TYPE-CERTIFICATE DATA SHEET

No. IM.E.044

for
AE 3007 Series Engines

Type Certificate Holder
Rolls-Royce Corporation

P.O. Box 420
Indianapolis, Indiana 46206-0420
United States of America

For Models:

AE 3007C
AE 3007A
AE 3007A1/1
AE 3007A1
AE 3007A1/2
AE 3007A1/3
AE 3007A3
AE 3007A1P
AE 3007C1
AE 3007A1E
AE 3007A2
AE 3007C2

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I. General

1. Type/ Model

Type: AE 3007
Models: AE 3007C, AE 3007A, AE 3007A1/1, AE 3007A1, AE 3007A1/2, AE 3007A1/3, AE 3007A3, AE 3007A1P, AE 3007C1, AE 3007A1E, AE 3007A2, AE 3007C2

2. Type Certificate Holder

Rolls-Royce Corporation
P.O. Box 420
Indianapolis, Indiana 46206-0420
United States of America

3. Manufacturer

Rolls-Royce Corporation
P.O. Box 420
Indianapolis, Indiana 46206-0420
United States of America

4. Date of Application

AE 3007A & AE 3007C	14 June 1991
AE 3007A3	20 October 1997
AE 3007A1/1 & AE 3007A1/2	13 May 1998
AE 3007A1	17 June 1998
AE 3007A1P	22 January 1999
AE 3007A1/3	18 February 1999
AE 3007A1E	05 February 2001
AE 3007C1	15 March 2001
AE 3007A2	29 September 2009
AE 3007C2	21 May 2014

5. EASA Type Certification Date

AE 3007A & AE 3007C	16 May 1997
AE 3007A1/1	28 September 1998
AE 3007A1 & AE 3007A1/2	04 March 1999
AE 3007A3 & AE 3007A1/3	21 October 1999
AE 3007A1P	02 April 2001
AE 3007C1	29 March 2002
AE 3007A1E	15 July 2003
AE 3007A2	20 July 2010
AE 3007C2	05 May 2015

(EASA Type Certification for the AE 3007C, AE 3007A, AE 3007A1/1, AE 3007A1, AE 3007A1/2, AE 3007A1/3, AE 3007A3, AE 3007A1P, AE 3007C1 and AE 3007A1E engine models is granted, in accordance with Article 2a paragraph 1(a) of EU Commission Regulation EC 375/2007 amending EU Commission Regulation 1702/2003, based on one or more EU member state approvals, following a JAA Certification process prior to 28 September 2003.)

II. Certification Basis

1. State of Design Authority Certification Basis

Refer to FAA ETCDS TE6CH

2. Reference Date for determining the applicable airworthiness requirements

All models except AE 3007A2 and AE 3007C2	24 May 1992
AE 3007A2	24 September 2009
AE 3007C2	11 October 2010

3. EASA Certification Basis

3.1. Airworthiness Standards

JAR-E Change 8, Effective 4 May 1990 plus Orange Paper E/91/1 dated 27 May 1991 and JAR-E 850 from JAR-E Change 9 effective 21 October 1994 for the models AE 3007C, AE 3007A and AE 3007A1/1 only

JAR-E Change 9 effective 21 October 1994 for the models AE 3007A1/2, AE 3007A, AE 3007A3, AE 3007C1, AE 3007A1/3, AE 3007A1P and AE 3007A1E only

JAR-E Change 9, effective 21 October 1994, for all requirements except E 525, E 650, E 780, E 790, E 800, E 810 and E 840 plus CS-E Amendment 2, effective 11 December 2009, for the requirements E 525, E 650, E 780, E 790, E 800, E 810 and E 840 for the AE 3007A2 model only

JAR-E Change 9, effective 21 October 1994, for all requirements except E 525, E 640, E 650, E 780, E 790, E 800, E 810 and E 840 plus CS-E Amendment 3, effective 23 December 2010, for the requirements E 525, E 640, E 650, E 780, E 790, E 800, E 810 and E 840 for the AE 3007C2 model only

3.2. Special Conditions (SC)

SC1 – Ingestion of Rain for all models except AE 3007A2 and AE 3007C2
SC2 – Ingestion of Hail for all models except AE 3007A2 and AE 3007C2

Note: For the AE 3007A1E model SC1 consists of the requirements of JAR-E 790 Change 10

3.3. Equivalent Safety Findings

JAR-E 640 Strength for all models except AE 3007C2

JAR-E 840 Compressor and Turbine Rotor Integrity Tests for all models except AE 3007A2 and AE 3007C2

JAR-E 890 Thrust Reverser Tests (for models AE 3007A, AE 3007A1/1, AE 3007A1, AE 3007A1/2, AE 3007A1/3, AE 3007A3, AE 3007A1P, AE 3007A1E, AE 3007A2 and AE 3007C2 only)

JAR-E 740 Endurance Test (for model AE 3007A1E only)

3.4. Deviations

None

3.5. Environmental Protection

CS-34 Issue 17.10.2003; ICAO Annex 16, Volume II (Second Edition, including Amendment 4), Part III, Chapter 2.3.2, c) (CAEP/4) for model AE 3007A1/2

CS-34 Issue 17.10.2003; ICAO Annex 16, Volume II (Third Edition, including Amendment 7), Part III, NOx levels in accordance with Part III, Chapter 2, 2.3.2, e) (CAEP/8) for all models except AE 3007A1/2

III. Technical Characteristics

1. Type Design Definition

AE 3007C:	Top Assembly Drawing P/N 23057202 plus Service Bulletin AE 3007C-72-037
AE 3007A:	Top Assembly Drawing P/N 23054002 plus Service Bulletin AE 3007A-72-025
AE 3007A1/1:	Top Assembly Drawing P/N 23070002
AE 3007A1:	Engine Assembly Drawing P/N 23070991 as included in Parts List No. 3705
AE 3007A1/2:	Engine Assembly Drawing P/N 23070443 as included in Parts List No. 3706
AE 3007A1/3:	Engine Assembly Drawing P/N 23070402 as included in Parts List No. 3714
AE 3007A3:	Engine Assembly Drawing P/N 23070412 as included in Parts List No. 3707
AE 3007A1P:	Engine Assembly Drawing P/N 23070401 as included in Parts List No. 3710
AE 3007C1:	Engine Assembly Drawing P/N 23074408 as included in Parts List No. 3730
AE 3007A1E:	Engine Assembly Drawing P/N 23074862 as included in Parts List No. 3728
AE 3007A2:	Engine Assembly Drawing P/N 23087636 as included in Parts List No. 10023
AE 3007C2:	Engine Assembly Drawing P/N 23090589 as included in Parts List No. 10039

2. Description

Direct drive turbofan engine of modular design. Incorporates a single stage fan, a 14-stage axial compressor with 6 stages of variable vanes (including inlet guide vanes), an annular combustion chamber, a two-stage high pressure turbine and a 3-stage low pressure turbine. The accessory gearbox is mounted at the bottom of the engine. The engine is equipped with two single channel Full Authority Digital Engine Control (FADEC) System units which are mounted in the aircraft. The engine features fore and aft mounting provisions, which allow either underwing pylon or aft fuselage mounting installation. The following table highlights differences between the models:

	All models except AE 3007C, AE 3007C1, AE 3007A2 and AE 3007C2 models	AE 3007C and AE 3007C1	AE 3007A2	AE 3007C2
Fan blades	P/N 23061623 (Type IV)	P/N 23060567 (Type III)	P/N 23089091 (Type X)	P/N 23089091 (Type X)
High Pressure Compressor bleed	9th stage	8th stage	9th stage	8th stage
Fan bypass bleed	Yes	No	Yes	No
Rear mount support ring	Fixed position	Rotatable position	Fixed position	Fixed position
Fuel flow meter, Rolls-Royce supplied	Yes	No	Yes	No

3. Equipment

The engine is certified for use with an operable Thrust Reverser Unit. The Thrust Reverser Unit does not form part of the engine Type Design and is certified as part of the aircraft Type Design (see also Note 7).

4. Dimensions

Overall Length: 2.92 m (115.08 inches)
Overall Height: 1.41 m (55.70 inches)
Overall Width: 1.17 m (46.14 inches)

5. Dry Weight

AE 3007C	732.1 kg (1614 lbs)
AE 3007A, AE 3007A1/1, AE 3007A1/2, AE 3007A1, AE 3007A1/3, AE 3007A3, AE 3007A1P, AE 3007A1E	751.6 kg (1657 lbs)
AE 3007C1	733.5 kg (1617 lbs)
AE 3007A2	762.5 kg (1681 lbs)
AE 3007C2	744.4 kg (1641 lbs)

Values for dry weight include Rolls-Royce supplied engine build-up components.

6. Ratings

The engine ratings are based on the following criteria:

- Sea level static, 1.01 bar (29.92 in Hg).
- 100% inlet pressure recovery for all models except AE 3007C, AE 3007C1 and AE 3007C2 and typical inlet pressure recovery for the models AE 3007C, AE 3007C1 and AE 3007C2.
- Exhaust nozzle area of 0.4323 m2 (670.1 in2) for all models except AE 3007C, AE 3007C1 and AE 3007C2 and exhaust nozzle area of 0.4193 m2 (650 in2) for the models AE 3007C, AE 3007C1 and AE 3007C2.
- Zero percent relative humidity.

- No inlet air distortion.
- No customer bleed extraction.
- No anti-ice airflow.
- No external power extraction.

Model	Static Thrust		Flat Rated
	Take-Off (5 min.)	Maximum Continuous	
AE 3007C	28.65 kN (6442 lbf)	28.65 kN (6442 lbf)	ISA+15°C
AE 3007A, AE 3007A1/1	33.71 kN (7580 lbf)	30.33 kN (6820 lbf)	ISA+15°C
AE 3007A1/2	33.71 kN (7580 lbf)	30.33 kN (6820 lbf)	ISA+23°C
AE 3007A1	33.71 kN (7580 lbf)	30.33 kN (6820 lbf)	ISA+30°C
AE 3007A1/3	33.71 kN (7580 lbf)	30.33 kN (6820 lbf)	ISA+30°C
AE 3007A3	32.02 kN (7201 lbf)	30.33 kN (6820 lbf)	ISA+15°C
AE 3007A1P	37.08 kN (8338 lbf)	30.33 kN (6820 lbf)	ISA+19°C
AE 3007C1	30.08 kN (6764 lbf)	30.08 kN (6764 lbf)	ISA+15°C
AE 3007A1E	39.67 kN (8917 lbf)	32.65 kN (7339 lbf)	ISA+19°C (Take-Off) ISA+30°C (Max.Continuous)
AE 3007A2	41.99 kN (9440 lbf)	36.02 kN (8097 lbf)	ISA+15°C (Take-Off) ISA+20°C (Max. Continuous)
AE 3007C2	31.32 kN (7042 lbf)	31.32 kN (7042 lbf)	ISA+15°C

7. Control System

One Goodrich Fuel Pump and Metering Unit (FPMU), one Compressor Variable Geometry (CVG) Actuator and two Goodrich Full Authority Digital Electronic Control (FADEC) Assembly units.

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

Fuel Specifications:
MIL-DTL-5624, NATO F-40 (JP-4) and NATO F-44 (JP-5)
MIL-DTL-83133, NATO F-34 (JP-8) and NATO F-35
ASTM-D-1655, Jet A and A1
ASTM-D-6615, Jet B
GOST 10227-86, TS-1 and RT
GB6537-94, RP-3
GB6537-2006 No. 3
GSTU 32.00149943.011-99, TC-1
GSTU 320.00149943.007-97, PT

Refer to the engine installation manual for approved fuel additives

Oil Specifications:
MIL-PRF-23699F and subsequent or MIL-PRF-7808L (below -40°C/-40°F) and subsequent

Refer to the engine Operations Manual for approved oils.

9. Aircraft Accessory Drives

Drive	Rotation	Speed Ratio to Gas Generator	Normal Load* kW(HP)	Cyclic* Overload kW(HP)	Failure* Overload kW(HP)	Maximum Shear Torque Nm(in.lb)	Max Overhung Nm(in.lb)
Generator 1	CW**	0.745:1	17.5 (23.5)	32.4 (43.5)	32.4 (43.5)	180.8 (1600)	33.9 (300)
Generator 2	CW**	0.745:1	17.5 (23.5)	32.4 (43.5)	32.4 (43.5)	180.8 (1600)	33.9 (300)
Hydraulic Pump	CW**	0.473:1	9.7 (13)	27.8 (37.3)	31.3 (42)	207.9 (1840)	18 (160)

*: The maximum total accessory power extraction for all thrust settings and flight conditions is 44.7 kW (60 HP). An overload limit of 59.7 kW (80 HP) is permitted for a period of 5 minutes at all thrust settings and all flight conditions below 45000 ft. Cyclic overload is defined as 5 minutes per one hour of operation. Failure overload is defined as 1 minute per 10000 hours of operation.
**: CW=Clockwise when looking at mounting pad

10. Maximum Permissible Air Bleed Extraction

	Model			
Bleed Location	AE 3007C, AE 3007C1 and AE 3007C2	AE 3007A	AE 3007A1/1, AE 3007A1/2, AE 3007A1, AE 3007A1/3, AE 3007A3 and AE 3007A1P	AE 3007A1E And AE 3007A2
Compressor, 8th Stage (%)	7.0	N/A	N/A	N/A
Compressor, 9th Stage (%)	N/A	8.5	7.9	6.9
Compressor, 14th Stage (%)	12.0	10.5	9.3	9.6
Fan bypass	N/A	40.8 kg/min	40.8 kg/min	40.8 kg/min
Maximum permissible total bleed air extraction (%)	17.5	18.0	16.5	16.0

IV. Operating Limitations

1. Temperature Limits

Measured Interstage Turbine Temperature (same as T4.5 and ITT), °C(°F):

Models	*Take-Off (90 seconds)*	*Take-Off (5 minutes)*	*Maximum Continuous*	*Starting*
AE 3007C	N/A	888 (1630)	850 (1562)	800 (1472)
AE 3007C1	N/A	907 (1665)	857 (1575)	800 (1472)
AE 3007A	N/A	921 (1690)	871 (1600)	800 (1472)
AE 3007A1/1	N/A	921 (1690)	874 (1605)	800 (1472)
AE 3007A1/2, AE 3007A3, AE 3007A1, AE 3007A1/3, AE 3007A1P	N/A	948 (1738)	900 (1653)	800 (1472)
AE 3007A1E*, AE 3007A2*	994 (1821)	970 (1778)	937 (1718)	800 (1472)**
AE 3007C2	N/A	899 (1650)	867 (1593)	800 (1472)**

*:For AE 3007A1E and AE 3007A2 models only, ITT may overshoot to a maximum of 994°C(1821°F) for as long as 90 seconds during the five-minute takeoff period due to the difference in rate of thermal growth between the turbine rotor and the turbine case after the sudden application of high power.
**:The ITT limit of 800°C (1472°F) may be exceeded for up to 5 seconds to a maximum of 850°C (1562°F). This brief ITT overshoot during engine start is an indication of normal control system operation.

Fuel Pump Inlet Temperature °C(°F):

Maximum Steady State	57 (135)
Minimum for take-off	-54 (-65)
Minimum needed to increase N1 above 40% (engine-indicated fuel temprerature)	4 (39) for models AE 3007C, AE 3007C1 and AE 3007C2

Refer to the relevant Installation Design Manual for recommended additives

Oil Inlet Temperature °C(°F)

Maximum	127 (260)
Minimum, MIL-PRF-23699F	-40 (-40)
Minimum, MIL-PRF-7808L	-54 (-65)
Minimum to increase N2 above 83%	40 (104) for all engine models except AE 3007C, AE 3007C1 and AE 3007C2 engine models

2. Speed Limits (see Note 2)

Models	High Pressure Rotor N2	Low Pressure Rotor N1
AE 3007C, AE 3007C1	16123	8700
AE 3007A, AE 3007A1/2, AE 3007A3	16270	8700
AE 3007A1, AE 3007A1/1, AE 3007A1/3, AE 3007A1P	16440 or 16667*	8700
AE 3007A1E	16667	8700
AE 3007A2	16667	8500
AE 3007C2	16300	8105
* : These models are cleared to 16667 rpm when specific engine configuration requirements are met. Compliance with Service Bulletin AE 3007A-73-090 or equivalent is required. Otherwise, maximum allowable high pressure rotor speed N2 is 16440 rpm.		

3. Torque Limits

N/A

4. Pressure Limits

- **4.1 Fuel Pressure**

Fuel Inlet Pressure Limits kPa (psig):

- Minimum: Refer to Section 1 of the applicable Installation Design Manual
- Maximum: 379.2 (55)

- **4.2 Oil Pressure**

Oil Inlet Pressure Limits kPa (psig):

	AE 3007C and AE 3007C1	All models except AE 3007C, AE 3007C1 and AE 3007C2	AE 3007C2
Minimum below 88% N2 (N2<14000 rpm)	234.5 (34)	234.5 (34)	234.5 (34)
Minimum above 88% N2 (N2>=14000 rpm)	331 (48)	331 (48)	331 (48)
Maximum, no time limit(1)	655 (95)(2)(4) or 724 (105)(2)(4)(5)	758 (110)	724 (105)
Maximum, up to 5 minutes	N/A	793 (115) (4)	N/A
Maximum, up to 2 minutes	1079 (155)(2)(4)	1079 (155)(3)(4)	1079 (155)

(1) With oil temperature > 21°C (70°F)
(2) Compliance with Service Bulletin AE 3007C-79-029 or equivalent is required
(3) Compliance with Service Bulletin AE 3007A-79-025 or equivalent is required
(4) Refer to the Abnormal Operation Section of the applicable Operations Manual
(5) Compliance with Service Bulletin AE 3007C-79-042 or equivalent is required. On engines complying with Service Bulletin AE 3007C-79-042 the maximum allowable oil pressure of 724 kPa (105 psig) will be indicated as 655 kPa (95 psig). All operating procedures and limitations are applied using the indicated oil pressure.

5. Time Limited Dispatch (TLD)

The engine is approved for TLD in accordance with CS-E 1030 and the approved time limits that the engines may operate with control system faults present are defined by the Mandatory Inspections Systems Description Section (05-13-00) and the Time Limits System Description Section (05-14-00) of the applicable Maintenance Manuals. Installation requirements are included in the Installation Design Manual.

6. ETOPS

N/A

V. Operating and Service Instructions

Model	Engine Maintenance Manual	Installation Design Manual	Operations Manual
AE 3007C	CSP34012	CSP34011	CSP30001
AE 3007A	CSP34022	CSP34021	CSP30017
AE 3007A1/1	CSP34022	CSP34073	CSP30017
AE 3007A1/2	CSP34022	CSP34074	CSP30011
AE 3007A1	CSP34022	CSP34070	CSP30017
AE 3007A1/3	CSP34022	CSP34075	CSP30017
AE 3007A3	CSP34022	CSP34076	CSP30017
AE 3007A1P	CSP34022	CSP34077	CSP30017
AE 3007C1	CSP34012	CSP34011	CSP30001
AE 3007A1E	CSP34022	CSP34095	CSP30017
AE 3007A2	CSP34022	CSP34090	CSP30017
AE 300C2	CSP34012	CSP34122	CSP30001

VI. Notes

Note 1: Lightning protection requirements an electromagnetic interference are specified in the relevant Installation Design Manual, Section 3.

Note 2: Aircraft mounted engine control equipment consist of two FADEC assembly units, associated sensors and equipment as defined in the following Turbofan Engine Assembly Drawings:

AE 3007C	23057202 revision CW and later
AE 3007A	23054002 revision DM and later
AE 3007A1/1	23070002 revision AD and later
AE 3007A1/2	23070443 revision H and later
AE 3007A1	23070991 revision E and later
AE 3007A1/3	23070402 revision A and later
AE 3007A1P	23070401 revision F and later
AE 3007A3	23070412 revision J and later
AE 3007C1	23074408 revision A and later
AE 3007A1E	23074862 revision D and later
AE 3007A2	23087636 initial release and later
AE 3007C2	23090589 revision M and later

For AE 3007A1E with two P/N 23076287 FADECs (B7.4 Software) the following restriction applies: Verify N2 speed is less than 9000 rpm prior to initiating any restart attempt.

Note 3: The EASA approved Airworthiness Limitations Section of the Instructions for Continued Airworthiness is published in the applicable "Engine Maintenance Manual" document, chapter 5 "Airworthiness Limitations".

Note 4: The software for the FADEC has been developed and tested in accordance with the provisions of Flight Critical category (level 1) of RTCA DO-178A.

Note 5: Compliance with Service Bulletin AE 3007A-72-384 is required for the AE 3007A2 model.

Note 6: The accessory gearbox mounted accessories provided as part of the engine include permanent Magnet Alternator (PMA), Fuel Pump & Metering Unit (FPMU) and oil Pump. Additional accessory gearbox mounting pads are also provided on the engine for the engine starter, two aircraft electrical generators and one aircraft hydraulic pump.

Note 7: The AE 3007C, AE 3007C1 and AE 3007C2 engine models are approved for use with the Dee Howard thrust reverser type TR7000. The AE 3007A, AE 3007A1/1, AE 3007A1/2, AE 3007A1, AE 3007A1/3, AE 3007A3, AE 3007A1P, AE 3007A1E and AE 3007A2 engine models are approved for use with the Hurel Dubois thrust reverser type 145-77751 series 400 and 600.

Note 8: The AE 3007A, AE 3007C, AE 3007C1, AE 3007A1, AE 3007A1/1, AE 3007A1/3, AE 3007A3, AE 3007A1P, AE 3007A1E and AE 3007A2 engine models were recertified to show compliance with the NOx Standards defined in ICAO Annex 16, Volume II, Part III, Chapter - paragraph 2.3.2 e CAEP/8 NOx Standard

SECTION: ADMINISTRATIVE

I. Acronyms and Abbreviations

CAEP	Committee on Aviation Environmental Protection
CFR	Code of Federal Regulations
CS	Certification Specifications
CS-E	Certification Specification - Engines
EASA	European Aviation Safety Agency
EC	European Commission
ETCDS	Engine Type Certificate Data Sheet
EU	European Union
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
ICAO	International Civil Aviation Organisation
JAA	Joint Aviation Authorities
JAR-E	Joint Aviation Requirements - Engines
NOx	Nitrogen Oxides
P/N	Part Number
SC	Special Condition

II. Type Certificate Holder Record

n/a

III. Change Record

Issue	Date	Changes	TC issue
Issue 01	20 July 010	Initial Issue	Initial Issue, 20 July 2010
Issue 02	22 July 2010	Editorial changes	
Issue 03	09 January 2013	Amended environmental protection requirements	
Issue 04	04. May 2015	Add model AE 3007C2	
Issue 05	22. May 2015	Editorial Changes	

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