



# ICAO ENGINE nvPM EMISSIONS DATA SHEET

## SUBSONIC ENGINES

ENGINE IDENTIFICATION: PW1428G-JM BYPASS RATIO (-): 12.1  
UNIQUE ID NUMBER: 01P22PW172 PRESSURE RATIO  $\pi_{co}$  (-): 33.3  
COMBUSTOR: TALON X, Block-C  
ENGINE TYPE: TF RATED OUTPUT  $F_{oo}$  (kN): 132.4

### REGULATORY DATA

| CHARACTERISTIC VALUES:                     | $LTO_{mass}/F_{oo}$<br>(mg/kN) | $LTO_{num}/F_{oo}$<br>(particles/kN) | NVPM MASS CONCENTRATION<br>( $\mu\text{g}/\text{m}^3$ ) |
|--|--------------------------------|--------------------------------------|---|
| LTO/ $F_{oo}$ AND MAX nvPM <sub>mass</sub> | 96.3                           | 2.57E+15                             | 2488  |
| AS % OF CAEP/10 LIMIT                      | -                              | -                                    | 43.2  |
| AS % OF CAEP/11 LIMIT (InP)                | 5.3                            | 21.8                                 |   |
| AS % OF CAEP/11 LIMIT (NT)                 | 28.7                           | 61.2                                 |   |

### MEASURED DATA

| MODE  | POWER<br>SETTING<br>(% $F_{oo}$ ) | TIME<br>minutes | FUEL FLOW<br>kg/s | EMISSIONS INDICES*            |                                     | NVPM MASS CONCENTRATION<br>PEAK nvPM <sub>mass</sub><br>( $\mu\text{g}/\text{m}^3$ ) |
|---|-----------------------------------|-----------------|-------------------|-------------------------------|-------------------------------------|--|
|   |                                   |                 |                   | EI <sub>mass</sub><br>(mg/kg) | EI <sub>num</sub><br>(particles/kg) |  |
| TAKE-OFF  | 100                               | 0.7             | 0.870             | 80.6                          | 8.99E+14                            |  |
| CLIMB OUT   | 85                                | 2.2             | 0.720             | 49.1                          | 8.65E+14                            |  |
| APPROACH  | 30                                | 4.0             | 0.250             | 6.8                           | 4.01E+14                            |  |
| IDLE  | 7                                 | 26.0            | 0.090             | 8.2                           | 7.55E+14                            |  |
| LTO TOTAL (kg, mg, number of particles)   |                                   |                 | 332               | 9174                          | 2.45E+17                            | -  |
| NUMBER OF ENGINES   |                                   |                 |                   | 1                             | 1                                   | 1  |
| NUMBER OF TESTS   |                                   |                 |                   | 3                             | 3                                   | 3  |
| AVERAGE LTO/ $F_{oo}$ VALUES (mg/kN, particles/kN)                                  |                                   |                 |                   | 69.3                          | 1.85E+15                            | -  |
| MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ( $\mu\text{g}/\text{m}^3$ ) |                                   |                 |                   | 80.6                          | 9.62E+14                            | 1933   |

\* Emissions Indices are corrected for thermophoretic loss and fuel hydrogen content

### DATA FOR EMISSIONS INVENTORIES (ESTIMATIONS FOR ENGINE EXIT PLANE VALUES)

| MODE      | POWER<br>SETTING<br>(% $F_{oo}$ ) | CORRECTED EMISSIONS INDICES      |  |
|-----------|-----------------------------------|----------------------------------|--|
|           |                                   | EI <sub>mass_SL</sub><br>(mg/kg) | EI <sub>num_SL</sub><br>(particles/kg) |
| TAKE-OFF  | 100                               | 98.0                             | 2.98E+15                               |
| CLIMB OUT | 85                                | 63.1                             | 3.57E+15                               |
| APPROACH  | 30                                | 9.8                              | 3.15E+15                               |
| IDLE      | 7                                 | 16.6                             | 7.44E+15                               |

### AMBIENT CONDITIONS

|                                | From   | To     | FUEL                          |       |
|--------------------------------|--------|--------|-------------------------------|-------|
| BAROMETER (kPa)                | 100.8  | 103.0  | HEAT OF COMBUSTION (MJ/kg)    | 43.27 |
| TEMPERATURE (K)                | 266.7  | 277.2  | HYDROGEN CONTENT (%mass)      | 13.84 |
| HUMIDITY (kg water/kg dry air) | 0.0004 | 0.0017 | AROMATICS CONTENT (%vol)      | 15.3  |
|                                |        |        | NAPHTHALENE CONTENT (%vol)    | 1.87  |
|                                |        |        | SULPHUR CONTENT (ppm by mass) | 705   |

MANUFACTURER: Pratt & Whitney  
TEST ORGANIZATION: Pratt & Whitney  
TEST LOCATION: East Hartford, CT  
TEST DATES: 02/03/2017-04/03/2017

### REMARKS

1. Data from certification report PWA-11701
2. 1 engine tested
3. TALON-X, Block-C\* combustor
4. Certification in accordance with ICAO Annex 16 Vol. II., Part III, Chapter 2.
5. nvPM levels in accordance with ICAO Annex 16 Vol. II, Part III, Chapter 4 and Appendices 7 and 8.(CAEP/10)