European Aviation Safety Agency

EASA

TYPE-CERTIFICATE
DATA SHEET

Number : E.023
Issue : 01
Date : 27 July 2009
Type : Rolls-Royce Deutschland Ltd & Co KG
BR700-715 series engines

Variants

BR700-715A1-30
BR700-715B1-30
BR700-715C1-30

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I. General

1. Type/Variants:

Type: BR700-715

Variants:

BR700-715A1-30	BR700-715B1-30	BR700-715C1-30

These variants are approved for use on multi-engined 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
(formerly Rolls-Royce Deutschland GmbH, formerly BMW Rolls-Royce GmbH)
Eschenweg 11, Dahlewitz
15827 Blankenfelde-Mahlow
Germany

EASA Design Organisation Approval No: EASA.21J.065

3. Manufacturer:

Rolls-Royce Deutschland Ltd & Co KG
(formerly Rolls-Royce Deutschland GmbH, formerly BMW Rolls-Royce GmbH)

4. Certification Application Date: December 18, 1995

5. Certification Reference Date: December 18, 1995

6. EASA Certification Date (see note 6): August 28, 1998

II. Certification Basis

1. Certification Specifications: JAR-E, Change 9

Special Conditions: SC1, Ingestion of Rain – compliance to AIA AC PC338-1
SC2, Ingestion of Hail - compliance to AIA AC PC338-1
SC3, Bird Strike (Medium Birds) – compliance to NPA-E-20
SC4, Bird Strike (Large Bird, 1,85 kg(4 lb) bird) - compliance to NPA-E-20

Deviations: JAR-E890(a) Engine Calibration in Reverse Thrust

Equivalent Safety Findings: JAR-E840(a)(2) Rotor Integrity

2. Environmental Protection Requirements: ICAO Annex 16, Volume II, Second Edition, July 1993 – Emissions and Fuel Venting

III. Technical Characteristics

1. Type Design Definition:

The Engine Type Designs are defined in the following Drawing Introduction Sheets (DIS):

BR700-715A1-30: DIS No. 10010 Issue 02 or later approved issues
BR700-715B1-30: DIS No. 10011 Issue 02 or later approved issues
BR700-715C1-30: DIS No. 10007 Issue 02 or later approved issues

Changes to the Engine Type Design are introduced on the basis of approved changes to the Type Design..

2. Description:

Two spool axial flow engine with a high bypass ratio featuring a Single Stage Wide Chord Fan, Two Stage Booster, Ten Stage HP Compressor, Annular Combustor, Two Stage HP Turbine, Three Stage LP Turbine, Full Authority Digital Engine Control (FADEC) and Accessory Gearbox.

3. Equipment:

Approved equipment is listed in RRD Report E-TR494/97(FR) Issue 04 – Engine Equipment Classification, or later approved issue.
For details of equipment included in the type design definition: refer to the appropriate engine DIS.

4. Dimensions: Overall Length: 3738 mm
Max. radius from engine centreline to max. protrusion (AGB): 1064 mm

5. Dry Weight: 2085 kg

Dry weight includes dressings, but excludes all fluids and all buyer furnished equipment.

6. Ratings:

	BR700-715A1-30	BR700-715B1-30	BR700-715C1-30
Take off	83,23 kN	89,68 kN	95,33 kN
Maximum Continuous	78,74 kN	89,68 kN	90,84 kN

See Note 5.

7. Control System:

The engine is equipped with a Full Authority Digital Engine Control (FADEC) system
EEC P/N 111E9430G609 or later approved standard (software standard included in the EEC P/N).

8. Fluids

Approved fuels, additives and oils are listed in Operating Instructions OI-715-3BR

9. Aircraft Accessory Drives:

	Direction of Rotation*	Trans-mission Ratio to N2	Shear Torque [daNcm]	Weight [kg]	Static Overhang Moment [daNcm]	Maximum Power Extraction [kW]
Hydr. Pump	counter-clockwise	0,234	1690-2260	9,00	82,90	18,60
Integrated Drive Generator	clockwise	0,501	3559-4125	32,61	565,00	71,90

* looking normal to pad along shaft

10. Maximum Permissible Air Bleed Extraction:

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 bypass mass flow, W12.
Maximum Flow includes maximum cabine air bleed for single or twin engine operation and the maximum anti ice bleed.

	Maximum Flow [%]		
Power Range	Stage 5	Stage 8**	Fan
Idle to 1,15 EPR	9	15	1,4
1,15 to 1,25 EPR	10	10	1,5
1,25 to 1,3 EPR	10	10	1,5
Above 1,3 EPR	10	10	1,5

** stage 8 bleed extraction is cleared for operation up to and including the Maximum Continuous Rating

IV. Operating Limitations:

1. Temperature Limits

Gas Temperatures TGT (trimmed):

Maximum prior to starting on ground	150 °C
Starting on ground	700 °C
Starting in flight	850 °C
Take-off[1]	900 °C
Maximum Continuous	850 °C
Maximum Overtemperature (20 sec.)	915 °C

Fuel Temperatures:

LP Pump Inlet, maximum	54 °C
HP Pump Outlet, Maximum	160°C (185°C)[2]
LP Pump Inlet, Minimum for take-off, climb and go-around	-42°C
LP Pump Inlet, Minimum for flight above 15000 ft	-48°C

Oil Temperatures:

Minimum for starting	-40 °C
Minimum for acceleration to Take-off	+20 °C
Maximum	+160 °C

2. Permissible Rotational Speeds

Low Pressure Turbine N1 [min^{-1}]:

Maximum Take-off[1]	6096
Maximum Continuous	6096
Maximum Overspeed (20 sec.)	6204
Reverse Thrust (maximum 30 sec.)	3810
Emergency Reverse Thrust	5576

High Pressure Turbine N2 [min^{-1}] :

Maximum Take-off[1]	16661
Maximum Continuous	16661
Maximum Overspeed (20 sec.)	16744

[1] Limited to 5 minutes and to maximum 10 minutes after one engine having failed.
[2] Temporarily permitted for a period of not more than 15 minutes

3. Pressure Limits

Fuel Pressures:

Minimum at LP Pump Inlet	13,79 kPa + true vapour pressure

Differential Oil Pressures (Lower Limit for flight in the range):

Idle to 11514 [min^{-1}] N2	241.2 kPa
11514 [min^{-1}] N2 to 14293 [min^{-1}] N2	Straight line interpolation form 241.2 kPa to 310.3 kPa
Above 14293 [min^{-1}] N2	310.3 kPa

Differential Oil Pressures (Minimum to complete flight in the range):

Flight Idle to 11514 [min^{-1}] N2	172.4 kPa
11514 [min^{-1}] N2 to	Straight line interpolation form 172.4 kPa to 241.3 kPa
Above 90% N2 to 14293 [min^{-1}] N2	241.3 kPa

4. Installation Assumptions:

Refer to Installation Requirements E-TR216/98(FR) Iss01 or later approved issues.

5. Dispatch Limitations:

See report ref. E-TR436/98(FR) Iss01 or later approved issues

V. Operating and Service Instructions:

Installation Requirements	E-TR216/98(FR) Iss01
Operating Instructions	OI-715-3BR
Maintenance Manual	M-715-3BR
Engine Manual	E-715-3BR
Time Limits Manual	T-715-3BR
Service Bulletins	As issued by Rolls-Royce Deutschland Ltd & Co KG.

VI. Notes:

1. The engines are approved for operation with a Boeing Thrust Reverser (not part of the engine Type Design), Assembly number 715-0021-505 for Left Hand and Right Hand Installations.

2. Life limited critical parts are included in the respective Time Limits Manuals.

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.

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].

6. Variants BR700-715A1-30, BR700-715B1-30, BR700-715C1-30 were previously covered under LBA Engine Type Certificate 6336 and Type Certificate Data Sheets 6336 prior to being superseded by the EASA Type Certificate and Type Certificate Data Sheet.

7. The engines are equipped with a starter which is part of the engine Type Design.

8. The engines are approved to use reverse thrust for moving the aircraft backwards.

9. The certification assumptions are contained in reports E-TR503/97(FR) Iss02, Assumptions, and E-TR435/98(FR) Iss01, FADEC Assumptions Summary.
