



# ICAO ENGINE nvPM EMISSIONS DATA SHEET

## SUBSONIC ENGINES

ENGINE IDENTIFICATION: GE90-110B1 BYPASS RATIO (-): 7.3  
 UNIQUE ID NUMBER: 01P21GE216 PRESSURE RATIO  $\pi_{co}$  (-): 40.4  
 COMBUSTOR: DAC  
 ENGINE TYPE: TF RATED OUTPUT  $F_{oo}$  (kN): 492.6

### 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>	31.5	5.38E+14	471
AS % OF CAEP/10 LIMIT	-	-	13.9
AS % OF CAEP/11 LIMIT (InP)	9.1	12.9	
AS % OF CAEP/11 LIMIT (NT)	14.7	19.4	

### MEASURED DATA

MODE	POWER SETTING (% $F_{oo}$ )	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK nvPM <sub>mass</sub> ( $\mu\text{g}/\text{m}^3$ )
				$EI_{mass}$ (mg/kg)	$EI_{num}$ (particles/kg)	
TAKE-OFF	100	0.7	4.226	12.5	9.15E+13	
CLIMB OUT	85	2.2	3.375	9.5	1.10E+14	
APPROACH	30	4.0	1.029	6.9	1.40E+14	
IDLE	7	26.0	0.334	5.8	1.75E+14	
LTO TOTAL (kg, mg, number of particles)			1390	11174	1.91E+17	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE LTO/ $F_{oo}$ VALUES (mg/kN, particles/kN)				22.7	3.87E+14	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ( $\mu\text{g}/\text{m}^3$ )				12.5	1.75E+14	366

\* 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	14.7	2.60E+14
CLIMB OUT	85	11.7	3.71E+14
APPROACH	30	9.2	6.37E+14
IDLE	7	8.2	9.87E+14

### AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	98.0	98.3	HEAT OF COMBUSTION (MJ/kg)	43.49
TEMPERATURE (K)	295.9	298.7	HYDROGEN CONTENT (%mass)	13.65
HUMIDITY (kg water/kg dry air)	0.0063	0.0094	AROMATICS CONTENT (%vol)	16.4
			NAPHTHALENE CONTENT (%vol)	0.40
			SULPHUR CONTENT (ppm by mass)	71

MANUFACTURER: General Electric Company  
 TEST ORGANIZATION: General Electric Company  
 TEST LOCATION: PTO, Ohio  
 TEST DATES: 25/05/2016-26/05/2016

### REMARKS

1. GE Report R2019AE459/Rev. 1
2. Engine S/N 901-007