TYPE CERTIFICATE DATA SHEET Nº EM-2015T04

Type Certificate Holder:

ROLLS-ROYCE PLC.
P. O. Box 31
Derby, DE24 8BJ
United Kingdom

EM-2015T04-00
Sheet 01

ROLLS-ROYCE PLC.

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

30 March 2015

Engines of models described herein conforming with this data sheet, which is part of Type Certificate No. 2015T04, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Brazilian Aeronautical Regulations provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other instructions.

MODELS Trent XWB-75, Trent XWB-79, Trent XWB-79B, Trent XWB-84.

TYPE Three-shaft high bypass ratio, axial flow, turbofan with low pressure, intermediate pressure and high pressure compressors driven by separated turbines through coaxial shafts. The engine is controlled by an Electronic Engine Control (EEC), which has an airframe interface for digital bus communication. It is also monitored by an Engine Monitoring Unit (EMU), which provides vibration signals to the aircraft.

RATINGS (See Note 1)

Engine Thrust, kN, (lbf.)	Trent XWB-75	Trent XWB-79	Trent XWB-79B	Trent XWB-84
Net Takeoff (5 min.)	330.0 (74 200)	351.0 (78 900)	--	374.6 (84 200)
Equivalent Bare Engine Takeoff	334.0 (75 094)	355.2 (79 845)	--	379.0 (85 213)
Net Maximum Continuous	296.3 (66 600)	317.6 (71 400)	--	--
Equivalent Bare Engine Max. Continuous	299.9 (67 414)	321.4 (72 264)	--	--

"--" Same as previous model; "#" Not applicable

FUEL TYPE Fuel types and additives conforming to the specifications listed in the engine "Operating Instructions" document.

OIL TYPE Oil types, brand and additives conforming to the specifications listed in the engine "Operating Instructions" document.

TEMPERATURE LIMITS For engine indicated turbine gas temperature limits, see Note 2.

PRESSURE LIMITS For fuel and oil pressure limits, see Note 3.

ROTOR SPEED LIMITS For engine rotational speed limits, see Note 4.

AIR BLEED For maximum permissible air bleed extraction, see Note 5.

CONTROL SYSTEM The software is part of the engine Type Design Definition.
The control and monitoring system software meets the following levels according to RTCA DO178B:
- Engine Electronic Control (EEC) is designated Level "A"
- Engine Monitoring Unit (EMU) is designated Level "E", except that the flight deck vibration display is Level "C".

DIMENSIONS AND WEIGHT
- Overall Length: 5 812 mm (228.8 inches) (from tip of spinner minus rubber to rear of cold nozzle).
- Maximum Radius: 2 001 mm (78.8 inches) (from centre line, not including drains mast).
- Maximum Weight: 7 277 kg (dry, not including fluids, nacelle and aircraft interface parts).

EQUIPMENTS AND COMPONENTS For details of equipment included in the type design definition, refer to the applicable Installation Manual. A thrust reverser unit is not part of the engine type design. The engine is approved for operation with a thrust reverser unit.

IMPORT REQUIREMENTS Each engine imported separately and/or spare parts must be accompanied by an Airworthiness Certificate for Export and/or an Airworthiness Approval Tag, respectively, issued by EASA (or a third country authority, in case of used engine imported from such country), attesting that the particular engine and/or parts were submitted to the governmental quality control before delivery and they are in conformity with the ANAC-approved type design. The ANAC type design corresponds to the EASA-approved type design, as stated in ANAC report number V.33-1064-00 dated 30 March 2015 or further revisions.

CERTIFICATION BASIS

· RBAC 33 corresponding to 14 CFR Part 33, including Amendments 33-1 through 33-31, inclusive, and three Equivalent Level of Safety (ELoS) findings, raised by EASA:

- CS-E 790(a)(1) - "Ingestion of Large Hailstones";
- CS-E 740 - "Endurance Tests";
- CS-E 840 & 850 - "HP Rotor 'Rotor Integrity' Compliance.

· Environmental protection requirements: 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).

Model	Application	Issued TC
Trent XWB-75	26 November 2014	30 March 2015
Trent XWB-79	26 November 2014	30 March 2015
Trent XWB-79B	26 November 2014	30 March 2015
Trent XWB-84	26 November 2014	30 March 2015

NOTES

NOTE 1 The engine ratings are based on sea level static ISA conditions, with no accessory loads or air bleed. The Equivalent Bare Engine Takeoff Thrust quoted is derived from the approved Net Takeoff Thrust by excluding the losses attributable to the inlet, cold nozzle, hot nozzle, by-pass duct flow leakage and the after-body. No power takeoffs are assumed. All models are flat rated to ISA + 15°C except the Trent XWB-79B, which is flat rated to ISA + 21.6°C.

NOTE 2 Temperature Limits:

Engine Turbine Gas Temperature (TGT), °C (°F):

Takeoff (5 minutes)	900 (1 652)
Maximum continuous	850 (1 562)
Ground start and shutdown	700 (1 292)
In-flight relight	900 (1 652)
Maximum exhaust gas over temperature (*)	920 (1 688)

(*) 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.

NOTE 2 (Cont.)

Oil Temperature, °C (°F):

At the oil tank outlet:

- Minimum for starting - 40 (- 40)
- Minimum for acceleration to power + 50 (+ 122)
- Maximum continuous + 180 (+ 356)

Fuel Inlet Temperature, °C (°F):

At the pylon interface point:

- Minimum in flight - 54 (- 65.2) (or fuel freeze point, whichever is higher)
- Minimum for ground starting - 54 (- 65.2) (or fuel freeze point, whichever is higher)
- Maximum + 55 (+ 131)

NOTE 3

Pressure Limits:

Fuel Pressure Limits (measured at pylon interface):

- Minimum absolute:	34.5 kPa (5 psi) + Fuel True Vapour Pressure
- Maximum gauge pressure - Transient conditions due to high power shutdown:	2 517 kPa (365 psi)
- Maximum gauge pressure - Transient conditions when the engine is running:	1 276 kPa (185 psi)
- Maximum gauge pressure - Thermal relief after engine shutdown:	689 kPa (100 psi)
- Maximum gauge pressure - Steady state conditions:	483 kPa (70 psi)

Oil Pressure Limits – Minimum:

- From ground idle to 70% N3	172.4 kPa (25 psid)
- From 70% to 92.5% N3	Increasing linearly to 330.9 kPa (48 psid)
- From 92.5% to 96% N3	Increasing linearly to 517.1 kPa (75 psid)
- From 96% to 97% N3	517.1 kPa (75 psid)
- From 97% to 97.5% N3	Increasing linearly to 655.0 kPa (95 psid)
- From 97.5% and above	655.0 kPa (95 psid)

NOTE 4 Maximum Rotational Speed Limits (rpm):

	LP Rotor (N1)	IP Rotor (N2)	HP Rotor (N3)
Take-off (5 minutes)	2 649 (98.1%)	8 298 (101.2%)	12 361 (98.1%)
Maximum continuous	2 614 (96.8%)	8 143 (99.3%)	12 159 (96.5%)
Reference speed (100%)	2 700	8 200	12 600

Stabilized operation in the speed range 70.6% to 80.6% N1 (ISA day) is not permitted during all ground operations. The EEC software includes a logic that does not permit stabilized 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.

NOTE 5 Maximum Permissible Air Bleed Extraction:

- Cabin Environmental Bleed Air System (EBAS):

Maximum Normal Cabin Air Bleed Schedule		
TET (K)	%W26	Source
1 000	11.0	HPC 6
1 415	11.0	HPC 6
1 716	4.9	HPC 6 / IPC 8
>1 716	2.1	IPC 8

Maximum Abnormal Cabin Air Bleed Schedule		
TET (K)	%W26	Source
1 000	14.6	HPC 6
1 485	14.6	HPC 6
1 685	12.8	HPC 6
1 720	10.4	HPC 6 / IPC 8
1 750	6.5	IPC 8
>1 815	3.7	IPC 8

NOTE 5 (Cont.) - Nacelle Anti-Icing (NAI) Bleed Air System:

Nascelle Anti-Icing Bleed Schedule		
TET (K)	%W30	Source
1 000	1.00	HPC 3
1 256	1.00	HPC 3
1 685	0.97	HPC 3
>1 815	0.45	HPC 3

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

NOTE 6 Aircraft Accessory Drives:

Drive	Rotation	Gear ratio / HP rotor	Shear Torque (Nm)
Aircraft Hydraulic Generation (2 drives)	CCW	0.363	974.0
Aircraft Hydraulic Generation (front)	CCW	1.726	612.2 – 703.9
Aircraft Hydraulic Generation (rear)	CCW	1.762	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.

NOTE 7 Life-limited parts are identified in the Airworthiness Limitation Section of the Time Limits Manual.

NOTE 8 The engine models have demonstrated eligibility for ETOPS under RBAC §33.201, which corresponds to 14 CFR §33.201, for a maximum diversion time of 420 minutes. The Trent XWB-75, Trent XWB-79, Trent XWB-79B and Trent XWB-84 engine models have complied with the requirements of §§33.3 (c), 33.44(a), 33.71(c)(4) and 33.201, and are therefore eligible for installation on Extended Operations (ETOPS) and Early ETOPS approved airplanes. The demonstrated diversion time is 405 minutes at maximum continuous thrust plus 15 minutes at hold power. Note that ETOPS eligibility does not constitute airplane or operational level approvals necessary to conduct ETOPS flights.

NOTE 9 The engine models are approved for Time Limited Dispatch (TLD). The maximum rectification period for each dispatchable state is specified in the Airworthiness Limitations Section of the applicable Time Limits Manual.

NOTE 10 The engines are approved for use with Goodrich thrust reverser system P/N 351-3001, 351-3002, 351-3003 and 351-3004. Maximum reverser thrust should not be used below 60 KCAS when idle reverse thrust should be promptly selected. Reverse thrust should be fully deselected below 40 KCAS.

NOTE 11 The engine may be used in ambient temperatures up to ISA + 40°C. Refer to the applicable Installation Manual for details of the operating envelope, including the air inlet distortion at the engine inlet.

NOTE 12 Operating and Service Instructions:

Installation Manual	DNS 184155
Operating Instructions	OI-TRENT-XWB – A350
Overhaul Data Set (including Illustarated Parts Data)	E-Trent-11RR
Time Limits Manual	TRENTXWB-K0680-TIME0-10
Maintenance Manual	Airbus A350 Customer Aircraft Maintenace Manual
Service Bulletins	Trent XWB – as required

NOTE 13 Service Bulletins, Structural Repair Manuals, Vendor Manuals, and Engine Maintenance Manuals, with contain a statement that the document is EASA-approved, are acceptable by the ANAC and are considered ANAC-approved unless otherwise noted. These approvals pertain to the type design only.

MÁRIO IGAWA
Gerente Geral de Certificação de Produto Aeronáutico
(Manager, Aeronautical Product Certification Branch)