



ICAO ENGINE EXHAUST EMISSIONS DATA BANK

SUBSONIC ENGINES

**** DATA SUPERSEDED ** SEE SHEET: 1RR014**

ENGINE IDENTIFICATION: RB211-535E4 BYPASS RATIO: 4.1
UNIQUE ID NUMBER: 1RR013 PRESSURE RATIO (π_{oo}): 25.4
ENGINE TYPE: MTF RATED OUTPUT (F_{oo}) (kN): 176.1

REGULATORY DATA

| CHARACTERISTIC VALUE: | HC | CO | NOx | SMOKE NUMBER |
|----------------------------|--------|--------|---------|--------------|
| D_p/F_{oo} (g/kN) or SN | 9.3 | 32.6 | 84.6 | 2.0 |
| AS % OF ORIGINAL LIMIT | 47.3 % | 27.6 % | 93.1 % | 9.8 % |
| AS % OF CAEP/2 LIMIT (NOx) | | | 116.4 % | |
| AS % OF CAEP/4 LIMIT (NOx) | | | 141.8 % | |
| AS % OF CAEP/6 LIMIT (NOx) | | | 161.1 % | |
| AS % OF CAEP/8 LIMIT (NOx) | | | 193.8 % | |

DATA STATUS

- PRE-REGULATION
x CERTIFICATION
- REVISED (SEE REMARKS)

TEST ENGINE STATUS

- NEWLY MANUFACTURED ENGINES
x DEDICATED ENGINES TO PRODUCTION STANDARD
- OTHER (SEE REMARKS)

EMISSIONS STATUS

x DATA CORRECTED TO REFERENCE
(ANNEX 16 VOLUME II)

CURRENT ENGINE STATUS

(IN PRODUCTION, IN SERVICE UNLESS OTHERWISE NOTED)
x OUT OF PRODUCTION (DATE: -)
- OUT OF SERVICE

MEASURED DATA

| MODE | POWER SETTING (% F_{oo}) | TIME minutes | FUEL FLOW kg/s | EMISSIONS INDICES (g/kg) | | | SMOKE NUMBER |
|---|-----------------------------|--------------|----------------|--------------------------|-----------|-----------|--------------|
| | | | | HC | CO | NOx | |
| TAKE-OFF | 100 | 0.7 | 1.860 | 0.69 | 1.01 | 52.7 | - |
| CLIMB OUT | 85 | 2.2 | 1.510 | 0.94 | 1.23 | 36.2 | - |
| APPROACH | 30 | 4.0 | 0.570 | 1.33 | 1.71 | 7.5 | - |
| IDLE | 7 | 26.0 | 0.190 | 2.85 | 15.44 | 4.3 | - |
| LTO TOTAL FUEL (kg) or EMISSIONS (g) | | | 711 | 1268 | 5134 | 13633 | - |
| NUMBER OF ENGINES | | | | 2 | 2 | 2 | 2 |
| NUMBER OF TESTS | | | | 5 | 5 | 5 | 5 |
| AVERAGE D_p/F_{oo} (g/kN) or AVERAGE SN (MAX) | | | | 7.12 | 28.6 | 76.9 | 1.7 |
| SIGMA (D_p/F_{oo} in g/kN, or SN) | | | | 0.45 | 3.5 | 1.3 | 0.3 |
| RANGE (D_p/F_{oo} in g/kN, or SN) | | | | 6.6-7.7 | 24.6-33.4 | 75.0-78.9 | 1.5-2.3 |

ACCESSORY LOADS

POWER EXTRACTION 0 (kW) AT - POWER SETTINGS
STAGE BLEED 0 % CORE FLOW AT - POWER SETTINGS

ATMOSPHERIC CONDITIONS

| | |
|----------------------|---------------|
| BAROMETER (kPa) | 100.8-101.2 |
| TEMPERATURE (K) | 285 - 298 |
| ABS HUMIDITY (kg/kg) | 0.0058-0.0087 |

FUEL

| | |
|----------|-------|
| SPEC | AVTUR |
| H/C | 1.91 |
| AROM (%) | 20 |

MANUFACTURER: Rolls Royce Ltd
TEST ORGANIZATION: Rolls Royce Ltd
TEST LOCATION: SINFIN-Derby
TEST DATES: FROM 02 Jul 84 TO 25 Oct 84

REMARKS

Ref RR report CRR58095

If REVISED, this data supersedes databank UID
Compliance with fuel venting requirements:

0 ('x' if complies, PR if pre-regulation)