



TYPE-CERTIFICATE DATA SHEET

No. EASA E.111

for
Trent XWB series engines

Type Certificate Holder

Rolls-Royce plc
PO Box 31
Derby DE24 8BJ
United Kingdom

For Models:

Trent XWB-75
Trent XWB-79
Trent XWB-79B
Trent XWB-84
Trent XWB-97



Intentionally left blank



TABLE OF CONTENTS

I. General	4
1. Type/ Model.....	4
2. Type Certificate Holder	4
3. Manufacturer	4
4. Date of Application.....	4
5. Certification Reference Date	4
6. EASA Type Certification Date	4
II. Certification Basis	4
1. EASA Certification Basis	4
1.1. Airworthiness Standards	4
1.2. Special Conditions (SC).....	5
1.3. Equivalent Safety Findings	5
1.4. Deviations	5
1.5. Environmental Protection	5
III. Technical Characteristics	5
1. Type Design Definition	5
2. Description.....	5
3. Equipment.....	6
4. Dimensions	6
5. Dry Weight	6
6. Ratings	6
7. Control System	6
8. Fluids (Fuel, Oil, Coolant, Additives)	7
9. Aircraft Accessory Drives	7
10. Maximum Permissible Air Bleed Extraction	7
10.1 Cabin Environmental Bleed Air System (EBAS):	7
10.2 Nacelle Anti-Icing (NAI) Bleed Air System :.....	8
IV. Operating Limitations	8
1. Temperature Limits	8
1.1 Turbine Gas Temperature (°C):.....	8
1.2 Oil Temperature (°C):.....	8
1.3 Fuel Inlet Temperature (°C):.....	9
1.4 Engine Equipment Temperatures:	9
1.5 Climatic Operating Envelope	9
2. Rotational Speed Limits (rpm).....	9
3. Pressure Limits	10
3.1 Fuel Pressure Limits:	10
3.2 Oil Pressure Limits	11
4. Installation Assumptions:.....	11
5. Time Limited Dispatch:	11
6. ETOPS Capability:	12
V. Operating and Service Instructions	12
VI. Notes	12
SECTION: ADMINISTRATIVE	14
I. Acronyms and Abbreviations	14
II. Type Certificate Holder Record	14
III. Change Record	14



I. General

1. Type/ Model

Trent XWB / Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84, Trent XWB-97

2. Type Certificate Holder

Rolls-Royce plc
PO Box 31
Derby DE24 8BJ
United Kingdom

Design Organisation Approval No.: EASA.21J.035

3. Manufacturer

Rolls-Royce plc

4. Date of Application

Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84: 16 June 2008
Trent XWB-97: 11 March 2013

5. Certification Reference Date

Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84: 01 October 2010
Trent XWB-97: 1 September 2014

6. EASA Type Certification Date

Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84: 07 February 2013
Trent XWB-97: 31 August 2017

II. Certification Basis

1. EASA Certification Basis

1.1. Airworthiness Standards

Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84	CS-E amendment 2, effective 18 December 2009 as issued by EASA Decision N°2009/18/R on 11 December 2009 CS-E 1040 "ETOPS" amendment 3, effective 23 December 2010 as issued by EASA Decision N°2010/015/R on 16 December 2010
Trent XWB-97	CS-E amendment 3, effective 23 December 2010 as issued by EASA Decision N°2010/015/R on 16 December 2010 CS-E 650 "Vibration Surveys" amendment 4, effective 12 March 2015 as issued by EASA Decision N° 2015/009/R on 12 March 2015



1.2. Special Conditions (SC)

None

1.3. Equivalent Safety Findings

All Trent XWB engine models:

CS-E 790(a)(1)	“Ingestion of Large Hailstones”
CS-E 740	“Endurance tests”
CS-E 840 & 850	“HP Rotor “Rotor Integrity” compliance”

1.4. Deviations

None

1.5. Environmental Protection

ICAO Annex 16 Volume II, third edition, including Amendment 7, effective 17 November 2011, as applicable to turbofan engines. NOx Standard in accordance with Part III, Chapter 2, § 2.3.2, e) (CAEP/8)

III. Technical Characteristics

1. Type Design Definition

The certified engine configurations are defined in the following Drawing Introduction Sheet (DIS) or later approved issues:

Trent XWB-75	DIS 2304 Issue 3
Trent XWB-79	DIS 2338 Issue 3
Trent XWB-79B	DIS 2339 Issue 3
Trent XWB-84	DIS 2306 Issue 3
Trent XWB-97	DIS 2341 Issue 2

See note 4

2. Description

Three-shaft, high bypass ratio, axial flow, turbofan with Low Pressure (LP), Intermediate Pressure (IP) and High Pressure (HP) compressors driven by separate turbines through coaxial shafts:

- single stage LP compressor (fan), 8-stage IP compressor (IPC), 6-stage HP compressor (HPC)
- annular combustor with 20-off fuel spray nozzles
- single stage HP turbine (HPT), 2-stage IP turbine (IPT), 6-stage LP turbine (LPT)
- dual channel full authority digital engine control (FADEC).

The LP compressor (Fan) diameter is 3.00m (118 inches). The LP and IP assemblies rotate in a counter clockwise direction; the HP assembly rotates clockwise, when viewed from the rear of the engine. The engine FADEC has an airframe interface for digital bus communications. An Engine Monitor Unit (EMU) provides vibration signals to the aircraft.



3. Equipment

The engine starter is part of the engine type design. Refer to the engine Drawing Introduction Sheet for details. The Thrust Reverser Unit is not part of the engine type design.

See note 3

4. Dimensions

	Overall Length (Front edge of A1 flange – fan case – to rear edge of A7 flange – tail bearing housing)	Maximum Radius (from centre line, not including drains mast)
Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84, Trent XWB-97	4483 mm (176.5 inches)	2001 mm (78.8 inches)

5. Dry Weight

	Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84	Trent XWB-97
Maximum dry engine weight, not including fluids, nacelle and aircraft interface parts:	7277 kg	7550 kg

6. Ratings

	Thrust - kN (lbf)				
	Trent XWB-75	Trent XWB-79	Trent XWB-79B	Trent XWB-84	Trent XWB-97
Take-Off Thrust (net) (5 minutes)	330.0 (74200)	351.0 (78900)	351.0 (78900)	374.5 (84200)	431.5 (97000)
Equivalent Bare Engine Take-Off Thrust	334.0 (75094)	355.2 (79845)	355.2 (79845)	379.0 (85213)	436.2 (98074)
Maximum Continuous Thrust (net)	296.3 (66,600)	317.6 (71,400)	317.6 (71,400)	317.6 (71,400)	369.6 (83,100)
Maximum Continuous	299.9 (67414)	321.4 (72264)	321.4 (72264)	321.4 (72264)	373.6 (83984)

See notes 1 and 2

7. Control System

The software is part of the engine Type Design:



Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84 – At DIS issue 3 certification:

- Engine Electronic Control: Version XWB3.5.3 P/N RRY2FXWB0030008
- Engine Monitoring Unit: Version EX5.0 P/N RRY57M3A0000023

Trent XWB-97 - At initial certification:

- Engine Electronic Control: Version XWB_97-5.3.A P/N RRY2FXWB0021019
- Engine Monitoring Unit: Version EX6.1 P/N RRY5CM3A0000039

See note 5

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

Refer to the applicable engine “Operating Instructions” document.

9. Aircraft Accessory Drives

All Trent XWB engine models:

Drive	Rotation	Gear ratio / HP rotor	Wet weight (kg)	Overhung Moment (Nm)	Shear Torque (Nm)
Hydraulic Generation (2 drives)	CCW	0.363	27.5	51.1	974
Electrical Generation (front)	CCW	1.726	57.6	124	612.2 – 703.9
Electrical Generation (rear)	CCW	1.762	57.6	124	612.2 – 703.9

CCW = Counter Clockwise when looking at the gearbox drive pad.

Refer to the applicable engine “Engine Installation Manual” document for installation details and operational requirements.

10. Maximum Permissible Air Bleed Extraction

%W26 and %W30 represent the percentage of air mass-flow through the core of the engine at the HPC entry (location 26) and at the HPC exit (location 30). Bleed flows vary linearly between the points listed.

10.1 Cabin Environmental Bleed Air System (EBAS):

Maximum Normal Cabin Air Bleed Schedule					
Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84			Trent XWB-97		
TET (k)	%W26	Source	TET (k)	%W26	Source
1000	11.0	HP6	1000	10.8	HP6
1415	11.0	HP6	1575	10.8	HP6
1716	4.9	HP6 / IP 8	1675	6.6	HP6
>1786	2.1	IP 8	1744.9	4.9	HP6
			1745	4	IP8
			>1886	2.6	IP8



Maximum Abnormal Cabin Air Bleed Schedule					
Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84			Trent XWB-97		
TET (k)	%W26	Source	TET (k)	%W26	Source
1000	14.6	HP6	1000	14.1	HP6
1485	14.6	HP6	1685	14.1	HP6
1685	12.8	HP6	1790	13.5	HP6
1720	10.4	HP6 / IP8	1814.9	9.9	HP6
1750	6.5	IP8	1815	3.9	IP8
>1815	3.7	IP8	>1886	3.1	IP8

10.2 Nacelle Anti-Icing (NAI) Bleed Air System:

Nacelle Anti-Icing Bleed Schedule					
Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84			Trent XWB-97		
TET (k)	%W26	Source	TET (k)	%W26	Source
1000	1.00	HP3	1000	0.8	HP3
1256	1.00	HP3	1431	0.8	HP3
1685	0.97	HP3	1810.9	0.76	HP3
>1815	0.45	HP3	1811	0.4	HP3
			>1900	0.3	HP3

IV. Operating Limitations

1. Temperature Limits

1.1 Turbine Gas Temperature (°C):

All Trent XWB engine models: The turbine Gas Temperature (TGT) is measured by thermocouples positioned at the stage 1 Nozzle Guide Vane of the LP Turbine.

	Maximum trimmed TGT (displayed)
Take-Off (5 minutes)	900
Maximum Continuous	850
Ground start and shutdown	700
In-flight relight	900
Maximum exhaust gas over temperature (*)	920

(*) The engine is approved for a maximum exhaust gas over temperature for inadvertent use for periods of up to 20 seconds without requiring maintenance action. The cause of the over temperature must be investigated and corrected.

1.2 Oil Temperature (°C):

All Trent XWB engine models, at the oil tank outlet:

Minimum for starting	minus 40
Minimum for acceleration to power	+ 50
Maximum Continuous	+ 180



1.3 Fuel Inlet Temperature (°C):

At the pylon interface point:

	Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84	Trent XWB-97
Minimum	minus 54 (or fuel freeze point, whichever is higher)	minus 47 (*) (or fuel freeze point, whichever is higher)
Minimum for ground starting	minus 54 (or fuel freeze point, whichever is higher)	minus 47 (*) (or fuel freeze point, whichever is higher)
Maximum	55	55

(*) The use of a chemical Fuel System Icing Inhibitor (FSII) is mandatory.

Refer to the applicable engine "Installation Manual" document for additional information, refer to engine "Operating Instructions" for use of FSII.

1.4 Engine Equipment Temperatures:

Refer to the applicable engine "Installation Manual" document.

1.5 Climatic Operating Envelope

The engine may be used in ambient temperatures up to ISA +40°C. Refer to the Installation Manual for details of the Operating Envelope, including the air inlet distortion at the engine inlet.

2. Rotational Speed Limits (rpm)

Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84		LP Rotor (N1)	IP Rotor (N2)	HP Rotor (N3)
Reference Speed (100%)		2700	8200	12600
Pre SB 73-J148 (Version 4.2.1 Software)	Take-off (5 minutes)	2649 (98.1%)	8200 (100%)	12272 (97.4%)
	Maximum Continuous	2614 (96.8%)	8036 (98.0%)	12033 (95.5%)
Post SB 73-J148 (Version 4.2.1 Software) or later approved software version	Take-Off (5 minute)	Post SB 72-H706 (Mk2 Fan System) 2676 (99.1%)	8200 (100%)	12272 (97.4%)
	Take-Off (5 minutes)	Pre SB 72-H706 (Mk1d Fan System) 2649 (98.1%)	8200 (100%)	12272 (97.4%)
	Maximum Continuous	2614 (96.8%)	8036 (98.0%)	12033 (95.5%)

Trent XWB-97		LP Rotor (N1)	IP Rotor (N2)	HP Rotor (N3)
Reference Speed (100%)		2700	8200	12600
All	Take-off (5 minutes)	2803 (103.8 %)	8397 (102.4%)	12411 (98.5%)
	Maximum Continuous	2765 (102.4%)	8200 (100.0%)	12411 (98.5%)



Stabilised operation in the following N1 speed ranges is not permitted during all ground operations.

N1 Keep Out Zone (KOZ - % N1 - ISA day conditions)		
Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84 (*)	Without SB 73-J148	71.5% to 79.7%
	With SB 73-J148 Mk2 Fan System	72.5% to 77.4%
	With SB 73-J148 Mk1d Fan System	71.5% to 79.7%
Trent XWB-97 (**)	All	64% to 84%

(*) Aircraft may be fitted with a Mk2 Fan on one side and a Mk1d Fan on the other. Under this condition the KOZ of the Mk2 Fan engine will be altered to avoid thrust asymmetry.

(**) For all static maintenance operation at engine speeds greater than taxi (such as engine maintenance testing, trim balancing or vibration surveys) no stabilised operation is to occur within the defined N1 KOZ values.

(*)(**) The Electronic Engine Control (EEC) software includes a logic which does not permit stabilised operation in this speed range as appropriate for the ambient conditions. However, passing through the above speed range, while increasing or decreasing thrust is permitted.

3. Pressure Limits

3.1 Fuel Pressure Limits:

Measured at the pylon interface:

	Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84	Trent XWB-97
Minimum absolute	34.5 kPa (5 psi) above Fuel True Vapour Pressure	55 kPa (8psi) above Fuel True Vapour Pressure
Maximum gauge pressure - Transient conditions due to high power shut down	2517 kPa (365 psi)	3144 kPa (456 psi)
Maximum gauge pressure - Transient conditions when the engine is running	1276 kPa (185 psi)	1276 kPa (185 psi)
Maximum gauge pressure - Thermal relief after Engine shut down	689 kPa (100 psi)	689 kPa (100 psi)
Maximum gauge pressure - Steady state conditions	483 kPa (70 psi)	483 kPa (70 psi)



3.2 Oil Pressure Limits:

Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84	NH Speed (%)	Oil Pressure kPa (psid)
Pre SB 73-J148 (Version 4.2.1 software)	0	172.4 (25)
	70	172.4 (25)
	92.5	330.9 (48)
	96	517.1 (75)
	97	517.1 (75)
	97.5	655.0 (95)
	100	655.0 (95)
Post SB 73-J148 (Version 4.2.1 software) or later approved software version	0	172.4 (25)
	70	172.4 (25)
	93	296.5 (43)
	96	517.1 (75)
	97	517.1 (75)
	97.5	655.0 (95)
	100	655.0 (95)

	NH Speed (%)	Oil Pressure kPa (psid)
Trent XWB-97	0	172.4 (25)
	75	172.4 (25)
	91.8	289.5 (42)
	95	517.1 (75)
	97.7	517.1 (75)
	105	517.1 (75)

4. Installation Assumptions:

Refer to the applicable engine "Installation Manual" document.

5. Time Limited Dispatch:

Engine Models Trent XWB-75, Trent XWB-79, Trent XWB-79B and Trent XWB-84: The engine is approved for Time Limited Dispatch in accordance with CS-E 1030 by EASA Certificate 10050644 dated 26 September 2014 (EEC software version XWB3.5.3 and later approved revisions). The maximum rectification period for each dispatchable state is specified in the Airworthiness Limitations Section of the applicable "Time Limits Manual".

Engine Model Trent XWB-97: The engine is not approved for Time Limited Dispatch in accordance with CS-E 1030.



6. ETOPS Capability:

Engine Models Trent XWB-75, Trent XWB-79, Trent XWB-79B and Trent XWB-84: The engine models (DIS issue 3 and later approved revisions) are approved for ETOPS capability in accordance with CS-E1040 amendment 3 by EASA Certificate 10050670 dated 29 September 2014 for a Maximum Approved Diversion Time of 405 minutes at Maximum Continuous thrust plus 15 minutes at hold thrust. ETOPS does not require any special engine limitation, marking, placard, or configuration. Engine Condition Monitoring according to task TRENTXWB-A-77-34-00-00A01-370A-A is required. This approval does not constitute an approval to conduct ETOPS operations.

Engine Model Trent XWB-97: The engine model not is approved for ETOPS capability.

V. Operating and Service Instructions

Manuals	Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84	Trent XWB-97
Installation Manual	DNS184155	EDNS01000337136
Operating Instructions	OI-TRENT-XWB – A350	OI-Trent-XWB-97-A350

Instructions for Continued Airworthiness (ICA)	All Trent XWB
Engine Manual	TRENTXWB-K0680-EMAN0-01
Time Limits Manual	TRENTXWB-K0680-TIME0-01
Cleaning, Inspection and Repair Manual	TRENTXWB-K0680-CIRMO-01
Check and Rectify Manual	TRENTXWB-K0680-CREPO-01
Illustrated Parts Catalogue	TRENTXWB-K0680-EIPCB-01
Maintenance Manual	Airbus A350 Customer Aircraft Maintenance Manual
Service Bulletins	Trent XWB — As published by Rolls-Royce

VI. Notes

- The take-off thrust, with the associated limits, shall not be used continuously more than 5 minutes. The duration may be extended to 10 minutes in case of engine failure of another engine on a multi-engine aircraft. If the duration exceeds 5 minutes, this shall be recorded in the engine log book.
- The Equivalent Bare Engine Take-off and Maximum Continuous thrusts quoted above are derived from the approved Net Take-off and Net Maximum Continuous thrust by excluding the losses attributable to the inlet, cold nozzle, hot nozzle, by-pass duct flow leakage and the after body. No power off-takes are assumed.
- Trent XWB-84 and Trent XWB-97 are approved for use with Airframer supplied thrust reverser systems:

Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84:

- 351-3000-513 –LH Wing – TRU Assy
- 351-3000-515 –RH Wing – TRU Assy



Trent XWB-97:

- 352-3000-505 –LH Wing – TRU Assy
- 352-3000-507 –RH Wing – TRU Assy

The maximum reverse thrust for all thrust reverser systems should not be used below 60 KCAS when idle reverse thrust should be promptly selected. Reverse thrust should be fully deselected below 40 KCAS.

4. Engine Models Trent XWB-75, Trent XWB-79, Trent XWB-79B and Trent XWB-84: In issue 02 of this TCDS, the DIS issue 3 engine configuration approved by EASA Certificate 10050669 dated 29 September 2014 is replacing the originally certified DIS issue 2 configuration. No engines were produced to DIS 2.
5. The control and monitoring system software meets the following levels according to EUROCAE ED-12B/RTCA DO178B:
 - Electronic Engine Control is designated Level "A".
 - Engine Monitoring Unit is designated Level "E", except that the flight deck vibration display is level "C".



SECTION: ADMINISTRATIVE

I. Acronyms and Abbreviations

CS-E	Certification Specifications for Engines
EASA	European Aviation Safety Agency
EBAS	Environmental Bleed Air System
EEC	Electronic Engine Control
EMU	Engine Motor Unit
ETOPS	Extended Time Operations
DIS	Drawing Introduction Sheet
FADEC	Full Authority Digital Engine Control
FSII	Fuel System Icing Inhibitor
HP	High Pressure
HPT	High Pressure Turbine
ICAO	International Civil Aviation Organisation
IP	Intermediate Pressure
IPT	Intermediate Pressure Turbine
KOZ	Keep Out Zone
LP	Low Pressure
LPT	Low Pressure Turbine
NAI	Nacelle Anti-Icing
rpm	Revolutions per Minute
SC	Special Conditions
TCDS	Type Certificate Data Sheet
TET	Turbine Entry Temperature
TGT	Turbine Gas Temperature
W26	Air Mass Flow HPC entry (location 26)
W30	Air Mass Flow HPC exit (location 30)

II. Type Certificate Holder Record

Rolls-Royce plc

III. Change Record

Issue	Date	Changes	TC issue date
Issue 01	07 February 2013	Initial Issue	Initial Issue, 07 February 2013
Issue 02	29 September 2014	ETOPS approval according to CS-E 1040 of CS-E amendment 3	07 February 2013
Issue 03	20 April 2016	Revised rotational speed limits reflecting introduction of the Mk 2 Fan System and new limits demonstrated by a post certification testing	07 February 2013
Issue 04	31 August 2017	Addition of Trent XWB-97 engine model	Amended, 31 August 2017

-END-

