



ICAO ENGINE nvPM EMISSIONS DATA SHEET

SUBSONIC ENGINES

ENGINE IDENTIFICATION: AE3007A1/1 BYPASS RATIO (-): 4.8
UNIQUE ID NUMBER: 01P06AL029 PRESSURE RATIO π_{co} (-): 17.7
COMBUSTOR: Type 3 (reduced emissions)
ENGINE TYPE: MTF RATED OUTPUT F_{oo} (kN): 35.0

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}	155.2	3.05E+15	260
AS % OF CAEP/10 LIMIT	-	-	2.1
AS % OF CAEP/11 LIMIT (InP)	4.0	13.4	
AS % OF CAEP/11 LIMIT (NT)	15.4	25.3	

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	0.386	43.1	2.83E+14	
CLIMB OUT	85	2.2	0.324	34.9	3.09E+14	
APPROACH	30	4.0	0.119	9.8	3.26E+14	
IDLE	7	26.0	0.050	18.4	6.38E+14	
LTO TOTAL (kg, mg, number of particles)			165	3908	7.69E+16	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE LTO/ F_{oo} VALUES (mg/kN, particles/kN)				111.6	2.20E+15	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ($\mu\text{g}/\text{m}^3$)				43.1	6.38E+14	202

* 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	48.3	6.75E+14
CLIMB OUT	85	39.8	7.96E+14
APPROACH	30	12.7	1.24E+15
IDLE	7	25.7	2.48E+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