



AGÊNCIA NACIONAL DE AVIAÇÃO CIVIL - BRASIL

TYPE CERTIFICATE DATA SHEET Nº EM-2007T09

Type Certificate Holder:

ROLLS ROYCE PLC
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EM-2007T09

Sheet 01

ROLLS ROYCE

RB211-TRENT 553-61,
RB211-TRENT 553A2-61,
RB211-TRENT 556-61,
RB211-TRENT 556A2-61,
RB211-TRENT 556B-61,
RB211-TRENT 556B2-61,
RB211-TRENT 560-61,
RB211-TRENT 560A2-61.

September 2007

Engines of models described herein conforming with this data sheet, which is part of Type Certificate No. 2007T09, 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.

TYPE	High by-pass turbofan (by-pass ratio of 8.5), axial flow, three shaft. Single-stage low pressure fan driven by a five stage turbine. Eight stage intermediate pressure compressor driven by single stage turbine. Six stage high pressure compressor driven by single stage turbine. Annular combustion chamber.
MODELS	TRENT 553-61, TRENT 553A2-61, TRENT 556-61, TRENT 556A2-61
RATINGS	See NOTE 1

RATINGS (Cont.)		553-61	553A2-61	556-61	556A2-61
	Maximum continuous (1) Thrust - kN (lbf), at sea level static	197.3 (44 359)	--	--	--
	Takeoff (5 minutes) (2) Thrust - kN (lbf), at sea level static	248.1 (55 780)	--	260.0 58 462	--
	Equivalent bare engine thrust – kN (lbf)	252.0 (56 655)	--	264.0 (59 350)	--
	(1) Flat rated to ISA + 10°C for all altitudes.				
	(2) Flat rated to ISA + 15°C for all altitudes.				
FUEL TYPE	See NOTE 7				
COMPONENTS	ELECTRONIC FULL AUTHORITY FUEL				
	- Fuel Control	TRWEECS 500-04			
	- Fuel Pump	TRWTPS 500MK2			
	- Fuel Metering Unit	TRWHMU 500MK2			
	IGNITION SYSTEM				
	- Ignition System Plugs	Federal Mogul CH34761			
	- Ignition System Units	Unison 430154			
OIL TYPE	See NOTE 12				
OIL CAPACITY	Nominal Total Tank capacity, liters (U.S. pints)	40.0 (84.5)	--	--	--
	Nominal Oil Tank capacity, liters (U.S. pints)	23.2 (49.0)	--	--	--
	Minimum Useable Oil (including effect of altitude), liters (U.S. pints)	16.0 (33.8)	--	--	--
TEMPERATURE LIMITS	See NOTE 2				
PRESSURE LIMITS	See NOTE 3				

PRINCIPAL DIMENSIONS		553-61	553A2-61	556-61	556A2-61
Weight, kg (lb)					
- Dry Powerplant		6 258 (13 797)	--	--	--
- Basic Engine		4 958 (10 930)	--	--	--
Length (front of nose to end of jet pipe nose), cm (in)		468.88 (184.6)	--	--	--
Radius (maximum), cm (in)		168.91 (66.5)	--	--	--
CENTER OF GRAVITY					
Complete Powerplant, cm (in)					
- Aft from powerplant station 100		68.83 (27.1)	--	--	--
- Below centerline		4.82 (1.9)	--	--	--
- Starboard from engine centerline		0.25 (0.1)	--	--	--
Basic Engine, cm (in)					
- Aft from powerplant station 100		70.61 (27.8)	--	--	--
- Below centerline		5.59 (2.2)	--	--	--
- Starboard from engine centerline		0.50 (0.2)	--	--	--
MODELS		TRENT 556B-61, TRENT 556B2-61, TRENT 560-61, TRENT 560A2-61			
RATINGS					
See NOTE 1		556B-61	556B2-61	560-61	560A2-61
Maximum continuous (1)		197.3			
Thrust - kN (lbf), at sea level static		(44 359)	--	--	--

		556B-61	556B2-61	560-61	560A2-61
RATINGS (Cont.)	Takeoff (5 minutes) (2) Thrust - kN (lbf), at sea level static	260.0 (58 462) (3)	--	275.3 (61 902)	--
	Equivalent bare engine thrust - kN (lbf)	264.0 (59 350)	--	279.1 (62 740)	--
	(1) Flat rated to ISA + 10°C for all altitudes. (2) Flat rated to ISA + 15°C for all altitudes. (3) The Trent 556B-61 and 556B2-61 engines rated takeoff thrust is identical to the Trent 556-61 and 556A2-61 engines at ISA sea level static conditions. The Trent 556B-61 and 556B2-61 ratings provide increased thrust for takeoff at altitudes above sea level. The magnitude of this increased thrust varies with altitude, mach number and ambient temperature and provides the 560-61 and 560A2-61 ratings at 7 341 feet and above.				
FUEL TYPE	See NOTE 7	556B-61	556B2-61	560-61	560A2-61
COMPONENTS	ELECTRONIC FULL AUTHORITY FUEL				
	- Fuel Control - Fuel Pump - Fuel Metering Unit		TRWEECS 500-04 TRWTPS 500MK2 TRWHMU 500MK2		
	IGNITION SYSTEM				
	- Ignition System Plugs - Ignition System Units		Federal Mogul CH34761 Unison 430154		
OIL TYPE	See NOTE 12				
OIL CAPACITY	Nominal Total Tank capacity, liters (U.S. pints)	40.0 (84.5)	--	--	--
	Nominal Oil Tank capacity, liters (U.S. pints)	23.2 (49.0)	--	--	--
	Minimum Useable Oil (including effect of altitude), liters (U.S. pints)	16.0 (33.8)	--	--	--
TEMPERATURE LIMITS	See NOTE 2				

PRESSURE LIMITS See NOTE 3

PRINCIPAL DIMENSIONS	556B-61	556B2-61	560-61	560A2-61
Weight, kg (lb)				
- Dry Powerplant	6 258 (13 797)	--	--	--
- Basic Engine	4 958 (10 930)	--	--	--
Length (front of nose to end of jet pipe nose), cm (in)	468.88 (184.6)	--	--	--
Radius (maximum), cm (in)	168.91 (66.5)	--	--	--
CENTER OF GRAVITY				
Complete Powerplant, cm (in)				
- Aft from powerplant station 100	68.83 (27.1)	--	--	--
- Below centerline	4.82 (1.9)	--	--	--
- Starboard from engine centerline	0.25 (0.1)	--	--	--
Basic Engine, cm (in)				
- Aft from powerplant station 100	70.61 (27.8)	--	--	--
- Below centerline	5.59 (2.2)	--	--	--
- Starboard from engine centerline	0.50 (0.2)	--	--	--

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, attesting that the particular engine and/or parts were submitted to the governmental quality control before delivery and are in conformity with the ANAC approved type design.

CERTIFICATION BASIS

RBHA 33 (Brazilian Requirements for Aeronautical Certification), which endorses the FAR 33, effective 01 February 1965, as amended by FAR 33-1 through FAR 33-19 inclusive.

<u>Model</u>	<u>Application</u>	<u>Issued TC</u>
TRENT 553-61	12 July 2007	21 September 2007
TRENT 553A2-61	12 July 2007	21 September 2007
TRENT 556-61	12 July 2007	21 September 2007
TRENT 556A2-61	12 July 2007	21 September 2007
TRENT 556B-61	12 July 2007	21 September 2007
TRENT 556B2-61	12 July 2007	21 September 2007
TRENT 560-61	12 July 2007	21 September 2007
TRENT 560A2-61	12 July 2007	21 September 2007

NOTES:**NOTE 1**

The engine ratings are based on static test stand operation under the following conditions:

(1)

- (a) Compressor inlet air at 15 °C (59°F) and 29.92 in Hg;
- (b) No air accessory loads or optional air extraction;
- (c) 100% air intake recovery corrected from the datum air intake system defined by drawing ATF 16471 or approved alternatives;
- (d) Engine exhaust system defined by Common Nozzle Assembly RX95432-7 and Spacer Ring RX95425;
- (e) Turbine gas temperature and rotor speed limitations are not exceeded.

(2) Equivalent Bare Engine Thrust

The equivalent bare engine thrust is rated thrust excluding the losses of propulsion fan duct , and thrust reverser and jet pipe washed by the fan stream.

NOTE 2

Maximum Permissible Temperatures, °C

Turbine Gas Temperature (TGT)

- Starting
 - Below 50% N3 (ground starting) 700 max. during start or relight
 - Below 50% N3 (inflight starting) 850
 - Above 50% N3 850
 - Takeoff (5 minutos) 900 up to 10 minutes in the event of engine failure
 - Maximum continuous (unrestricted) 850
 - Overtemperature (20 seconds) 920
- Oil, Combined Scavenge Temperature
 - Minimum for starting
 - for engine incorporating Modification Bulletin 79-E065 -40
 - for engine incorporating Modification Bulletin 79-D327 -20
 - Minimum for operating up 20
 - Maximum for unrestricted use 196

NOTE 3

Fuel and Oil Pressure Limits, kpa (psig)

- Fuel
 - Minimum fuel pressure (1) 52.42 (5)
 - Maximum fuel pressure (2) 379.21 (55)
- Oil
 - Minimum oil pressure
 - Ground idle to 70% HP rpm 172.37 (25)
 - Above 95% HP rpm 275.79 (40)

- (1) Between sea-level and 12 497 m (41 000 ft), plus true fuel vapor pressure, measured at inlet to LP fuel pump,
 (2) Measured at inlet to LP fuel pump.

NOTE 4

Maximum Permissible Engine Rotor Speeds (%)

100% HP = 13 300 rpm

100% IP = 9 100 rpm

100% LP = 3 900 rpm

Maximum Takeoff (5 minutes) (1)

HP 97.4 %

IP 99.4 %

LP 92.5 %

Maximum Reverse Thrust (30 seconds)

LP 69.0 %

(1) The takeoff rating and its associated operating limitations may be used for up to 10 minutes in the event of engine out contingency, but their use is otherwise limited to no more than 5 minutes.

NOTE 5

Maximum Permissible Compressor Air Bleed

Air delivery for aircraft services, excluding powerplant anti-icing. The air is automatically scheduled from the engine HP stage 1 and HP stage 6 compressor bleed ports via two valves in the aircraft ducting, which select the appropriate supply in response to signals sensing HP compressor delivery pressure (P30) together with a synthesized HP compressor delivery temperature (T30Syn).

With valve controller 6853A020000X5 the switchover from the HP6 to the HP1 compressor delivery port occurs at engine power settings where the following conditions are met:

- (a) Out of icing conditions: when both the HPC delivery static pressure (P30S) is greater than 105 ± 5 psig.
- (b) In icing conditions: : when both the HPC delivery static pressure (P30S) reaches 130 ± 5 psig and the HPC delivery temperature (T30Sys) reaches $375^{\circ}\text{C} \pm 5^{\circ}\text{C}$

**NOTE 5
(CONT.)**

Maximum HP6 bleed (% of gas generator compressor flow): this bleed decreases linearly between the values listed below for the low idle and switchover points.

- (a) Normal operation:
 - (1) Low idle and up to 1190K TET 9.5
 - (2) At switchover point 4.0
- (b) Abnormal (one engine inoperative):
 - (1) Low idle and up to 1210K TET 16.25
 - (2) At 1400K TET 7.7
 - (3) At switchover point 4.6

Maximum HP1 bleed (% of gas generator compressor flow): this bleed decreases linearly between the values listed below for the low idle and switchover and 1700K TET.

- (a) Normal operation:
 - (1) At switchover point 4.0
 - (2) Up to 1700K TET 1.0
 - (3) At takeoff 1.0
- (b) Abnormal (one engine inoperative):
 - (1) At switchover point 7.0
 - (2) Up to At 1700K TET 2.0
 - (3) At takeoff 2.0

Maximum LP1 bleed (% of fan flow).

- (a) Normal and Abnormal (one engine inoperative) operations:
 - (1) From low idle and up to 1130K TET 0.53
 - (2) Above 1650K TET 0.25

Maximum HP3 bleed for powerplant anti-icing (% of HPC inlet flow): this bleed decreases linearly between the values listed below for the 1000K TET and 1600K TET points.

- (a) Normal and Abnormal (one engine inoperative) operations:
 - (1) From low idle and up to 1000K TET 1.75
 - (2) At 1600K TET and up to takeoff 1.5

NOTE 6

Shaft power extraction limitations Accessory drive provisions (continuous power as listed may be extracted under all engine operating conditions).						
All Models	Drive	Rotation	Speed Ratio to HP rotor speed	Torque N-m (lbf-in)		
				Continuous	Maximum Instantaneous	Overhang
	Starter	CW *	0.7967	#	718.6 (6 360)	32.7 (290)
	IDG	CW	0.6807	248.6 (2 200)	509.0 (4 505)	146.9 (1 300)
	Hydraulic Pump	CW	0.3744	169.5 (1 500)	226.0 (2 000)	20.6 (183)

* CW = Clockwise
CCW = Counterclockwise

- Max starter torque at 0 ft. varies with air temperature as follows:

Air Temperature, °C	Max Torque N-m (lbf-in)
-54	687.4 (6 084)
-40	686.6 (6 077)
ISA	675.6 (5 980)

NOTE 7

Approved fuels and fuel additives are listed in relevant Operating Instructions as listed in Note 11.

NOTE 8

For all models, power setting, power check, and control of the engine output are to be based on Rolls-Royce engine charts included relevant Operating Instructions (listed in Note 11) regarding Integrated Engine Pressure Ratio (IEPR) or Engine Pressure Ratio (EPR). Pressure probes are included in the engine for this purpose.

NOTE 9

Life limited parts are identified in relevant Life Limits Manual T - TRENT - 5RR.

NOTE 10

This engine approval includes the bare engine, engine mounting feet and links, core engine cowlings, engine accessories, coolers, filters, harness, and instrumentation transmitters as defined in the Rolls-Royce Drawing Introduction Sheet (DIS).

NOTE 11

RB211-Trent 500 engine models manuals approved under CAA-UK requirements and accepted as equivalent to RBHA/FAR 33.4 and RBHA/FAR 33.5 requirements are:

Model	Operating Instructions	Maintenance Manual	Installation Manual	Engine Manual
All Models	OI - TRENT - A340	M - TRENT - A340	DNS 62612	M - TRENT- A340

NOTE 12

Approved oils are listed in the relevant Rolls-Royce Operating Instructions (Note 11). Also, oils of the approved types when reclaimed to the approved Rolls-Royce standards for the appropriate viscosity grade are approved for use.

NOTE 13

These engine models comply with the applicable exhaust emissions and fuel venting requirements of RBHA 34, which endorses the FAR 34, amended by FAR 34-3, effective 03 February 1999.

NOTE 14

Although acceptable, it is not mandatory that individual engine instruments and red line markings be provided for these fuel temperature limitations, provided that the installer can prove to the aircraft certification authority that these limits are not likely to be exceeded within the approved aircraft operating envelope under reasonably probable fault conditions for each proposed installation.

NOTE 15

Model characteristics of the RB-211-Trent 500 engine models:

Models	Variants
TRENT 553-61	Basic model.
TRENT 556-61 AND TRENT 560-61	Same as basic model except for increased takeoff thrust rating.
TRENT 556B-61	Same as basic model except for increased takeoff thrust ratings at altitude.
TRENT 553A2-61	A derivative of the Trent 553-61 with improved fuel consumption.
TRENT 556A2-61	A derivative of the Trent 556-61 with improved fuel consumption.
TRENT 556B2-61	A derivative of the Trent 556B-61 with improved fuel consumption.
TRENT 560A2-61	A derivative of the Trent 560-61 with improved fuel consumption.

NOTE 16

These engines are fitted with an independent IP and LP spool overspeed governor. Dispatch with this item unserviceable is not permitted.

- NOTE 17** The engines are fitted with Digital Electronic Engine Fuel Control system in which the software has been verified to the Level A and meets the “critical” standard of RTCA DO-178B.
- NOTE 18** In icing conditions, the engines may be operated satisfactorily at LP rotor speeds (N1) down to low idle. Minimum corresponding N1 at low idle for these engines is 17.6 percent in flight and 15.4 percent on ground.
- NOTE 19** Service Bulletins, Structural Repair Manuals, Vendor Manuals, Aircraft Flight Manuals, Overhaul and Maintenance Manuals which contain a statement that the document is EASA approved, are accepted by the ANAC and are considered ANAC-approved. These approvals pertain to the type design only.
- NOTE 20** Time Limited Dispatch – These engines have been approved to with certain faults present in the control system for a limited time, satisfying the RBHA/FAR 25 control system reliability requirements. The dispatch criteria are specified in the approved Rolls-Royce Dispatch Statement Report DNS73288 issue 14 or later approval issues.
The criteria for dispatch and maintenance requirements for the engine control system are:
- Fault Class 1 Level A: No dispatch allowed.
 - Fault Class 1 Level B: Dispatchable, maximum operating interval is 300 operating hours.
 - Fault Class 2: Dispatchable, maximum operating interval is 500 operating hours.
- NOTE 21** For the RB211-Trent 500 engine models, the takeoff rating and its associated limitations may be used for up to 10 minutes in the event of engine out contingency, but their use is otherwise limited to no more than 5 minutes.


for **CLÁUDIO PASSOS SIMÃO**
Gerente Geral, Certificação de Produtos Aeronáuticos
(Manager, Aeronautical Products Certification)