



ICAO ENGINE nvPM EMISSIONS DATA SHEET

SUBSONIC ENGINES

ENGINE IDENTIFICATION: LEAP-1B21 BYPASS RATIO (-): 8.5
UNIQUE ID NUMBER: 01P20CM133 PRESSURE RATIO π_{co} (-): 36.8
COMBUSTOR: TAPS II
ENGINE TYPE: TF RATED OUTPUT F_{oo} (kN): 111.3

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}	1.9	9.94E+13	85
AS % OF CAEP/10 LIMIT	-	-	1.4
AS % OF CAEP/11 LIMIT (InP)	0.1	0.7	
AS % OF CAEP/11 LIMIT (NT)	0.4	1.7	

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	0.877	0.0	2.59E+10	
CLIMB OUT	85	2.2	0.722	0.0	2.95E+10	
APPROACH	30	4.0	0.245	2.0	7.66E+13	
IDLE	7	26.0	0.089	0.2	2.48E+13	
LTO TOTAL (kg, mg, number of particles)			330	150	7.96E+15	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE LTO/ F_{oo} VALUES (mg/kN, particles/kN)				1.3	7.15E+13	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ($\mu\text{g}/\text{m}^3$)				3.8	1.17E+14	66

* 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	0.0	4.10E+10
CLIMB OUT	85	0.0	2.95E+10
APPROACH	30	3.1	5.60E+14
IDLE	7	0.5	4.73E+14

AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	98.0	98.2	HEAT OF COMBUSTION (MJ/kg)	43.27
TEMPERATURE (K)	290.6	296.5	HYDROGEN CONTENT (%mass)	13.84
HUMIDITY (kg water/kg dry air)	0.0048	0.0079	AROMATICS CONTENT (%vol)	14.8
			NAPHTHALENE CONTENT (%vol)	1.97
			SULPHUR CONTENT (ppm by mass)	840

MANUFACTURER: CFM International
TEST ORGANIZATION: CFM International
TEST LOCATION: PTO, Ohio
TEST DATES: 08/03/2016-09/03/2016

REMARKS

1. Certification Report CRL-2201b/Rev. 5
2. Engine S/N 602-109/1