



ICAO ENGINE nvPM EMISSIONS DATA SHEET

SUBSONIC ENGINES

ENGINE IDENTIFICATION: PW1133GA-JM BYPASS RATIO (-): 11.6
UNIQUE ID NUMBER: 01P22PW166 PRESSURE RATIO π_{co} (-): 38.1
COMBUSTOR: TALON X, Block-D
ENGINE TYPE: TF RATED OUTPUT F_{oo} (kN): 147.3

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}	52.3	1.05E+15	1443
AS % OF CAEP/10 LIMIT	-	-	26.3
AS % OF CAEP/11 LIMIT (InP)	3.5	10.3	
AS % OF CAEP/11 LIMIT (NT)	22.5	34.8	

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	1.023	37.7	3.12E+14	
CLIMB OUT	85	2.2	0.839	31.4	4.01E+14	
APPROACH	30	4.0	0.278	0.4	4.07E+13	
IDLE	7	26.0	0.099	2.7	3.25E+14	
LTO TOTAL (kg, mg, number of particles)			375	5539	1.11E+17	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				4	4	4
AVERAGE LTO/ F_{oo} VALUES (mg/kN, particles/kN)				37.6	7.52E+14	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ($\mu\text{g}/\text{m}^3$)				37.7	4.25E+14	1121

* 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	44.9	8.72E+14
CLIMB OUT	85	38.7	1.38E+15
APPROACH	30	0.9	4.30E+14
IDLE	7	6.0	4.51E+15

AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	101.5	102.2	HEAT OF COMBUSTION (MJ/kg)	43.32
TEMPERATURE (K)	279.6	300.8	HYDROGEN CONTENT (%mass)	13.89
HUMIDITY (kg water/kg dry air)	0.0036	0.0120	AROMATICS CONTENT (%vol)	16.5
			NAPHTHALENE CONTENT (%vol)	0.74
			SULPHUR CONTENT (ppm by mass)	228

MANUFACTURER: Pratt & Whitney
TEST ORGANIZATION: Pratt & Whitney
TEST LOCATION: W. Palm Beach, FL
TEST DATES: 18/01/2020-21/01/2020

REMARKS

1. Data from certification report PWA-12090
2. 1 engine tested
3. TALON-X, Block-D combustor
4. Certification in accordance with ICAO Annex 16 Vol. II., Part III, Chapter 4.