



# ICAO ENGINE nvPM EMISSIONS DATA SHEET

## SUBSONIC ENGINES

ENGINE IDENTIFICATION: LEAP-1A29 BYPASS RATIO (-): 10.7  
UNIQUE ID NUMBER: 01P20CM130 PRESSURE RATIO  $\pi_{co}$  (-): 35.5  
COMBUSTOR: TAPS II  
ENGINE TYPE: TF RATED OUTPUT  $F_{oo}$  (kN): 130.3

### 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 $nvPM_{mass}$	4.9	$7.60\text{E}+13$	206
AS % OF CAEP/10 LIMIT	-	-	3.5
AS % OF CAEP/11 LIMIT (InP)	0.3	0.6	
AS % OF CAEP/11 LIMIT (NT)	1.4	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	0.946	1.8	$1.17\text{E}+11$	
CLIMB OUT	85	2.2	0.777	1.2	$7.87\text{E}+10$	
APPROACH	30	4.0	0.261	2.9	$9.85\text{E}+13$	
IDLE	7	26.0	0.094	0.6	$6.37\text{E}+12$	
LTO TOTAL (kg, mg, number of particles)			352	461	$7.12\text{E}+15$	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE $LTO/F_{oo}$ VALUES (mg/kN, particles/kN)				3.5	$5.47\text{E}+13$	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ( $\mu\text{g}/\text{m}^3$ )				7.6	$2.18\text{E}+14$	160

\* 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	2.2	$1.56\text{E}+11$
CLIMB OUT	85	1.4	$1.07\text{E}+11$
APPROACH	30	4.4	$6.44\text{E}+14$
IDLE	7	0.7	$1.79\text{E}+13$

### AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	97.8	98.8	HEAT OF COMBUSTION (MJ/kg)	43.26
TEMPERATURE (K)	274.6	279.8	HYDROGEN CONTENT (%mass)	13.69
HUMIDITY (kg water/kg dry air)	0.0020	0.0032	AROMATICS CONTENT (%vol)	16.5
			NAPHTHALENE CONTENT (%vol)	0.66
			SULPHUR CONTENT (ppm by mass)	150

MANUFACTURER: CFM International  
TEST ORGANIZATION: CFM International  
TEST LOCATION: PTO, Ohio  
TEST DATES: 21/11/2016-02/12/2016

### REMARKS

1. Certification Report CRL-2201\_2/Rev. 4
2. Engine S/N 600-104