



# ICAO ENGINE nvPM EMISSIONS DATA SHEET

## SUBSONIC ENGINES

ENGINE IDENTIFICATION: CF34-8E2A1 BYPASS RATIO (-): 5.1  
UNIQUE ID NUMBER: 01P08GE196 PRESSURE RATIO  $\pi_{co}$  (-): 23.9  
COMBUSTOR: LEC  
ENGINE TYPE: TF RATED OUTPUT  $F_{oo}$  (kN): 59.2

### 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 <sub>mass</sub>	26.2	2.79E+14	878
AS % OF CAEP/10 LIMIT	-	-	9.9
AS % OF CAEP/11 LIMIT (InP)	0.8	1.4	
AS % OF CAEP/11 LIMIT (NT)	3.1	2.8	

### MEASURED DATA

MODE	POWER SETTING (% $F_{oo}$ )	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK nvPM <sub>mass</sub> ( $\mu\text{g}/\text{m}^3$ )
				EI <sub>mass</sub> (mg/kg)	EI <sub>num</sub> (particles/kg)	
TAKE-OFF	100	0.7	0.642	25.7	2.67E+14	
CLIMB OUT	85	2.2	0.525	3.4	6.30E+13	
APPROACH	30	4.0	0.179	1.0	1.83E+12	
IDLE	7	26.0	0.062	1.5	2.37E+12	
LTO TOTAL (kg, mg, number of particles)			237	1114	1.19E+16	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE LTO/ $F_{oo}$ VALUES (mg/kN, particles/kN)				18.8	2.01E+14	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ( $\mu\text{g}/\text{m}^3$ )				25.7	2.67E+14	682

\* 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 <sub>mass_SL</sub> (mg/kg)	EI <sub>num_SL</sub> (particles/kg)
TAKE-OFF	100	32.0	9.31E+14
CLIMB OUT	85	4.3	2.25E+14
APPROACH	30	1.1	3.20E+12
IDLE	7	1.7	5.69E+12

### AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	98.1	98.6	HEAT OF COMBUSTION (MJ/kg)	43.19
TEMPERATURE (K)	290.7	296.3	HYDROGEN CONTENT (%mass)	13.67
HUMIDITY (kg water/kg dry air)	0.0033	0.0048	AROMATICS CONTENT (%vol)	17.5
			NAPHTHALENE CONTENT (%vol)	0.23
			SULPHUR CONTENT (ppm by mass)	77

MANUFACTURER: General Electric Company  
TEST ORGANIZATION: General Electric Company  
TEST LOCATION: PTO, Site 3B  
TEST DATES: 17/04/2017-18/04/2017

### REMARKS

1. GE Aviation Report R2018AE311/Rev. 0
2. Engine S/N 902-647/1