

UKRAINE

STATE AVIATION ADMINISTRATION OF UKRAINE (SAAU)

TYPE CERTIFICATE DATA SHEET No TD0020

Revision 02

Date of issue: January 16, 2021

This Data Sheet is an integral part of Type Certificate No TD0020, and it includes information about type design, certification basis, limitations and other terms in accordance with which the listed engines meet the requirements of the airworthiness standards presently effective in Ukraine.

The 02nd revision of the Data Sheet included 250-C47E/4 engine model approved by FAA.

Engine Models: 250-C40B, 250-C47B, 250-C47E/4

Type Certificate Holder: Rolls-Royce Corporation
450 South Meridian Street
Indianapolis, Indiana 46225-1103
USA

1. Brief Engine Description

Free turbine turboshaft with single stage centrifugal flow compressor, 2-stage gas producer turbine, 2-stage power turbine and single combustion chamber with pre-chamber

| 2. Type Design Definition Documents | <u>250-C40B</u> | <u>250-C47B</u> | <u>250-C47E/4</u> |
|--|-----------------|-----------------|-------------------|
| - Engine Assembly Drawing | 23063378 | 23063392 | M250-10761 |
| - Operation and Maintenance Manual Publication | CSP 21000 | CSP 21001 | CSP21017 |
| - Installation Design Manual Publication | CSP 24001 | CSP 24002 | CSP24040 |

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|----------|----|----|----|----|----|----|----|----|
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| | <u>250-C40B</u> | <u>250-C47B</u> | <u>250-C47E/4</u> |
|--|---|--|---|
| - Illustrated Parts Catalog Publication | CSP 23001 | CSP 23001 | CSP23011 |
| - Overhaul Manual Publication | CSP 22000 | CSP 22001 | CSP22011 |
| - Airworthiness Directives (AD) and related S/B (CEB) | AD 97-25-09 CEB A-72-5009 | AD 96-24-09 CEB A-73-6010 CEB A-73-6011 CEB A-73-6012 AD 97-21-09 CEB A-73-6015 AD 98-10-03 CEB A-73-6010 CEB A-73-6015 CEB A-73-6017 AD 2003-13-10 TBD | None to date of application to SAAU |
| - Service Bulletins and Service Letters mandatory for implementation | CSL-A-5010 CSL-A-5012 CSL-A-5077 CEB-A-72-5005 CEB-A-72-5028 CEB-A-72-5031 CEB-A-72-5039 CEB-A-73-5006 CEB-A-73-5007 CEB-A-73-5021 | CSL-A-6010 CSL-A-6012 CSL-A-6077 CEB-A-72-6006 CEB-A-72-6033 CEB-A-72-6034 CEB-A-72-6037 CEB-A-72-6044 CEB-A-73-6007 CEB-A-73-6008 CEB-A-73-6010 CEB-A-73-6012 CEB-A-73-6030 | Publication ref. CEB250C47; Publication ref. CSL250C47 |
| 3. Certification Basis: | Aviation Regulation AR-33. Airworthiness Standards for Aircraft Engines, IAC, 1994 | | |
| 4. Production Basis: | Federal Aviation Administration Production Type Certificate Number 310, Issued 20 May 1955, last Revised 28 February 2017. | | |
| 5. Main Performance and Technical Data | | | |
| 5.1. Shaft Horse Power: | | | |
| - Maximum continuous | 613 | 600 | --- |
| - Take-off (5 minute) | 715 | 650 | --- |
| - Continuous OEI | 715 | — | — |
| - 30 minute OEI: | 715 | — | — |
| - 2 minute OEI: | 770 | — | — |
| - 30 second OEI: | 820 | — | — |

| |
|---|
| " — — " indicates same as preceding model |
|---|

| |
|--------------------------------|
| " — " indicates not applicable |
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| | <u>250-C40B</u> | <u>250-C47B</u> | <u>250-C47E/4</u> |
|--|-----------------|-----------------|-------------------|
| 5.2. Gas producer rpm | | | |
| – Maximum continuous | 48488 | 48258 | 48460 |
| – Take-off (5 minute) | 49791 | 48863 | 49014 |
| – Continuous OEI | 49791 | — | — |
| – 30 minute OEI: | 49791 | — | — |
| – 2 minute OEI: | 50553 | — | — |
| – 30 second OEI: | 51323 | — | — |
| 5.3 Output shaft rpm | | | |
| – Maximum continuous | 9598 | 6317 | — |
| – Take-off (5 minute) | 9598 | 6317 | — |
| – Continuous OEI | 9598 | — | — |
| – 30 minute OEI: | 9598 | — | — |
| – 2 minute OEI: | 9598 | — | — |
| – 30 second OEI: | 9598 | — | — |
| 5.4. Measured rated gas temperature (°F/°C): | | | |
| – Maximum continuous | 1263 / 684 | 1253 / 678 | 1340 / 727 |
| – Take-off (5 minute) | 1356 / 736 | 1296 / 702 | 1435 / 779 |
| – Continuous OEI | 1356 / 736 | — | — |
| – 30 minute OEI: | 1356 / 736 | — | — |
| – 2 minute OEI: | 1400 / 760 | — | — |
| – 30 second OEI: | 1447 / 786 | — | — |

Note to 5.1...5.4 items

The engine ratings are based on:

- static sea level standard condition, compressor inlet air (dry) $t_{I1}=59^{\circ}\text{F}(15^{\circ}\text{C})$ and $P_{I1}=29,92$ in. Hg. (760 mm Hg);
- compressor inlet bell attached to provide suitable air approach conditions;
- no external accessory loads and no air bleed ;
- measured rated gas temperature is indicated by the average of the 4 gas temperature thermocouples.

| | | <u>250-C40B</u> | <u>250-C47B</u> | <u>250-C47E/4</u> |
|-----------|---|-----------------------------|--|-------------------|
| 5.5 | Principal dimensions (mm/in): | | | |
| | - Length | 1097 / 43,198 | 1100 / 43,307 | 1100 / 43,307 |
| | - Width | 557 / 21,996 | 560 / 22,047 | 560 / 22,047 |
| | - Height | 653 / 25,715 | 638 / 25,130 | 650 / 25,591 |
| 5.6. | Dry weight (lb/kg) | 280 / 127 | 275.75 / 125 (does not include inter- ECU harness) | 289.9 / 131.5 |
| 6. | Operation Limitations | | | |
| 6.1 | Output shaft speed (% / rpm): | | | |
| | Maximum transient (up to 15 sec.) | 118/11327 | 113.3/7158 | — — |
| | Maximum sustained | 106.3/10203 | 102.1/6449 | — — |
| | Minimum transient (up to 15 sec.) | 69.6/6680 | 66.8/4220 | — — |
| | Minimum sustained | 89/8542 | 85.4/5397 | — — |
| | 100% output shaft speed= 9598 rpm. for 250- C40B, 100% output shaft speed = 6317 rpm for 250-C47B. | | | |
| 6.2. | Gas producer speed (%): | | | |
| | Maximum transient (up to 10 sec.) | 106.5 | — — | — — |
| | Maximum sustained | 105 | — — | — — |
| | 100% gas producer speed = 51000 rpm for all models | | | |
| 6.3. | Maximum allowable torque as measured by the torquemeter (lb-ft): | | | |
| | For 250-C40B Model: | | | |
| | - Takeoff power and Continuous OEI power – 409; | | | |
| | - Max continuous power – 338; | | | |
| | - 30 minute OEI – 432; | | | |
| | - 2 minute OEI – 444; | | | |
| | - 30 sec. OEI – 462; | | | |
| | - For 16 sec. – 521. | | | |
| | For 250-C47B and 250-C47E/4 Models: | | | |
| | - Takeoff power – 590; | | | |
| | - Max continuous power – 524; | | | |
| | - For 10 sec. – 637; | | | |
| | - For 2 sec. – 686. | | | |
| 6.4. | Maximum allowable temperatures (°F/°C) | <u>250-C40B</u> | <u>250-C47B</u> | <u>250-C47E/4</u> |
| 6.4.1. | Measured gas temperature: | | | |
| | - Maximum continuous | 1340 / 727 | — — | — — |
| | - Takeoff, 5 minute | 1435 / 779 | — — | — — |
| | - Continuous OEI | 1435 / 779 | — | — |
| | - 30 minute OEI | 1468 / 798 | — | — |
| | - 2 minute OEI | 1521 / 827 | — | — |
| | - 30 sec. OEI | 1600 / 871 | — | — |
| | - Maximum transient (not to exceed 12 sec.) | 1468 / 798 to 1662 / 906 | 1435 / 779 to 1662 / 906 | — — |

| | | | |
|--|--|-----|-----|
| – Starting (not to exceed 10 sec.) | 1550 / 843 to 1700 / 927 | — — | — — |
| Note to 6.4.1 item: | Starting momentary peak gas temperature - 1700 / 927 (not to exceed one second) | | |
| 6.4.2. Oil inlet: | - 65 / - 54 to 225 / 107 | | |
| 6.5. Fuel and oil pressure limits: | Minimum allowable fuel inlet pressure varies as a function of fuel type, fuel temperature and altitude. | | |
| 6.5.1. Fuel inlet pressure: | Tables, curves and methods for determining the minimum fuel pressure are included in the Installation Design Manuals (see item 2). | | |
| | Maximum fuel inlet pressure: 25 psig / 1,76 kg/cm ² | | |
| 6.5.2. Operating oil gauge pressures | 115 to 130 psig / 8,1 to 9,1 kg/cm ² | | |
| – 47940 rpm (94,0%) gas generator speed and above | 90 to 30 psig / 6,3 to 9,1 kg/cm ² | | |
| – 40290 rpm (79,0%) gas generator speed to 47940 rpm (94,0%) | 50 to 130 psig / 3,5 to 9,1 kg/cm ² | | |
| – below 40290 (79,0%) gas generator speed | 5 in Hg / 0,17 kg/cm ² absolute | | |
| – minimum oil pump inlet pressure | | | |
| 6.6. External air bleed (%), not exceed: | 4,5 | | |
| 7. Fuel | | | |
| 7.1. Foreign fuel: | MIL-T-5624, Grade JP-4, JP-5. Aviation Turbine Fuels ASTM D1655, Jet A or Jet A1, or Jet B, MIL-T-83133, JP-8. (See Note 1 to item 7) | | |
| 7.2. CIS fuels and additives: | Fuels RT and TS-1 (GOST 10227-86), fuel additives Fluid I (GOST 8313) or Fluid IM (TU 6-10-1458) in accordance with R-R Commercial Service Letters CSL 5050 (250-C40B) or CSL 6050 (250-C47B), approved FAA (See Note 2 to item 7) | | |

Note to item 7:

1. Emergency use of aviation gasoline is permitted for a maximum 6 hours during any overhaul period. For all models a mixture consisting of 1/3 by volume of aviation gasoline MIL-G-5572, grade 80/87 and 2/3 by volume MIL-T-5624, grade JP-5, or aviation turbine fuels ASTM D1655, Jet A or A-1, may be used for unrestricted periods of time. A mixture consisting of 1/3 by volume of aviation gasoline MIL-G-5572, grade 100/130 with a maximum of 2.0 ml/gal lead content and 2/3 by volume of MIL-T-5624, grade JP-5, or aviation turbine fuels ASTM D1655, Jet A or A-1, may be used for not over 300 hours during any overhaul period. It is not necessary to purge the unused fuel from the system before refueling with different type fuels. No fuel control adjustment is required when switching these type fuels. Fuel containing Tri-Cresyl-Phosphate additives shall not be use. Anti-icing additives conforming to MIL-I-27686 are approved for use in fuels in amounts not to exceed 0.15 percent by volume. Shell anti-static additive is approved for use at a concentration that will not exceed fuel conductivity of 300 pico-Ohms per meter.

2. Cold engine starts using CIS fuels conforming Specification GOST 10227 are possible at fuel temperature corresponding to a fuel viscosity of 6 centistokes or lower.

| | | | |
|--|--|------------------------|--------------------------|
| 8. Oil: | Oils conforming MIL-L-7808G or MIL-L-23699 and subsequent revision | | |
| 9. Accessory drive mounting provision | <u>250-C40B</u> | <u>250-C47B</u> | <u>250-C47E/4</u> |
| 9.1. Driven by gas producer turbine: | | | |
| Spare: | | | |
| – direction of rotation ¹⁾ | CC | — — | — — |
| – speed ratio to turbine | 0.2351 | — — | — — |
| – maximum torque (in-lb), continuous/ static | 550 ²⁾ / 1100 | — — | — — |
| – maximum overhung moment (in-lb) | 150 | — — | — — |
| Tachometer: | | | |
| – direction of rotation ¹⁾ | CC | — — | — — |
| – speed ratio to turbine | 0.0825 | — — | — — |
| – maximum torque (in-lb), continuous/ static | 7 / 50 | — — | — — |
| – maximum overhung moment (in-lb) | 4 | — — | — — |
| Starter-generator: | | | |
| – direction of rotation ¹⁾ | C | — — | — — |
| – speed ratio to turbine | 0.2351 | — — | — — |
| – maximum torque (in-lb), continuous/ static | 550 ³⁾ / 1100 | — — | — — |
| – maximum overhung moment (in-lb) | 150 | — — | — — |
| 9.2. Driven by power turbine: | | | |
| Tachometer: | | | |
| – direction of rotation ¹⁾ | CC | — — | — — |
| – speed ratio to turbine | 0.2168 | 0.1370 | — — |
| – maximum torque (in-lb), continuous/ static | 4 / 32 | 7 / 50 | — — |

| | | | |
|--|---------------------------|----------------------------|-------------------------|
| - maximum overhung moment (in-lb) | 4 | — — | — — |
| Power take-off: | | | |
| - direction of rotation ¹⁾ | CC | C | CC/C (front/rear) |
| - speed ratio to turbine | 0.3105 | 0.1963 | — — |
| - type of attachment | Flanged drive | Internal spline | — — |
| - maximum torque (in-lb), continuous/ static | — | 7524 ⁴⁾ / 10000 | — — |
| - maximum torque (in-lb) (30 sec. OEI), continuous/ static (front drive) | 5544 ⁴⁾ / 6443 | — | — |
| - maximum torque (in-lb) (30 min. OEI), continuous/ static (front drive) | 5184 ⁴⁾ / 6443 | — | — |
| - maximum torque (in-lb), continuous/ static (rear drive) | 330 / 330 | — | — |
| - maximum overhung moment (in-lb) | 380/10 (front/rear) | 100 | 969/100 (front/rear) |

Note to item 9:


- 1) C – Clockwise viewing drive pad, CC – Counterclockwise.
- 2) The maximum accessory load is 6 horsepower.
- 3) The maximum accessory load is 12 horsepower.
- 4) The sum of torques extracted in any combination from the front and rear power output drives shall not exceed the torque values specified in item 6.3.

10. Engine accessories:
 Engine control system
 Fuel pump
 Ignition system

Chandler Evans FADEC system including an Electronic Control Unit (ECU) and Hydromechanical Unit (HMU)
 Two stage suction system, integral to HMU
 TRW solid state, high energy exciter unit. Shunted surface gap spark igniter, Champion P/N CH34187 or AC P/N 0270769 or Auburn P/N 0270769

11. Notes (additional limitations)

- 11.1. Life limits established for critical rotating components are published in corresponding Operation and Maintenance Manual (see item 2).
Acceptable crack limits of first stage and second stage turbine wheels specified in the Overhaul Manual CSP 22011 (Turbine Section – Inspection/Check 72-50-00).
- 11.2. Aircraft air intake must be designed to minimize the ingestion of foreign object by the engine.
- 11.3. A press-to-test indicator lamp for the N2 overspeed control system is an installation requirement.
- 11.4. A magnetic oil drain plug (chip detector) indicator lamp is an installation requirement.
- 11.5. Scavenge oil filter must be installed in accordance with Engine Installation Design Manual requirements and recommendations (see item 2).
- 11.6. Applicable to the Model 250-C40B engine: Operational use of the on-line software loader in the field is prohibited.
Applicable to the Model 250-C47B engine: Operational use of the on-line loader in the field is approved for Software Version 5.201 or later FAA approved Software Version per applicable FAA approved Commercial Engine Bulletin.

Head of Aeronautical Products Type Certification Department  Sergii GREZIN