# Civil Aviation Authority
# United Kingdom

# TYPE-CERTIFICATE DATA SHEET

## UK.TC.E.00084

for

BR700-710 engines

Type Certificate Holder

Rolls-Royce Deutschland Ltd & Co KG
Eschenweg 11
15827 Blankenfelde-Mahlow
Germany

| | |
|---|---|
| Model(s): | BR700-710A1-10<br>BR700-710A2-20<br>BR700-710C4-11<br>BR700-725A1-12<br>BR700-710D5-21 |
| Issue: | 01 |
| Date of issue: | 15 March 2024 |

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## Section 1 General (All Models)

### I. General

This Type-Certificate Data Sheet (TCDS) is the concise definition of the type-certificated product accepted and or approved by the CAA in the UK where EASA were the Type Certificating Authority.

This TCDS includes:

1. Details of the type design that affect the TCDS that have been approved or accepted by the CAA in the UK from 01 January 2021.

2. Details of the type design that affected the TCDS and were approved or accepted by EASA before 01 January 2021, and were incorporated into EASA TCDS EASA.E.018 at Issue 14 dated 05 December 2019 and are therefore accepted by the UK under Article 15 of Annex 30 of the UK-EU Trade and Cooperation Agreement.

## Section 2 BR700-710

### I. General

### 1. Type / Variant or Model

Type: BR700-710

Models:

BR700-710A1-10

BR700-710A2-20

BR700-710C4-11

BR700-725A1-12

BR700-710D5-21

This models are approved for use on multi-engine civil aircraft at the ratings and within the operating limitations specified below, subject to compliance with the powerplant installation requirements appropriate to approved installations.

### 2. Type Certificate Holder

Rolls-Royce Deutschland Ltd & Co KG

Eschenweg 11

15827 Blankenfelde-Mahlow Germany

DOA ref.: EASA.21J.065

### 3. Manufacturer

Rolls-Royce Deutschland Ltd & Co KG

(Formerly Rolls-Royce Deutschland GmbH, formerly BMW Rolls-Royce GmbH)

### 4. Date of Application at EASA (Certificating Authority)

| Model | Application Date |
|---|---|
| BR700-710A1-10 | 16 February 1993 |
| BR700-710A2-20 | 23 March 1994 |
| BR700-710C4-11 | 15 January 2001 |
| BR700-725A1-12 | 06 March 2006 |
| BR700-710D5-21 | 12 December 2012 |

### 5. Type Certification date at EASA (Certificating Authority)

| Model | Certification Date |
|---|---|
| BR700-710A1-10 | 14 August 1996 |
| BR700-710A2-20 | 28 January 1997 |
| BR700-710C4-11 | 24 June 2002 |
| BR700-725A1-12 | 23 June 2009 |
| BR700-710D5-21 | 28 February 2018 |

Models BR700-710A1-10, BR700-710A2-20, BR700-710C4-11 were previously covered under LBA Engine Type Certificate 6305 and Type Certificate Data Sheets 6305 (BR700-710A1-10 at Issue 7, BR700-710A2-20 at Issue 6, BR700-710C4-11 at Issue 1) prior to being superseded by the EASA Type Certificate and Type Certificate Data Sheet.

**6. Date of Application at CAA (Validating Authority)**

| Model | Application Date |
|---|---|
| BR700-710A1-10 | 26 June 2023 |
| BR700-710A2-20 | 26 June 2023 |
| BR700-710C4-11 | 26 June 2023 |
| BR700-725A1-12 | 26 June 2023 |
| BR700-710D5-21 | 26 June 2023 |

**7. Type Certification date at CAA (Validating Authority)**

| Model | Certification Date |
|---|---|
| BR700-710A1-10 | 15 March 2024 |
| BR700-710A2-20 | 15 March 2024 |
| BR700-710C4-11 | 15 March 2024 |
| BR700-725A1-12 | 15 March 2024 |
| BR700-710D5-21 | 15 March 2024 |

Note: Administrative update to include compliance to the CAEP/11 requirements.

## II. Certification Basis

### 1. Reference Date for determining the applicable airworthiness requirements.

31 August 1993 for BR700-710A1-10, BR700-710A2-20, BR700-710C4-11, BR700-725A1-12

28 February 2015 for BR700-710D5-21

### 2. State of Design Airworthiness Authority Type Certification Data Sheet Number

EASA.E.018

### 3. State of Design Airworthiness Authority Certification Basis

Refer to TCDS EASA.E.018

### 4. UK CAA Certification Basis

### 4.1 Airworthiness Standards

| Model | Airworthiness Standards |
|---|---|
| BR700-710A1-10 | JAR-E, Change 8<br>Amendment E/91/1, effective 27.05.1991<br>Amendment E/93/1, effective 17.05.1993<br>Emissions and Fuel Venting: ICAO Annex 16, Volume II (Second Edition July 1993) |
| BR700-710A2-20 | JAR-E, Change 8<br>Amendment E/91/1, effective 27.05.1991<br>Amendment E/93/1, effective 17.05.1993<br>Emissions and Fuel Venting: ICAO Annex 16, Volume II (Second Edition July 1993) |
| BR700-710C4-11 | JAR-E, Change 8<br>Amendment E/91/1, effective 27.05.1991<br>Amendment E/93/1, effective 17.05.1993<br>JAR-E, Change 10, E790 Ingestion of Rain and Hail<br>JAR-E, Change 10, E40(f) Rating<br>Emissions and Fuel Venting: ICAO Annex 16, Volume II (Second Edition July 1993) |
| BR700-725A1-12 | CS-E, Initial Issue dated 24 October 2003 E50 and E1030 of CS-E, Amendment 1 dated 10 December 2007 E1040 of CS-E, Amendment 3 |
| BR700-710D5-21 | CS-E, Amendment 4 dated 12 March 2015 for the engine JAR-E, change 8 plus Amendments E/91/1 and E/93/1 for the Thrust Reverser |

### 4.2 Special Conditions (SC)

| Model | Special Conditions (SC) |
|---|---|
| BR700-710A1-10 | Ingestion of Hail, Ingestion of Rain |
| BR700-710A2-20 | Ingestion of Hail, Ingestion of Rain |
| BR700-710C4-11 | None |
| BR700-725A1-12 | None |
| BR700-710D5-21 | None |

### 4.3 Equivalent Safety Findings (ESF)

| Model | Equivalent Safety Finding (ESF) |
|---|---|
| BR700-710A1-10 | JAR-E840(a)(2) Rotor Integrity |
| BR700-710A2-20 | JAR-E840(a)(2) Rotor Integrity |
| BR700-710C4-11 | JAR-E840(a)(2) Rotor Integrity |
| BR700-725A1-12 | None |
| BR700-710D5-21 | CS-E740(b)(1) Endurance Test Schedule<br>CS-E790(a)(1) Large Hailstone Ingestion |

### 4.4 Deviations

| Model | Deviations |
|---|---|
| BR700-710A1-10 | JAR-E890(a) Engine Calibration in Reverse Thrust – Exemption |
| BR700-710A2-20 | JAR-E890(a) Engine Calibration in Reverse Thrust – Exemption |
| BR700-710C4-11 | JAR-E890(a) Engine Calibration in Reverse Thrust – Exemption |
| BR700-725A1-12 | None |
| BR700-710D5-21 | None |

### 4.5 Environmental Protection

| Model | Environmental Protection requirements. |
|---|---|
| BR700-710A1-10 | CS-34 as issued by EASA Decision No. 2003/3/RM of the Executive Director of the Agency dated 17 October 2003 in accordance with environmental protection requirements, ICAO Annex 16 Volume II Amendment 7 applicable 17 November 2011. NOx standard in accordance with ICAO Annex 16 Volume II, Part III, Chapter 2, paragraph 2.3.2 e) (CAEP/8). |
| BR700-710A2-20 | CS-34 Amendment 4 as adopted by CAA ORS9 Decision No.36 (applicable from 20 December 2023), meeting the requirement of ICAO Annex 16 Volume II, Amendment 10 applicable 1 January 2021. NOx standard in accordance with ICAO Annex 16 Volume II, Part III, Chapter 2, § 2.3.2 e) (CAEP/8). Maximum nvPM mass concentration levels in compliance with Part III, Chapter 4, paragraph 4.2.2.1. nvPM mass and number emissions in compliance with Part III, Chapter 4, paragraph 4.2.2.2 a) 1) and 4.2.2.2 b) 1) (CAEP/11 In-Production standard. |
| BR700-710C4-11 | CS-34 Amendment 4 as adopted by CAA ORS9 Decision No.36 (applicable from 20 December 2023), meeting the requirement of ICAO Annex 16 Volume II, Amendment 10 applicable 1 January 2021. NOx standard in accordance with ICAO Annex 16 Volume II, Part III, Chapter 2, § 2.3.2 e) (CAEP/8). Maximum nvPM mass concentration levels in compliance with Part III, Chapter 4, paragraph 4.2.2.1. nvPM mass and number emissions in compliance with Part III, Chapter 4, paragraph 4.2.2.2 a) 1) and 4.2.2.2 b) 1) (CAEP/11 In-Production standard. |
| BR700-725A1-12 | CS-34 Amendment 4 as adopted by CAA ORS9 Decision No.36 (applicable from 20 December 2023), meeting the requirement of ICAO Annex 16 Volume II, Amendment 10 applicable 1 January 2021. NOx standard in accordance with ICAO Annex 16 Volume II, Part III, Chapter 2, § 2.3.2 e) (CAEP/8). Maximum nvPM mass concentration levels in compliance with Part III, Chapter 4, paragraph 4.2.2.1. nvPM mass and number emissions in compliance with Part III, Chapter 4, paragraph 4.2.2.2 a) 1) and 4.2.2.2 b) 1) (CAEP/11 In-Production standard. |
| BR700-710D5-21 | CS-34 Amendment 4 as adopted by CAA ORS9 Decision No.36 (applicable from 20 December 2023), meeting the requirement of ICAO Annex 16 Volume II, Amendment 10 applicable 1 January 2021. NOx standard in accordance with ICAO Annex 16 Volume II, Part III, Chapter 2, § 2.3.2 e) (CAEP/8). Maximum nvPM mass concentration levels in compliance with Part III, Chapter 4, paragraph 4.2.2.1. nvPM mass and number emissions in compliance with Part III, Chapter 4, paragraph 4.2.2.2 a) 1) and 4.2.2.2 b) 1) (CAEP/11 In-Production standard. |

## III. Technical Characteristics

### 1. Type Design Definition

The build standards are defined in the following Drawing Introduction Sheet (DIS) or later approved issues:

Changes to the Engine Type Design are introduced by approved Modification Bulletins.

| Model | Part Number |
|---|---|
| BR700-710A1-10 | DIS 10002 ISSUE 03 or later approved issues |
| BR700-710A2-20 | DIS 10005 ISSUE 02 or later approved issues |
| BR700-710C4-11 | DIS 10012 ISSUE 01 or later approved issues |
| BR700-725A1-12 | DIS 10016 ISSUE 03 or later approved issues |
| BR700-710D5-21 | DIS 10018 ISSUE 04 or later approved issues |

## 2. Description

The BR700-710A1-10, BR700-710A2-20, BR700-710C4-11, BR700-725A1-12, BR700-710D5-21 are two spool axial flow engines consisting of a single stage fan, a ten stage axial flow high pressure compressor, an annular combustion chamber, a two stage axial flow high pressure turbine, a two/three (1) stage axial flow low pressure turbine, an accessory gearbox, a thrust reverser (2) and a Full Authority Digital Engine Control (FADEC).

(1) The BR700-710A1-10, BR700-710A2-20 and BR700-710C4-11 feature a two stage axial flow low pressure turbine, while the BR700-725A1-12 and BR700-710D5-21 features a three stage axial flow low pressure turbine.

(2) The BR700-725A1-12 is designed for use with a Thrust Reverser, but it is not part of the engine Type Design.

## 3. Equipment

Approved equipment is listed in the following RRD reports.

| Model | Part Number |
|---|---|
| BR700-710A1-10 | E-TR150/95-(FR), ISSUE 03 ‘Engine Equipment Classification’ or later approved issues |
| BR700-710A2-20 | E-TR427/96-(FR), ISSUE 01 ‘Engine Equipment Classification’ or later approved issues |
| BR700-710C4-11 | E-TR466/01-(FR), ISSUE 02 ‘Engine Equipment Classification’ or later approved issues |
| BR700-725A1-12 | See Installation Manual O-TR1458/08 or later approved issues |
| BR700-710D5-21 | See Installation Manual EDNS 01000373100/006 or later approved issues |

For details of equipment included in the type design definition: refer to the appropriate engine DIS.

## 4. Dimensions

| Model | Overall length | Maximum Diameter |
|---|---|---|
| BR700-710A1-10 | 4669 mm | 1820 mm |
| BR700-710A2-20 | 4669 mm | 1820 mm |
| BR700-710C4-11 | 4660 mm | 1785 mm |
| BR700-725A1-12 | 3297 mm (tip of spinner to rear of exhaust cone) | 950 mm (radius from centre line measured at the lowest point of AGB) |
| BR700-710D5-21 | 4809 mm (tip of spinner to rear of thrust reverser) | 980 mm (radius from centreline measured to the drains plate) |

## 5. Dry Weight

| Model | Dry Weight in Kilograms |
|---|---|
| BR700-710A1-10 | 1851.2 |
| BR700-710A2-20 | 1891.0 |
| BR700-710C4-11 | 1818.4 |
| BR700-725A1-12 | 1635.2 |
| BR700-710D5-21 | 1828.8 |

Dry weight includes thrust reverser and dressings for the BR700-710A1-10, BR700-710A2-20 and BR700-710C4-11 and dressings for the BR700-725A1-12 but excludes all fluids and all buyer furnished equipment and in the case of the BR700-725A1-12 also the thrust reverser.

## 6. Ratings

| Models | Maximum Take Off (MTO) kN | Maximum Continuous (MCT) kN |
|---|---|---|
| BR700-710A1-10 | 65.6 | 64.3 |
| BR700-710A2-20 | 65.6 | 64.3 |
| BR700-710C4-11 | 68.4 | 64.3 |
| BR700-725A1-12 | 75.2 | 66.6 |
| BR700-710D5-21 | 67.8 | 63.4 |

Note: The ratings shown under III.6. are achieved at sea level and ISA standard day conditions using a defined test bed configuration for the air intake and exhaust system with all optional bleeds closed and the aircraft service equipment drives unloaded, at a lower fuel heating value of 43179 kJ/kg [22721 CHU/kg].The take-off rating and associated operating limitations may be used for up to 10 minutes in the event of an engine failure or shut down.

## 7. Control System

The engine is equipped with a Full Authority Digital Engine Control (FADEC) system.

| Model | EEC Part Number |
|---|---|
| BR700-710A1-10 | 1501KDC01-817 or later approved standards |
| BR700-710A2-20 | 1520KDC01-605 or later approved standards |
| BR700-710C4-11 | 1505KDC01-002 or later approved standards |
| BR700-725A1-12 | G3010ECU01BA or later approved standards |
| BR700-710D5-21 | G3020ECU01AE or later approved standards |

## 8. Fluids (Fuel, Oil Coolant, Additives)

Approved fuels, additives and oils are listed in the Operating Instructions.

## 9. Aircraft Accessory Drives

| **BR700-710A1-10** (with two hydraulic pumps installed) | **Direction of Rotation (1)** | **Trans-mission Ratio** - | **Shear Torque** [Nm] | **Weight** [kg] | **Static Overhang Moment** [Nm] | **Maximum Torque Extraction** [Nm] |
|---|---|---|---|---|---|---|
| Gear Line 6 Pad (Hydr. Pump 1) | counter-clockwise | 0.270 | 418 | 8.91 | 8.1 | 69 |
| Gear Line 8 Pad (Hydr. Pump 2) | counter-clockwise | 0.275 | 418 | 8.91 | 8.1 | 68 |
| Gear Line 11 Pad (Generator) | clockwise | 0.520 | 412.5 | 32.61 | 56.5 | 106 |
| **BR700-710A1-10 & BR700-710C4-11** | **Direction of Rotation(1)** | **Trans-mission Ratio** - | **Shear Torque** [Nm] | **Weight** [kg] | **Static Overhang Moment** [Nm] | **Maximum Torque Extraction** [Nm] |
| Gear Line 8 Pad (Hydraulic Pump) | counter-clockwise | 0.275 | 418 | 8.91 | 8.1 | 86 |
| Gear Line 11 Pad (Generator) | clockwise | 0.520 | 412.5 | 32.61 | 56.5 | 106 |
| **BR700-710A2-20** | **Direction of Rotation(1)** | **Trans-mission Ratio** - | **Shear Torque** [Nm] | **Weight** [kg] | **Static Overhang Moment** [Nm] | **Maximum Torque Extraction** [Nm] |
| Gear Line 6 Pad (Hydraulic Pump) | counter-clockwise | 0.335 | 305.1 | 6.54 | 6.1 | 39 |
| Gear Line 8 Pad (Generator No. 2) | counter-clockwise | 1.080 | 283 | 20.3(2) | 32.5 | 50 |
| Gear Line 11 Pad (Generator No. 1) | clockwise | 1.083 | 283 | 20.3(2) | 32.5 | 50 |
| **BR700-725A1-12** | **Direction of Rotation(1)** | **Trans-mission Ratio** - | **Shear Torque** [Nm] | **Weight** [kg] | **Static Overhang Moment** [Nm] | **Maximum Torque Extraction** [Nm] |
| Hydr. Pump and Actuator | clockwise | 0.261 | 406.75 | 14,82(4) | 120(3) | 16.37 |
| IDG | clockwise | 0.522 | 412,5 | 32,61(2) | 109(3) | 56.5 |
| ATS | clockwise | 0.988 | 847 | 9.99(2) | 415 | 6.76 |

(1) Direction of rotation by looking normal to pad along the shaft.
(2) Dry Weight.
(3) Further details regarding acceptable loading are defined in the Installation Manual.
(4) Wet Weight.

| BR700-710D5-21 | Direction of Rotation | Gear Ratio to N2 | Max wet Overhung Moment [Nm] | Shear Neck Value [Nm] | Maximum Torque [Nm] | Weight dry [kg] |
|---|---|---|---|---|---|---|
| EDP | CCW | 0.2778 | 9.5 | 305.1 | 50.8(1) | 8.48 |
| VFG Pad 1, 4 | CCW | 0.8594 | 22.03 | 293 highest | 50.0(1) | 20.29 |
| VFG Pad 2, 3 | CW | 0.8978 | 22.03 | 293 highest | 50.0(1) | 20.29 |

(1) Further details regarding acceptable loading are defined in the Installation Manual

## 10. Maximum Permissible Air Bleed Extraction

**BR700-710A1-10, BR700-710A2-20, BR700-710C4-11** :

EPR=P50/P20.

The amounts of bleed extraction from stages 5 and 8, respectively, are related to the core entry mass flow, W26. The amounts of fan bleed extraction are related to the fan entry mass flow, W1A.

Stage 8 bleed extractions are cleared for operation up to and including Maximum Continuous rating.

| BR700-710A1-10 | Normal Flow [%] | | | Maximum Flow [%] | | |
|---|---|---|---|---|---|---|
| Power Range | Stage 5 | Stage 8 | Fan | Stage 5 | Stage 8 | Fan |
| Idle to 1.06 EPR | None | 7.8 | None | 3.0 | 12.1 | 0.6 |
| 1.06 to 1.3 EPR | 4.4 | 4.2 | 0.2 | 8.3 | 7.9 | 1.6 |
| Above 1.3 EPR | 4.3 | None | 0.4 | 8.5 | 8.0 | 1.8 |

| BR700-710A2-20 | Normal Flow [%] | | | Maximum Flow [%] | | |
|---|---|---|---|---|---|---|
| Power Range | Stage 5 | Stage 8 | Fan | Stage 5 | Stage 8 | Fan |
| Idle to 1.06 EPR | None | 7.8 | 0.4 | 3.0 | 12.1 | 0.6 |
| 1.06 to 1.3 EPR | 4.4 | 4.2 | 0.4 | 8.3 | 7.9 | 0.9 |
| Above 1.3 EPR | 4.3 | None | 0.4 | 8.5 | 8.0 | 1.1 |

| **BR700-710C4-11**<br><br>**Power Range** | **Normal Flow [%]** | | | **Maximum Flow [%]** | | |
|---|---|---|---|---|---|---|
| | Stage 5 | Stage 8 | Fan | Stage 5 | Stage 8 | Fan |
| Idle to 1.06 EPR | None | 7.7 | None | 3.0 | 12.0 | 0.6 |
| 1.06 to 1.3 EPR | 4.3 | 4.1 | 0.2 | 8.2 | 7.8 | 1.6 |
| Above 1.3 EPR | 4.2 | None | 0.4 | 8.3 | 7.8 | 1.8 |

**BR700-725A-12:**

$NHRT2$=Mechanical HP Speed [rpm] / √Engine Inlet Temperature [$K$]

$=NH$ / $\sqrt{T2}$

- Stage 5 and stage 8 HP compressor customer bleed is expressed as a percentage of HP compressor entry mass flow W26.

- Fan bleed flow is expressed as percentage of the fan tip entry mass flow W12.

- Further details regarding acceptable conditions for customer bleed air extractions are defined in the installation Manual

| **HP Bleed Stage 5** | | | |
|---|---|---|---|
| Nominal | | Maximum | |
| NHRT2 | % W26 | NHRT2 | % W26 |
| Idle – 675 | 6.5 | Idle – 700 | 7.7 |
| 675 – 850 | 10.1 | 700 – 875 | 10.1 |
| 850 – MTO | 6.5 | 875 – MTO | 8.6 |

| **HP Bleed Stage 8** | | | |
|---|---|---|---|
| Nominal | | Maximum | |
| NHRT2 | % W26 | NHRT2 | % W26 |
| Idle – 790 | 13.6 | Idle – 800 | 14.1 |
| 790 – MTO | 9.3 | 800 – MTO | 13.6 |
| | | | |

| **LP (Fan) Bleed** | | | |
|---|---|---|---|
| Nominal | | Maximum | |
| NHRT2 | % W12 | NHRT2 | % W12 |
| Idle – 700 | 1.4 | Idle – 720 | 1.5 |
| 700 – 775 | 1.7 | 720 – MTO | 1.9 |
| 775 – MTO | 1.7 | | |

**BR700-710D5-21:**
Allowable Nominal bleed flows

| Bleed Stage | Unit | Idle ≤ NHRT2 ≤ 980 | NHRT2 > 980 |
|---|---|---|---|
| Fan | %W020A | 0.5 | 0.6 |
| HPC stage 4 | %W026 | 1.6 | 5.6 |
| or | | | |
| HPC stage 7 | %W026 | 9.9 | 9.2 |

Allowable Maximum bleed flows

| Bleed Stage | Unit | Idle ≤ NHRT2 ≤ 980 | NHRT2 > 980 |
|---|---|---|---|
| Fan | %W020A | 0.5 | 0.6 |
| HPC stage 4 | %W026 | 1.6 | 7.3 |
| or | | | |
| HPC stage 7 | %W026 | 11.7 | 10.8 |

A constant percentage of 1.6%W026 is supplied by HPC stage 4 bleed across the full NHRT2 range.

For NHRT2 ≤ 980 only stage 7 bleed can be extracted up to the illustrated levels in addition to the stated 1.6%W026 supplied by HPC stage 4 bleed.

For NHRT2 > 980 either HPC stage 4 or stage 7 can be extracted up to the illustrated levels.

Simultaneous extraction of HPC stage 4 beyond the stated 1.6%W026 and stage 7 bleed is not permitted.

$NHRT2$ = Mechanical HP Speed [rpm] **/** √Engine Inlet Temperature [$K$]

= $NH$ **/** $\sqrt{T2}$

Stage 4 and stage 7 HP compressor customer bleed is expressed as a percentage of HP compressor entry mass flow W026.

Fan bleed flow is expressed as percentage of the total fan face entry mass flow W020A.

Further details regarding acceptable conditions for customer bleed air extractions are defined in the Installation Manual.

## IV. Operating Limitations

### 1. Temperature Limits

### 1.1. Turbine Gas Temperature (TGT) – Trimmed in Degree Centigrade.

| | BR700-710A1-10<br>BR700-710A2-20<br>BR700-710C4-11 | BR700-725A1-12 | BR700-710D5-21 |
|---|---|---|---|
| Maximum prior to starting on the ground | 150 | 150 | 150 |
| Starting on ground | 700 | 700 | 700 |
| Starting in flight | 850 | 850 | 850 |
| Maximum Take-off (1) | 900 | 900 | 890 |
| Take-off (transient 2 min.) | N/A | N/A | 900 |
| Maximum Continuous | 860 | 885 | 850 |
| Maximum Overtemperature (20 sec) | 905 | 920 | 915 (see Note) |

(1) Limited to 5 minutes and to maximum 10 minutes after one engine having failed.

Note: The BR700-725A1-12 engine is approved for a maximum exhaust gas over temperature of 920°C, BR700-710D5-21 engine 915°C for inadvertent use for periods up to 20 seconds without requiring maintenance action. The cause of the over temperature must be investigated and recorded.

### 1.2. Fuel Temperature

| **BR700-710A1-10, BR700-710A2-20, BR700-710C4-11, BR700-725A1-12, BR700-710D5-21** | |
|---|---|
| | **Fuel Temperature (°C)** |
| LP Pump Inlet, maximum | 54 (at sea level) |
| LP Pump Inlet, 51000 ft(1) | 47 |
| Minimum fuel temperature. | Minus 40 within the Take-Off envelope/<br>Minus 45 outside the Take-Off envelope |

(1) The maximum engine fuel inlet temperature at altitude below 51000ft are derived by linear interpolation between the values given for sea level and 51000ft.

### 1.3. Oil Temperature

| | **BR700-710A1-10** | **BR700-710A2-20** | **BR700-710C4-11** | **BR700-725A1-12**<br>**BR700-710D5-21** |
|---|---|---|---|---|
| Minimum for engine starting (°C) | minus 30 | minus 40(1) | minus 30 | minus 40 |
| Minimum for acceleration to Take Off (°C) | 20 | 20 | 20 | 20 |
| Maximum for unrestricted use (°C) | 160 | 160 | 160 | 160 |

(1) For temperature below minus 30 Degree Centigrade see OI-710-2BR Operating Instructions.

## 2. Pressure Limits

### 2.1. Fuel Pressure

| **Fuel Pressure** – kPa | |
|---|---|
| **BR700-710A1-10, BR700-710C4-11, BR700-710A2-20, BR700-725A1-12, BR700-710D5-21** | |
| Minimum at LP Pump Inlet | 34.5 |

### 2.2. Oil Pressure (Differential Oil Pressure)

Lower limit for flight in the range:

| **BR700-710A1-10, BR700-710C4-11, BR700-710A2-20, BR700-725A1-12, BR700-710D5-21** | |
|---|---|
| Idle to 72.3% N2 | 241.2 kPa |
| 72.5% N2 to 90% N2 | Straight Line Interpolation from 241.2 kPa to 310.3 kPa |
| Above 90% N2 | 310.3 kPa |

Minimum to Complete Flight in the range:

| **BR700-710A1-10, BR700-710C4-11, BR700-710A2-20, BR700-725A1-12, BR700-710D5-21** | |
|---|---|
| Idle to 72.3% N2 | 172.3 kPa |
| 72.5% N2 to 90% N2 | Straight Line Interpolation from 172.3 kPa to 241.2 kPa |
| Above 90% N2 | 241.2 kPa |

## 3. Rotational Speed Limits.

| Maximum Permissible Low Pressure Turbine N1 Rotor Speeds in % | BR700-710A1-10 | BR700-710A2-20 | BR700-710C4-11 | BR700-725A1-12 | BR700-710D5-21 |
|---|---|---|---|---|---|
| Reference speeds rpm (%) | 7431(100%) | 7431(100%) | 7431(100%) | 7000(100%) | 7431(100%) |
| Maximum for Take-off % | 101.1% | 102.1% | 101.1% | 102.8% | 102.1% |
| Maximum Over-speed (20-second limit) % | 101.5% | 102.5% | 101.5% | 104.3% | 103.3% |
| Maximum Continuous % | 101.0% | 102.1% | 101.0% | 102.8% | 102.1% |
| Reverse Thrust (maximum 30 sec.) % | 70.0% | 70.0% | 70.0% | 78.1% | 70.4% |

| Maximum Permissible High Pressure Turbine N2 Rotor Speeds in % | BR700-710A1-10 | BR700-710A2-20 | BR700-710C4-11 | BR700-725A1-12 | BR700-710D5-21 |
|---|---|---|---|---|---|
| Reference speeds rpm (%) | 15898(100%) | 15898(100%) | 15898(100%) | 15898(100%) | 19000(100%) |
| Maximum for Take-off % | 99.6% | 99.6% | 99.6% | 100.0% | 101.6% |
| Maximum Over-speed (20-second limit) % | 99.8% | 99.8% | 99.8% | 101.3% | 102.8% |
| Maximum Continuous % | 98.9% | 98.9% | 98.9% | 98.7% | 99.9% |

## 4. Installation Assumptions

Refer to Installation Manuals for details.

## 5. Time Limited Dispatch

Information on engine operation with FADC system dispatch limitations is contained in the respective Engine Operating Instructions and Time Limited Manuals.

## 6. ETOPS Capability

The BR700-725A1-12 engine is approved for ETOPS capability in accordance with CS-E1040 amendment 3 by EASA Approval 10059805 for a Maximum Approved Diversion Time of 180 minutes at Maximum Continuous thrust. This approval does not constitute an approval to conduct ETOPS operations.

## V. Operating and Service Instructions

| **Manuals** | **BR700-710A1-10** | **BR700-710A2-20** | **BR700-710C4-11** | **BR700-725A1-12** | **BR700-710D5-21** |
|---|---|---|---|---|---|
| Installation Manual | E-TR206/95 Issue 6 or later approved issues | E-TR364/95 Issue 1 or later approved issues | E-TR240/01(FR) ISS02 or later approved issues | O-TR1458/08 Issue 2 or later approved issues | EDNS 01000373100/008 or later approved issues |
| Operating Instructions | OI-710-1BR | OI-710-2BR | OI-710-4BR | OI-725-7BR | OI-710-8BR |
| **Instructions for Continued Airworthiness (ICA)** | | | | | |
| Engine Manual | E-710-1BR | E-710-1BR | E-710-1BR | E-710-1BR | E-710-8BR |
| Time Limits Manual | T-710-1BR | T-710-1BR | T-710-1BR | T-710-1BR | T-710-8BR |
| Maintenance Manual | M-710-1BR | M-710-2BR | M-710-4BR | M-725-7BR | M-710-8BR |
| Service Bulletins | As issued by Rolls-Royce Deutschland Ltd. & Co. KG. | As issued by Rolls-Royce Deutschland Ltd. & Co. KG. | As issued by Rolls-Royce Deutschland Ltd. & Co. KG. | As issued by Rolls-Royce Deutschland Ltd. & Co. KG. | As issued by Rolls-Royce Deutschland Ltd. & Co. KG. |

For BR700-710C4-11 Engines with Modification 72-101466 incorporated E-TR0283/06 Issue01 or later approved issue and the Service Bulletin SB-BR700-72-101466 apply additionally

## VI. Notes

1. The engines are equipped with a thrust reverser (which is not part of the engine design) with the following part numbers:

| | **BR700-710A1-10** | **BR700-710A2-20** | **BR700-710C4-11** | **BR700-725A1-12** | **BR700-710D5-21** |
|---|---|---|---|---|---|
| Left Hand Engine | P/N04G0001-039 or later approved standards | P/N07G0001-005 or later approved standards | P/N25G0001-001 or later approved standards | P/N RD00103001-1 or later approved standards | P/N 29G0001-021 or later approved standards |
| Right Hand Engine | P/N04G0001-041 or later approved standards | P/N07G0001-007 or later approved standards | P/N25G0001-003 or later approved standards | P/N RD00103001-2 or later approved standards | P/N 29G0001-023 or later approved standards |
| Operation of these thrust reversers is approved for ground use only. | | | | | |
| Power back is prohibited. | | | | | |

2. The EASA (Certificating Authority) approved Airworthiness Limitation Section of the Instructions for Continued Airworthiness is published in the applicable Time Limits Manual.

3. The EEC software has been developed and verified in accordance with RTCA/DO-178B respectively ED-12B, Level A.

4. Information on lightning protection and electromagnetic compatibility is contained in the Installation Requirements Document.

5. The ratings shown under III.6. are achieved at sea level and ISA standard day conditions using a defined test bed configuration for the air intake and exhaust system with all optional bleeds closed and the aircraft service equipment drives unloaded, at a lower fuel heating value of 43179 kJ/kg [22721 CHU/kg].The take-off rating and associated operating limitations may be used for up to 10 minutes in the event of an engine failure or shut down.

6. Models BR700-710A1-10, BR700-710A2-20, BR700-710C4-11 were previously covered under LBA Engine Type Certificate 6305 and Type Certificate Data Sheets 6305 (BR700-710A1-10 at Issue 7, BR700-710A2-20 at Issue 6, BR700-710C4-11 at Issue 1) prior to being superseded by the EASA Type Certificate and Type Certificate Data Sheet.

7. The BR700-725A1-12 engine is approved for a maximum exhaust gas over temperature of 920°C, BR700-710D5-21 engine 915°C for inadvertent use for periods up to 20 seconds without requiring maintenance action. The cause of the over temperature must be investigated and recorded.

8. The BR700-725A1-12 engine is approved for ground operation in freezing fog conditions down to minus 20°C, BR700-710D5-21 down to minus 19°C.

9. Deleted (refer to section 1.5 Environmental Protection).

10. “Pearl 15” is the marketing name for the BR700-710D5-21 engine model.

## Section 3 Administration

### I. Acronyms and Abbreviations

| Acronym / Abbreviation | Definition |
|---|---|
| ARINC | Aeronautical Radio, Incorporated |
| AGB | Accessories Gearbox |
| CNA | Common Nozzle Assembly |
| DIS | Drawing Introduction Sheet |
| EASA | European Union Aviation Safety Agency |
| ESF | Equivalent Safety Finding |
| EBU | Engine Build Unit |
| EEC | Engine Electronic Controller |
| EMI | Electro Magnetic Interference |
| FADEC | Full Authority Digital Engine Control |
| HP | High Pressure |
| ICAO | International Civil Aviation Organisation |
| IDG | Integrated Drive Generator |
| IP | Intermediate Pressure |
| LP | Low Pressure |
| rpm | Revolutions per Minute |
| SC | Special Conditions |
| TCDS | Type Certificate Data Sheet |
| TC | Type Certificate |
| TGT | Turbine Gas Temperature |
| CAA | Civil Aviation Authority |

## II. Type Certificate Holder Record

| TCH Record | Period |
|---|---|
| Rolls-Royce Deutschland Ltd & Co KG<br>Eschenweg 11, 15827 Blankenfelde-Mahlow<br>Germany<br><br>Design Organisation Approval No.: EASA.21J.065 | Since initial issue |

## III. Amendment Record

| TCDS Issue No. | TCDS Issue Date | Changes | TC Issue and Date |
|---|---|---|---|
| 01 | 15 Mar 2024 | - Section 1 is added to provide explanatory notes about the details of the type design that affect the TCDS, that have been approved or accepted by the CAA in the UK from 01 January 2021 and that the design changes accepted by EASA before 01 January 2021 were incorporated into EASA TCDS EASA.E.018 at Issue 14 dated 05 December 2019 were therefore accepted by the UK under Article 15 of Annex 30 of the UK-EU Trade and Cooperation Agreement.<br>- Section 2 (II) (1), (2), (3), and (4) added to provide information about certifying authority and certification basis applied by the certificating authority.<br>- Section 2 (II) (4.5) updated with regards to the certification basis for environmental protection CAEP/11<br>- BR700-725A1-12 Technical Characteristics – new hydraulic pump standard -approved by EASA as a Major (non-significant) Change Approval 10081366 and recording of the latest DIS 10016 Issue 03 – EASA Major (non-significant) Change Approval 10082991. | Issue 01<br>15 Mar 2024 |

– END –