

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION TYPE CERTIFICATE DATA SHEET E25NE	TCDS NUMBER E25NE REVISION: 9* DATE: June 17, 2004 ROLLS-ROYCE DEUTSCHLAND Ltd & Co KG MODELS: TAY 611-8 TAY 620-15 TAY 651-54 TAY 650-15 TAY 611-8C
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Engines of models described herein conforming with this data sheet (which is part of Type Certificate Number E25NE) and other approved data on file with the Federal Aviation Administration, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Federal Aviation Regulations, provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

TYPE CERTIFICATE (TC) HOLDER: Rolls-Royce Deutschland Ltd & Co KG
 Postfach 1536
 D-15827 Dahlewitz
 Germany
 (formerly Rolls-Royce plc, Derby, England)

I. MODELS (TAY)	620-15	611-8	650-15	651-54	611-8C
TYPE	Dual rotor, axial flow high bypass turbofan, single-stage fan, three-stage low pressure compressor, 12-stage high pressure compressor, 10 cannular combustion chambers, two-stage high pressure turbine, and three-stage low pressure turbine.				
RATINGS					
Maximum continuous at sea level, static thrust, lb	13,475	12,420	14,000	--	12,420
Takeoff (5 min.) at sea level, static thrust, lb	13,850	--	15,100	15,400	13,850
Takeoff (10 min. OEI) at sea level, static thrust, lb	13,850	--	15,100	15,400	13,850

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PAGE	1	2	3	4	5	6	7	8
REV.	9	9	9	9	8	8	9	8

LEGEND: "- -" INDICATES "SAME AS PRECEDING MODEL"
 "---" NOT APPLICABLE
 NOTICE: ALL PAGES ARE REFORMATTED. SIGNIFICANT CHANGES, IF ANY, ARE BLACK-LINED IN THE LEFT MARGIN.

I. MODELS (CONT.) (TAY)	620-15	611-8	650-15	651-54	611-8C
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COMPONENTS

FADEC: EEC Goodrich (1)P/N

Fuel control: Goodrich (1)
 or: Goodrich (1) P/N
 or: Goodrich (1) P/N
 or: Goodrich (1)P/N

Fuel pump (LP):
 FR-HiTemp (2) P/N

Fuel pump (HP): Goodrich P/N

Ignitor Plugs: Smiths P/N
 or: Smiths P/N

 or: Champion (3) P/N
 or: Champion (3) P/N

N/A	N/A	N/A	N/A	N/A	TEEC2000-04-AD
CASC501 CASC512	CASC504 CASC514 CASC515 CASC516	CASC506 CASC508 CASC509	CASC510 CASC506 CASC508		FMU1101 & TMB101
BP230/6 MK5	BP230/6 MK5	BP230/6 MK5	BP230/6 MK5	BP230-6 MK5	BP230-6 MK5
GD500	GD501	GD501	GD501	GD501	GD502
1401/RIG 1 1401/RIG 2	1401/RIG 1 1401/RIG 2	1401/RIG 1 1401/RIG 2	1401/RIG 2	1401/RIG 2	
Y183-5	Y183-5	Y183-5 Y183-6	Y183-5 Y183-6	Y183-5	Y183-5

- (1) formerly TRW and Lucas
- (2) formerly Bae Systems & Plessey
- (3) formerly Auburn

PRINCIPAL DIMENSIONS, IN.					
Length, front flange to rear flange	94.75	--	--	--	--
Maximum diameter, encircling diameter	70.72	--	--	--	--
WEIGHT (dry) (lbs.)	3,310	3,255	3,516	3,590	3,390
Basic engine with all essential accessories necessary for engine operation, but excludes intake, jet pipe, and nozzle assembly and hydraulic pumps. Starter is included for models TAY 620-15, 650-14, 650-15, and 651-54.					
CENTER OF GRAVITY, IN.					
Aft front suspension centerline	13.8	--	14.2	14.5	14.3
Below engine centerline	3.4	2.9	3.3	3.5	2.1
Starboard from engine centerline	0.6	0.4	0.6	--	-0.8

FUEL

OIL

Oil Capacity

See NOTE 10
See NOTE 11
13.6 Liter/5.1 Liter usable

CERTIFICATION BASIS

FARs 21.29 and 33 effective Feb. 1, 1965, amended by FAR 33-1 through 33-9 for the TAY 620-15, 611-8, 650-15, and 651-54 engine models.

Pursuant to FAR 21.29(a)(1)(ii), Type Certificate E25NE was issued in validation of the British Civil Aviation Authority's certification of compliance with BCAR standards, which were found to provide a level of safety equivalent to the above "Certification Basis", as follows:

JAR-E, Change 6, dated August 28, 1981 (BCAR Section C, Issue 13)

FARs 21.29 and 33, effective Feb. 1, 1965, amended by FAR 33-1 through 33-9, 33.28, Amendment 15, 33.76, Amendment 20, 33.78, Amendment 19, 33.88, Amendment 18 and FAR 34, Amendment 3 for the TAY 611-8C engine model.

MODEL	DATE OF APPLICATION	DATE TC ISSUED OR REVISED	DATE TC CANCELLED
TAY 610-8	MAR 06, 1984	OCT 30, 1986	OCT 21, 2002
TAY 620-15	MAR 06, 1984	OCT 30, 1986	
TAY 611-8	SEP 09, 1987	OCT 15, 1987	
TAY 611-8B	MAY 02, 1989	JUN 30, 1989	OCT 21, 2002
TAY 650-14	JAN 26, 1988	MAR 16, 1990	OCT 21, 2002
TAY 650-15	JUN 02, 1987	OCT 05, 1988	
TAY 651-54	MAR 20, 1991	MAY 20, 1992	
TAY 611-8C	DEC 12, 2001	MAR 5, 2003	

IMPORT REQUIREMENTS

To be considered for installation on United States-registered aircraft, each engine (or propeller) to be exported to the United States shall be accompanied by a certificate of airworthiness for export, or certifying statement endorsed by the exporting cognizant civil airworthiness authority, which contains the following language:

- (1) This engine (or propeller) conforms to its United States type design (Type Certification Number E25NE) and is in a condition for safe operation.
- (2) This engine (or propeller) has been subjected by the manufacturer to a final operational check and is in a proper state of airworthiness.

Reference FAR Section 21.500, which provides for the airworthiness acceptance of aircraft engines or propellers manufactured outside of the United States for which a United States type certificate has been issued.

Additional guidance is contained in FAA Advisory Circular 21-23, Airworthiness Certification of Civil Aircraft, Engines, Propellers, and Related Products, Imported into the United States.

Service bulletins, structural repair manuals, vendor manuals, aircraft flight manuals, and overhaul and maintenance manuals which contain a statement that the document is LBA/CAA-approved are accepted by the FAA and are considered FAA-approved. These approvals pertain to the type design only.

NOTES

I. MODELS (TAY)	620-15	611-8	650-15	651-54	611-8C
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NOTE 1.

LOW PRESSURE ROTOR (N1)

Takeoff (5 min.)
Takeoff (10 min. OEI)
Maximum continuous
Transient (20 sec.)
Maximum for reverse thrust

HIGH PRESSURE ROTOR (N2)

Takeoff (5 min.)
Takeoff (10 min. OEI)
Maximum continuous
Transient (20 sec.)
Minimum idle, ground and flight
Maximum for reverse thrust

MAXIMUM PERMISSIBLE ENGINE OPERATING SPEEDS (See NOTES 8, 14, and 18)

Models 611-8, 611-8C	100% HP=12,484 rpm, 100% LP=8,393 rpm
Models 620-15, 650-15, 651-54	100% HP=12,136 rpm, 100% LP=8,393 rpm

	620-15	611-8	650-15	651-54	611-8C
Takeoff (5 min.)	8,100	8,015	--	--	--
Takeoff (10 min. OEI)	8,100	8,015	--	--	--
Maximum continuous	8,100	8,015	--	--	--
Transient (20 sec.)	8,343	8,250	--	--	8,100
Maximum for reverse thrust					5,457
Takeoff (5 min.)	12,560	12,446	12,560	12,670	12,560
Takeoff (10 min. OEI)	12,560	12,446	12,560	12,670	12,560
Maximum continuous	12,197	12,172	12,197	--	12,172
Transient (20 sec.)	12,937	12,809	12,937	--	12,684
Minimum idle, ground and flight	5,813	5,818	5,813	--	6,130
Maximum for reverse thrust	11,602	11,485	11,310	11,650	N/A

NOTE 2.

TURBINE GAS TEMP.

MAXIMUM PERMISSIBLE TEMPERATURES (See NOTE 14)

Measured at first stage low pressure turbine nozzle guide vane

	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Takeoff (5 min.)	800/1472	--	850/1562	865/1589	800/1472
Takeoff (10 min. OEI)	800/1472	--	850/1562	865/1589	800/1472
Maximum continuous	735/1355	715/1319	795/1463	--	715/1319
Overtemperature (20 sec.)	820/1508	--	870/1598	885/1625	820/1508
Starting, ground (2 sec.)	700/1292	--	740/1364	--	700/1292
Starting, inflight (2 sec.)	780/1436	--	780/1436	--	--

FUEL TEMPERATURE

Measured at inlet to high pressure stage of fuel pump (See NOTE 10)

	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Continuous operation	90/194	--	95/203	--	--
Transient operation (15 min.)	120/248	--	130/266	--	--

OIL INLET TEMPERATURE

Measured at oil pump exit (See NOTE 11)

	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
Continuous operation	105/221	--	--	--	--
Transient operation (15 min.)	120/248	--	--	--	120/248

NOTE 3.

FUEL

Minimum operation
Minimum starting
Maximum

OIL

Minimum for takeoff
Maximum continuous
Idle to 9500 rpm (1)

FUEL AND OIL PRESSURE LIMITS / ALL MODELS

Measured at inlet to low pressure stage of fuel pump

12 psia or 6 psi above tank pressure, which ever is lower, but not less than 2 psig
10 psia
40 psig

Measured at oil pump exit.

30 psig
25 psig
16 psig

(1) Oil pressure increase follows a straight line relationship between 9500 rpm N2 and maximum continuous condition.

I. MODELS (TAY)	620-15	611-8	650-15	651-54	611-8C
NOTE 4.	MAXIMUM PERMISSIBLE AIR BLEED EXTRACTIONS				
	Compressor air bleed may be used in accordance with Rolls-Royce instructions such that the operating limitations are not exceeded, up to either the individual or combined non-dimensional bleed extraction defined. Bleed air for nose cowl anti-icing is included.				
	T1 = total temperature at engine intake (°K) P1 = total pressure at engine intake (psia) M7 = HP stage 7 offtake mass flow (lb/sec) M12 = HP stage 12 offtake mass flow (lb/sec) MT = M7+M12 offtake mass flow (lb/sec) MF = LP (fan) offtake mass flow (lb/sec)				
7th-Stage HPC Bleed ((M7)(T1**.5))/P1					
Maximum takeoff	7.0	--	--	9.69	7.0
Maximum continuous and below	7.0	--	--	9.10	7.0
12th-Stage HPC Bleed ((M12)(T1**.5))/P1					
Maximum takeoff	---	--	--	--	--
Maximum continuous and below	10.0	--	--	12.9	6.9
HPC Total Bleed ((MT)(T1**.5))/P1					
Maximum takeoff (a)	7.0	--	--	9.69	7.0
Maximum continuous and below (b)	10.0	--	--	12.9	10.0
Fan Bleed ((MF)(T1**.5))/P1					
Maximum takeoff	10.5	--	6.5	14.51	10.5
Maximum continuous and below	10.5	--	6.5	13.94	10.5

- (a) For maximum takeoff, the bleed air may be extracted from 7th stage only.
 (b) For maximum continuous, the bleed air may be extracted either from 12th stage or from combination of 7th and 12th stages.

NOTE 5.**BASIS OF RATINGS**

Use of the 10-minute one engine inoperative (OEI) takeoff rating is approved for use only in the event of an inoperative engine(s) due to shutdown or failure, and is limited to periods of not more than 10-minutes. Takeoff thrust under normal conditions, i.e. when all engines are operative, is limited to periods of not more than 5-minutes.

Ratings are based on static test stand operation under the following conditions:

- compressor inlet air at 15°C (59°F) and 29.92 in-Hg
- Rolls-Royce test bed flaremeter TA1, TA2 or TA3 (ATF9476) for the TAY 611-8 and 620-15 and TA10 or TA11 (ATF10173) for the TAY 650-15, 651-54 and 611-8C.
- Rolls-Royce Jet Pipe/Final Nozzle Assembly JP2 or JP3 (ATF9786) for the TAY 611-8 and 620-15, 650-15 and 651-54 and JP4 or JP5 (ATF9786) for the TAY 611-8C.
- turbine gas temperature measured by 9 pairs of thermocouples mounted in the first stage low pressure turbine nozzle guide vane (NGV) with ballast resistor, specified in the applicable engine manual
- no aircraft accessory loads or bleed air extraction
- turbine gas temperature limits and engine rotor speed limits are not exceeded
- 100% air intake recovery

NOTE 6.

ACCESSORY DRIVE PROVISIONS					
DRIVE	Rotation	Speed Ratio To HP Rotor Speed	TORQUE (lb - in)		Overhang (lb - in)
			Maximum Continuous	Instantaneous	
Starter All models	CW	1.0398	2592	2981	153
Main Hydraulic pump 611-8 / 611-8C	CCW	0.2615	732	3000	140
620-15 / 650-15	CCW	0.3397	461	1455	36
651-54	CW	0.2880	732	3000	140
Auxiliary hydraulic pump 620-15 / 650-15	CW	0.3176	176	500	11
IDG 620-15 / 650-15	CW	0.5088	659	4286	743
611-8C	CW	0.5088	659	7140	743
AC generator 611-8	CCW	0.8821	500	2310	250
CSD and alternator 651-54	CW	0.6846	1230	5900	2154

NOTES: CW = clockwise, looking into the appropriate gearbox face
CCW = counter-clockwise

NOTE 7.

Thrust setting, thrust check and control of engine output in all operations are to be based on Rolls-Royce engine charts included in the relevant operating instructions. On the hydromechanically controlled engines, pressure ratio (EPR) indication is not reliable as the primary thrust setting parameter due to the EPR probe's susceptibility to icing. N1 thrust setting procedures must be used for the TAY 620-15 model unless the EPR probes are modified in accordance with Rolls-Royce Service Bulletins 75-1036 and 75-1055 or the equivalent and with appropriate EPR thrust setting charts.

NOTE 8.

For inflight operation during icing conditions, the minimum allowable fan speed (N1) for the TAY 611-8C is 21.1% (1770rpm) and for the other variants is 21% (1760 rpm).

NOTE 9.

Certain engine parts are life-limited. These parts are listed in time limit section of the relevant Engine Manuals. Maintenance is to be carried out in accordance with the manual (See NOTE 12).

NOTE 10.

Approved fuels and fuel additives are listed in the appropriate Rolls-Royce Operating Instructions (See NOTE 12.)

For the TAY 611-8and 651-54 and 611-8C, minimum fuel temperature measured at inlet to low pressure stage of fuel pump is -40°C(-40°F).

For the TAY 620-15and 650-15, minimum fuel temperature measured at inlet to low pressure stage of fuel pump is -50°C(-58°F).

NOTE 11.

Approved oils are listed in the appropriate Rolls-Royce Operating Instructions (See NOTE 12). Oils of the approved types when reclaimed to the approved Rolls-Royce standards are approved for use. Minimum oil temperatures, measured at oil pump exit, are as follows:

TAY MODEL	MINIMUM OIL TEMPERATURE			
	STARTING		ACCELERATION FROM IDLE	
	°C	°F	°C	°F
611-8 / 611-8C	-40	-40	-30	-22
620-15 / 650-15	-50	-58	-30	-22
651-54	-40	-40	-30	-22

NOTE 12.

TAY MODEL	OPERATING INSTRUCTIONS	MAINTENANCE MANUAL	ENGINE MANUAL	INSTALLATION MANUAL
611-8	F-TAY-1RR	M-TAY-1RR	E-TAY-1RR	EL2825
620-15	F-TAY-2RR	M-TAY-2RR	E-TAY-2RR	EL1716
650-15	F-TAY-3RR	M-TAY-3RR	E-TAY-3RR	EL2823
651-54	F-TAY-5RR	M-TAY-5RR	E-TAY-5RR	EL2834
611-8C	F-TAY-6RR	M-TAY-6RR	E-TAY-6RR	O-TR0817/03

NOTE 13.

These engines meet the smoke, fuel venting, and gaseous emission requirements of SAFR 27-5 dated January 1, 1984. The TAY 611-8C meets the requirements of FAR 34 amendment 3 (ICAO Annex 16, Volume 11, Second Edition, July 1993).

NOTE 14.

Limits regarding transient rotor shaft overspeed and transient gas temperature and number of occurrences are specified in the appropriate Rolls-Royce Maintenance Manual (See NOTE 12).

NOTE 15.

The engines are approved for use to the following ambient temperatures in Column 1 and 2 and are flat rated to the values in column 3 and 4.

TAY MODEL	MAXIMUM AMBIENT		FLAT TAKEOFF	
	°C	°F	°C	°F
611-8	55	131	30	86
620-15	55	131	30	86
650-15	55	131	30	86
651-54	50	122	30	86
611-8C	52	131	30	86

NOTE 16.

The maximum inlet throat area of the engines including aircraft air intake is limited to 1405 square inches for the TAY 611-8C and 1500 square inches for all other variants.

NOTE 17.

The maximum engine inlet distortion limit is specified in the appropriate Rolls-Royce Installation Manual (See NOTE 12).

NOTE 18.

The limits quoted are relative to the engines equipped with one of the following thrust reverser types.

TAY 611-8: Grumman Aerospace type 1159P41460-1 / -2

TAY 620-15: Grumman Aerospace type 1159P41530-1 / -2 / -9 / -10 and 1159RDP41530-51 / -52.

TAY 650-15: Grumman Aerospace type 1159RDP41530-7 / -8 / -9 / -10.

TAY 651-54: Dee Howard thrust reverser type TR6510 with the engine side mount configuration, and Dee Howard jet pipe P/N Qf 781.1000 for center engine mount configuration.

TAY 611-8C: Nordam thrust reverser P/N 08ND78006-1 for left hand installation and P/N 08ND78006-2 for right hand installation.

Approval for operation in reverse thrust does not imply approval of the thrust reversers themselves.

NOTE 19.

These engine models incorporate the following general characteristics:

- 610-8: Base Engine with Installation features to suit Gulfstream IV series aircraft. No longer in service.
- TAY 620-15: Same as 610-8, except takeoff and maximum continuous static thrust increase at sea level flat rated to 86°F ambient temperature. Installation features to suit Fokker 70 and Fokker 100 series aircraft.
- TAY 611-8: Same as 610-8, except takeoff static thrust increase at sea level flat rated to 86°F ambient temperature. Installation features to suit Gulfstream IV and IV-SP series aircraft.
- TAY 650-15: Same as 620-15, except with increased diameter fan, improved combustors, new high pressure turbine blades and vanes, and other minor hardware changes to accommodate higher thrust. Installation features to suit Fokker 100 series aircraft.
- TAY 651-54: Same as 650-15, except with installation features and gearbox to suit the Boeing 727-100 series aircraft and either a Dee Howard thrust reverser (side-mounted engines) or a Dee Howard jet pipe P/N Qf 781.1000 (center engine).
- TAY 611-8C: Same as 611-8, except with Fan system from TAY 650-15 and the introduction Of a FADEC control system.

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