European Aviation Safety Agency

EASA

RESTRICTED TYPE-CERTIFICATE DATA SHEET

No. EASA.IM.A.114

for

Beriev Be-200ES-E

Type Certificate Holder

Beriev Aircraft Company

1 Aviatorov Square
Taganrog, 347923
Russia

For Model: Beriev Be-200ES-E

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2. Models	Beriev Be-200ES-E
3. EASA Reference Date	10 August 1996
4. EASA Certification Application Date	22 July 2005
5. EASA Restricted Certification Date	07 September 2010

II. Restricted Certification Basis

1. IAC AR Certification Date	Type Certificate № СТ 229-Бе-200ЧС/Д03 (Be-200ES-E), issued 24 May 2010
2. Basis of Primary Restricted Certification	Requirements of Aviation Regulations Part 25 with Amendments 4
3. EASA Airworthiness Requirements	
3.1 EASA Airworthiness Requirements	
3.1.1 Airworthiness Standards	JAR-25, Change 14, 27 May 1994 Orange Paper 25/96/1, 19 April 1996 JAR AWO, Change 2, 01 August 1996
3.1.2 Reversions	None
3.1.3 Special Conditions	

3.1.3.1 Novel or unusual Features or unconventional use

SC Be-200ES-E/B-02	Performance when Operating from Water (see CRI B-02)
SC Be-200ES-E/B-05	Waterborne Operations (see CRI B-05)
SC Be-200ES-E/B-09	Static Longitudinal Stability (see CRI B-09)
SC Be-200ES-E/B-10	Static Lateral Stability (see CRI B-10)
SC Be-200ES-E/B-11	High Angle of Attack Protection (CRI B-11)
SC Be-200ES-E/C-03	Loads at Fire Fighting Mission (CRI C-03)

SC Be-200ES-E/C-04	Dive Speed Definition with Speed Protection System (CRI C-04)
SC Be-200ES-E/C-06	Carriage of Bulk Liquids in Aircraft (CRI C-06)
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SC Be-200ES-E/C-10	Unsymmetrical Loads on Floats (CRI C-10)
SC Be-200ES-E/C-15	Loading of Towing Devices (CRI C-15)
SC Be-200ES-E/C-16	Loading of Attachment Fittings of anchored Aircraft (CRI C-16)
SC Be-200ES-E/C-17	Loads on Water Scooping (CRI C-17)
SC Be-200ES-E/D-08	Hydraulic Fluid Overheat (CRI D-08)
SC Be-200ES-E/E-05	Falling and Blowing Snow (CRI E-05)
SC Be-200ES-E/F-11	Marine Equipment (CRI F-11)
SC Be-200ES-E/F-12	Riding Light (CRI F-12)
SC Be-200ES-E/F-13	Fire Fighting Operations (CRI F-13)
SC Be-200ES-E/F-16	Navigation Lights on Water (CRI F-16)
SC Be-200ES-E/F-17	Water in Compartment Lights (CRI F-17)
SC Be-200ES-E/F-18	Scooping and Water Bombing (CRI F-18)
SC Be-200ES-E/F-19	Cargo Compartment (CRI F-19)
SC Be-200ES-E/F-21	Water Takeoff Flap Movement (CRI F-21)

3.1.3.2 General Experience:

SC Be-200ES-E/B-01	Accelerate-Stop Distances and related Performances (CRI B-01) INT/POL/25/5
SC Be-200ES-E/B-07	Human Factors Aspects of Flight Deck Design (CRI B-07) INT/POL/25/14
SC Be-200ES-E/C-01	Design Manoeuvre Requirements (CRI C-01)
SC Be-200ES-E/C-07	Flutter Considerations for Unbalanced Control Surfaces (CRI C-07)
SC Be-200ES-E/C-12	Emergency Landing (CRI C-12)

SC Be-200ES-E/C-13	Fatique (Safe Life) Scatter Factors (CRI C-13)
SC Be-200ES-E/C-19	Material Strength Properties and Design Values (CRI C-19)
SC Be-200ES-E/D-01	Worn Brakes (CRI D-01) INT/POL/25/6
SC Be-200ES-E/D-03	Tires and Wheels Failure (CRI D-03) JAA TGM 25/8 Issue 2
SC Be-200ES-E/D-04	Class E Cargo Compartments Essential Systems Fire Protection (CRI D-04) INT/POL/25/15
SC Be-200ES-E/D-10	Flight Controls Operational Ground Test (CRI D-10)
SC Be-200ES-E/D-11	Flight Controls (CRI D-11)
SC Be-200ES-E/E-01	Engine D-436TP (CRI E-01)
SC Be-200ES-E/E-02	Engine D-436TP Additional Technical Conditions (CRI E-02)
SC Be-200ES-E/E-03	APU Aerosila TA 12-60 (CRI E-03)
SC Be-200ES-E/E-04	APU Aerosila TA 12-60 Additional Technical Conditions (CRI E-04)
SC Be-200ES-E/E-06	Fuel Tank Safety (CRI E-06) INT/POL/25/12
SC Be-200ES-E/E-09	Uncontrolled Thrust Increase (CRI E-09)
SC Be-200ES-E/E-11	Engine Operation in Icing Conditions (CRI E-11)
SC Be-200ES-E/F-01	Protection from Effects of HIRF (CRI F-01) INT/POL/25/2
SC Be-200ES-E/F-02	Protection from the Direct of Lightning (CRI F-02) INT/POL/25/3 Issue 2
SC Be-200ES-E/F-04	Complex Electronic Hardware (CRI F-04)
SC Be-200ES-E/F-05	Systems for Specified Operation Use (CRI F-05)
SC Be-200ES-E/F-06	Liquid Crystal Displays (LCD) (CRI F-06)
SC Be-200ES-E/F-07	Operation without Normal Electrical Power (CRI F-07)
SC Be-200ES-E/F-09	Primary In-Flight Ice Detection Systems (PIIDS) (CRI F-09)
SC Be-200ES-E/F-10	Flight Instrument External Probes – Qualification in Icing Conditions (CRI F-10)
SC Be-200ES-E/F-14	Software Aspects of Certification, Application of ED-12B/DO-178B (CRI F-14)

3.1.4 Equivalent Safety Findings

ESF Be-200ES-E/F-20	Flight Data Recorder (FDR) (CRI F-20)

3.1.5 Exemptions — No exemption has been granted

3.2 Elect to Comply Requirements

ECR Be-200ES-E/B-03	Stall and stall warning speeds and Manoeuvre Capability (CRI B-03) NPA 25B-215
ECR Be-200ES-E/B-04	Operations from Wet and Contaminated Runways (CRI B-04) NPA 14/2004
ECR Be-200ES-E/B-08	Landing in Abnormal Configurations (CRI B-08) NPA 240
ECR Be-200ES-E/C-02	Fuel Tank Integrity (CRI C-02) NPA 21-2005
ECR Be-200ES-E/C-05	Sustained Engine Imbalance (CRI C-05) NPA 25E-306
ECR Be-200ES-E/C-08	Interaction of Systems and Structures (CRI C-08) NPA 25C-199
ECR Be-200ES-E/C-11	Flight Loads Measurement (CRI C-11) NPA 02-2005
ECR Be-200ES-E/C-14	Proof of Structure (CRI C-14) NPA 25C-290
ECR Be-200ES-E/C-18	Vibration Buffet and Aeroelastic Stability Requirements (CRI C-18) NPA 25C-199 and 25BCD-236
ECR Be-200ES-E/C-20	Gust and Turbulence Loads (CRI C-20) NPA 25C-309
ECR Be-200ES-E/D-02	Towbarless Towing (CRI D-02) NPA 25D-275
ECR Be-200ES-E/D-05	Doors (CRI D-05) NPA 25 D-301 Rev.1
ECR Be-200ES-E/E-07	Powerplant Safety Assessment (CRI E-07) NPA 25E-337
ECR Be-200ES-E/E-08	Flammable Fluid Shut-Off (CRI E-08) NPA 25E-339
ECR Be-200ES-E/F-08	Flight in Icing Conditions (CRI F-08) NPA 16-2004

4. EASA Environmental Standards

Noise	ICAO Annex 16, Volume 1, Third Edition, Amdt. 7, Chapter 3
Emissions	ICAO, Annex 16, Volume 2, Second Edition, Amdt. 5

III. Technical Characteristics and Operational Limitations

1. Production Basis	Manufactured under Type Certificate
2. Type Design Definition	Current issue of Doc. №A204.0000.000.D17
3. Description	Twin engine, fire fighting cantilever high wing amphibious airplane, metal construction, retractable tricycle landing gear, T-tail

4. Dimensions

Span, m (ft)	32.78	(107.04)
Length, m (ft)	32.05	(104.65)
Height, m (ft)	8.90	(29.06)
Wing Area, m^2 (sqft)	117.44	(1264.23)

5. Engines	2 D-436TP by-pass three-rotor turbojet engines Type Certificate issued by IAC Aviation Register № CT 194-AMD dated 05 December 2000 (for characteristics and limitations see Annex 1 of the TCDS)
6. Auxiliary Power Unit	TA12-60 turbine engine Type Certificate issued by IAC Aviation Register № 101-VD dated 05 April 1996 APU non essential and not used in flight
7. Propellers	None
8. Fuel	Refer to approved Flight Manual
9. Oil	Refer to approved Flight Manual

10. Air Speeds and Mach number

Maximum Operating Limit IAS V_{MO}, kts (km/h)	286 (530)
Maximum operating limit Mach number M_{MO}	0.64
Take-off minimum control speed V_{MC}, kts (km/h)	91 (168)
Maximum permissible IAS with slats extended ($\delta_{slat}=20^0$), kts (km/h)	173 (320)
Maximum permissible IAS with flaps extended V_{FE}, kts (km/h)	
in intermediate position (δ_{flap} =10°)	165 (305)
in take-off position (δ_{flap}=20°)	156 (290)
in landing position (δ_{flap}=38°)	151 (280)
Maximum permissible IAS at which landing gear can be extended or retracted V_{LO}, kts (km/h)	189 (350)
Maximum permissible IAS with landing gear extended, kts (km/h)	232 (430)
Maximum permissible IAS with water doors opened, kts (km/h)	189 (350)
Maximum permissible when hydroplaning with water scoops extended, kts (km/h)	113 (210)

11. Operating Altitudes

Maximum Operating Altitude, m (ft)	8100 (26500)
Maximum Airfield Elevation for take-off, m (ft)	2000 (6500)

12. Wave height at operation from inland water basins and sea, m (ft) 1,2 (3,92)

13. Conditions

All weather Capability	Cat I Flights in the day and night time, VFR and IFR, on CIS routes and flights in area navigation system (BRNAV) in the European region in latitudes up to 72° North; in latitudes higher than 70° North - flight altitude should not exceed 7600m
Flights in Icing Conditions	Flights into known or forecast icing are prohibited
Flights in thunderstorm conditions	Aircraft should not approach heavy cloud concentrations not more than 15 km. Distance between the marking on the weather radar and the aircraft should not be less than 25 km.
Cargo Transport:	Transportation of Cargo is not certified
Outside Air Temperature at start-up and take-off	Land Operations: from -50℃ to 42℃ Water Operations: from 5℃ to 42℃

14. Maximum Certified Weights

Take-off (Land), kgf (lbf)	41000 (90300)
Take-off (Water), kgf (lbf)	37900 (83500)
Landing (Land), kgf (lbf)	35000 (77100)
Landing (Water), kgf (lbf)	37900 (83500)
Taxi, kgf (lbf)	41200 (90800)
Zero Fuel, kgf (lbf)	28300 (62400)
Take-off weight when scooping on gliding, kgf (lbf)	43000 (94700)
Water scooped on gliding, kgf (lbf)	12000 (26000)

15. Centre of Gravity	See Airplane Flight Manual
16. Datum	620 mm in front of Nose Point
17. Levelling Means	See AMM, Section 08.10.00
18. Minimum Flight Crew	2 (Captain, Co-pilot)

19. Crew for Fire-Fighting Mission	2 (Captain, Co-pilot)
20. Wheels and Tyres	
Nose Assy (Qty 2)	Wheel KN46, Tyre 620x180R-305 mod. 1A
Main Assy (Qty 4)	Wheel KT232, Tyre 950x300 mod. 2A

IV. Operating and Service Instructions

1. Flight Manual	
Airplane Flight Manual (AFM)	Document №A204.0000.000.AFM
2. Mandatory Maintenance Instructions	
Airplane Maintenance Manual (AMM) (incl. Airworthiness Limitations)	Document №A204.0000.000.AMM
Airplane Maintenance Schedule	Document №A204.0000.000.MS

V. Notes

None.

SECTION: ADMINISTRATIVE

I. Acronyms and Abbreviations

None

II. Type Certificate Holder Record

Beriev Aircraft Company
1 Aviatorov Square
Taganrog, 347923
Russia

III. Change Record

Issue	Date	Changes	TC issue
Issue 1.0	07/09/2010	Initial Issue	Initial Issue, 07/09/2010
Issue 2.0	17/09/2010	1.I.5 EASA Restricted Certification Date added Update of paragraphs 1.II.1 and 1.II.2	07/09/2010

ANNEX 1: ENGINE CHARACTERISTICS

EASA
ENGINE DATA SHEET

Number	01-E
Issue	01
Date	06 November 2008
Type	Ivchenko-Progress D-436TP engine
Variants	D-436TP

I. General

1. Type/Variants	Ivchenko-Progress D-436TP This model is accepted for use on multi-engine civil aircraft classified in the Restricted Type Certificate Category (fire fighting mission) at the ratings and within the operating limitations specified below, subject to compliance with the powerplant installation requirements appropriate to approved installations.
2. Engine Designer	Ivchenko-Progress Machine Building Design Bureau 2, Ivanova St. 69068, Zaporozhye UKRAINE
3. Manufacturer	Motor Sich JSC, Zaporozhye, UKRAINE/MMPP Salut, Moscow, RUSSIA/UMPU JSC, Ufa, RUSSIA
4. Engine Acceptance Application Date	22 July 2005
5. Engine Acceptance Reference Date	25 February 1998
6. EASA Engine Acceptance Date	06 November 2008

II. Engine Acceptance Basis

1. Airworthiness Standards and Environmental Requirements	JAR-E Change 9 plus Orange Papers E/96/1 and E/97/1 CS-E745(a)(3) – Acceleration Datum Conditions CS-E840 – Rotor Integrity CS-E850 – Compressor, Fan and Turbine Shafts Emissions and Fuel Venting: ICAO Annex 16, Volume II, Parts II & III (2nd Edition, July 1993) Amendment 5 dated 24th November 2005
2. Special Conditions	None
3. Deviations	None
4. Equivalent Safety Findings	E 80(d) Equipment with High Energy Rotors E 790(b),(c) Ingestion of Rain and Hail E 800(b),(c) Bird Strike / Ingestion E 810 Compressor and Turbine Blade Failure

III. Technical Characteristics

1. Type Design Definition	The build standards are defined in the following Specification or later approved issues: P/N 638 00 00 000
2. Description	The D-436TP engine is a three shaft high bypass ratio, axial flow, turbofan with Low Pressure, Intermediate Pressure and High Pressure Compressors driven by separate turbines through coaxial shafts. The LP Compressor fan diameter is 1390mm with fan blade and OGV's. The combustion system consists of a single annular combustor with 18-off fuel spray nozzles.

The Compressor and Turbine have the following features:

Compressor	Turbine
LP – 2 stage (fan and booster)	LP – 3 stage
IP – 6 stage	IP – single stage
HP – 7 stage	HP – single stage

The engine control system utilises a hydro-mechanical fuel control system and an electronic power governor unit.

Equipment:

Electronic Engine Power Governor	ЭРРД-436
Fuel Control	935TM
Fuel Pump	934TM
Bleed Valve Unit	4017.5B
	4017.11H
Ignitor Box	КВФ-114-1, ПВФ-11-1

For details of equipment included in the type design definition refer to Maintenance Manual.
The engine is not accepted for use with an operable Thrust Reverser Unit.

3. Dimensions

Overall Length (mm)	4170
Maximum Diameter (mm)	1912

4. Dry Weight

Dry engine weight	1450 kg

5. Ratings

The ISA sea-level static thrust ratings are:

Take-Off	73,6kN (up to +30℃)
Maximum Continuous	59,8kN
Maximum Cruise	14,7kN (Standard Atmosphere, altitude at 11000m, Mach 0,75)

6. Control System	The engine is equipped with a hydro-mechanical control system and an electronic power governor. Refer to the Maintenance Manual for further information.

7. Fluids

7.1 Fuel and Additives	Refer to the Maintenance Manual for information on approved fuel and additive specifications.
7.2 Oil (see Note 2)	Refer to the Maintenance Manual for information on approved oil specifications.
8. Aircraft Accessory Drives	The engine's accessory gearbox may be fitted with two aircraft Hydraulic Pumps and one AC Electric Generator to provide hydraulic and electrical power to the aircraft. These units are part of the airframe, and certified under Aircraft Airworthiness Standards. The Engine Maintenance Manual details installation and operational requirements.
9. Maximum Permissible Air Bleed Extraction	The D-436TP supplies compressor air for the aircraft ECS and for anti-icing of the engine air intake.

Aircraft System	Engine Failure Case	Max. Mass Flow [kg/hour]	Off-take condition
Aircraft ECS	No failure	800	Constant off-take at all thrust ratings except take-off at icing conditions
	OEI	1000	
Engine Intake anti-icing	No failure	1800	Constant off-take at all thrust ratings at icing conditions
	OEI		

IV. Operating Limitations

1. Temperature Limits

1.1 Turbine Gas Temperature – IPT Outlet (℃)

Maximum during starts	680
Maximum during flight	835

1.2 Fuel temperature (℃)

Minimum fuel temperature	5℃ above the temperature of crystallization
Maximum fuel temperature	60℃ (100℃ for no more th an 5 min)

1.3 Oil temperature (℃) at engine inlet

Minimum for engine starting	-40
Minimum before setting to the thrust rating above flight idle	-5
Maximum (5 minutes)	125
Maximum for unrestricted use	110
	* -30℃ for oils according to MIL-PRF-23699, DEF STAN 91-101

1.4 Ambient Temperature Limits (℃)

Ground running	-55…+45
Engine not in operation	below -55
Operation in icing conditions	-20

2. Pressure Limits

2.1 Fuel pressure (kPa)

Minimum inlet pressure (measured at engine inlet)	39,22…176,51 but not less than 88,26 absolute. For further information refer to Maintenance Manual

2.2 Oil pressure (kPa) at engine inlet downstream oil filter

Minimum oil pressure

(i) Ground idle operation not less than 196,1

(ii) Flight idle operation and above 245,2...441,3

3. Maximum Permissible Rotor Speeds [min^{-1}]

HP	IP	LP**
14780	10980	5930

** Prolonged engine operation in a LP speed range from 4200 min^{-1} to 4500 min^{-1} is not permitted. See Maintenance Manual section 072.00.00, page 33.
In the case of operation above these limitations, refer to Maintenance Manual for necessary actions

4. Installation Assumptions	There has been no specific Installation Manual issued. The installation assumptions are part of several dedicated documents agreed between Ivchenko-Progress and Beriev company.
5. Dispatch Limitations	The engine has not been approved to operate with faults present in the control system.

V. Operating and Service Instructions

Document	P/N
Maintenance Manual	638 00 00 000РЭ
Service Bulletins	as required

VI. Notes

1. For certain engine critical parts a Mandatory Parts Life has been established as listed below

Part		Cycles
Fan Disc	P/N 436T1.01.09.011	30000
Fan Blade	P/N 436T1.01.09.001	11650
Booster Disc	P/N 436T1.01.09.012-01	30000
Fan Shaft	P/N 436T1.09.080	15000
IPC 1 Disc	P/N 436T1.01.03.011	9570
IPC 2 Disc	P/N 36.01.03.200-01	5335
IPC 2 Disc	P/N 436T1.01.03.200	24590
IPC 3 Disc	P/N 36.01.03.013	7415
IPC 3 Disc	P/N 436T1.01.03.013	15800
IPC 4 Disc	P/N 36.01.03.014	15830
IPC 5 Disc	P/N 36.01.03.015	14120
IPC 6 Disc	P/N 36.01.03.016-03	30000
IPC Aft Shaft	P/N 36.01.03.051-03	16000
HPC 1 Disc	P/N 436T.01.06.011	12755
HPC 2 Disc	P/N 436T.01.06.012	30000
HPC 3 Disc	P/N 436T.01.06.013	30000
HPC 4 Disc	P/N 436T.01.06.020	29725
HPC 5 Disc	P/N 436T.01.06.045	30000
HPC 6 Disc	P/N 436T.01.06.046	30000
HPC 7 Disc	P/N 436T.01.06.047	30000
Shaft	P/N 436T.01.06.048	15000
Labyrinth Seal Disc	P/N 436T.04.02.002	26110
HPT Disc	P/N 436T.04.02.001-02	14700
IPT Disc	P/N 36.04.04.001-02	30000
IPT Disc	P/N 0360404001-03	30000
IPT Shaft	P/N 436T.04.04.009	30000
LPT 1 Disc	P/N 436T.04.06.001	11000
LPT 2 Disc	P/N 436T.04.06.003	15615
LPT 3 Disc	P/N 436T.04.06.005-01	30000
LPT Shaft	P/N 436T.04.06.009	30000
Combustor Case	P/N 436T.03.02.000	17580
Mount	P/N 638.13.01.000	30000
Thrust Bracket	P/N 436T1.13.01.080-01	30000

2. Mixing of oils is not permitted, except for ИПМ-10 and Turbonycoil 210A.

3. The D-436TP engine is accepted for installation in Be200ES-E and Be200-E aircraft only.