis  
TEST DATES: 23/03/2015-25/03/2015

### REMARKS

1. Certification Report EDNS04000123846