Beriev-200 Amphibious Aircraft
Be-200 multirole platform

- Fire fighting
- Search-and-Rescue
- Ecological monitoring and pollution control
- Medevac
- Freight and passenger
Deployment

Aerodrome B-class
(1,800 m paved runway)

Hydrodrome fitted with ramp, minimum water depth 2.6 m

Mooring to standard pier up to 48 hours

18 m (59 ft)

40 m (131 ft 3 in)

2.5 m (8 ft 2 ft)

Max. inclination 7 deg
Flight crew: two pilots

1 – cockpit; 2 – first pilot station; 3 – co-pilot station; 4 – weather radar compartment; 5 – equipment units;
6 – forward maintenance door; 7 – cargo hatch; 8 – blister; 9 – life raft; 10 – liquid retardant tanks; 11 – drain ducts;
12 – aft maintenance door; 13 – forward water tank; 14 – retractable water scoops; 15 – rear water tank; 16 – service compartment; 17 – rear technical compartment; 18 – aft compartment; 19 – lavatory; 20 – aft entrance door; 21 – left emergency door.
Fire Fighting System

**Intake capacity**

**Scooping time**

12,000 kg (3,170 US gal)

14 seconds

Two integrated water tanks are placed under the cabin floor. Tanks are divided into 8 sections, each equipped with the dedicated door.

Four tanks for liquid fire foam.

Two low-drag scoops ensure intake of full load of water.

Pre-programmed water release sequence with water tanks doors opened simultaneously, separately, or consecutively.
Fire Fighting System

Water filling indication
(System status monitor display)

SFS Control panel
(Overhead panel)
- Selector switch of water amount to be scooped
- Drop modes selector switch
- Liquid chemicals mixing
- Scoops extension/retraction indication
- Tanks doors closed/opened position indication

Controls
- Water release button
  (safety guarded)
- Scoops extension/retraction pushbutton
  (for each pilot)

Water amount picked up

TANKS FULL

Emergency drop
Captain

Emergency drop
Co-pilot
Composition

- Two high-bypass ratio cruise engines with the thrust of 7500 kgf each (Ukraine)
- Auxiliary power unit (Russia)

- Engines are mounted above center-wing to protect engines inlets against sprays.
Performance / Fire Fighting Aircraft

Maximum take-off weight ................................................................. 41000 kg (90,389 lb)
Operating ceiling ............................................................................. 8100 kg (90,389 lb)
Economic speed ................................................................................ 550 km/h (297 kt)
Range of flight with one-hour fuel reserve .................................... 3150 km (1,701 nm)
Take-off distance up to altitude 10.7 m (ISA, sea level):
  from land .................................................................................. 1350 m (4,167 ft)
  from water .................................................................................. 1600 m (5,249 ft)
Landing distance from altitude 15 m (ISA, sea level)
  on land .................................................................................... 1050 m (3,346 ft)
  on water .................................................................................... 1300 m (4,265 ft)
Seaworthiness ................................................................................ up to 1.2 m (3ft 11in)
Flight Deck

- Fly-By-Wire
- Glass Cockpit
- ICAO CAT I, II compliant

- IFR, pressurized and de-iced
- Autopilot
Operational safety

• Safety for piloting in fire fighting missions
  Angle of attack limiter for enhanced protection in all configurations, including flights in icing conditions

• High thrust-to-weight ratio
  Climb rate of 16.5 m/sec (3300 ft/min) ensures safety in mountains
  Capable of climbing after engine failure during scooping
Operation

The Be-200ES aircraft have been in fire fighting operations by Beriev Aircraft, Russian EMERCOM and Disaster Relief Ministry of Azerbaijan:

- Italy: 2004 and 2005
- Portugal: 2006 and 2007
- Indonesia: 2006
- Greece: 2007
- Russia: 2004 – 2012
- France: 2011
- Serbia: 2011-2013
• Operation for Protezione Civile
• Based in Olbia, Sardegna to cover all Italian territory within 45 minutes – 1 hour
• 4 Italian pilots trained at Beriev Training Center and type rated for Be-200ES, operated by joint Russian-Italian crews
• 20 minutes time span from fire call to T/O.
• 215 flight hours of fire fighting and familiarization flights
• 5415 tons of water mixed with chemical foam dropped on fires
• Average number of drops per block hour: 4,76/h
• Average drop in Fire mission: 9,5 tons of water
Operational range based on location of water resources approved for scooping

Be-200 was based at the AF Base in Monte Real. Portuguese coordinator participated in all flights.

After the aircraft delivery the crews identified 19 inner water resources with 42 scooping areas which were cleared for the Be-200 operation.
### Operation of one Be-00ES aircraft (1.5 months)

<table>
<thead>
<tr>
<th>Total block-time</th>
<th>hours:minutes</th>
<th>80:45</th>
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</thead>
<tbody>
<tr>
<td>Total sorties</td>
<td>flights</td>
<td>26</td>
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<tr>
<td>Total quantity of water dropped</td>
<td>t</td>
<td>1621</td>
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</table>

### Operation of two Be-00ES aircraft (2.5 months)

<table>
<thead>
<tr>
<th>Total block-time</th>
<th>hours:minutes</th>
<th>181:36</th>
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</thead>
<tbody>
<tr>
<td>Total sorties</td>
<td>flights</td>
<td>76</td>
</tr>
<tr>
<td>Total quantity of water dropped</td>
<td>t</td>
<td>3817</td>
</tr>
</tbody>
</table>
Three Be-200ES aircraft of EMERCOM Rapid Response Squadron were fighting forest fires at Sumatra and Kalimantan Islands (Palembang, Banjarmasin, Palangkaraya districts) from 30 October till 11 December 2006.
Over 7,000 natural fire centers were observed within the area of more than 430,000 ha. More than 50 people lost their lives in fire and 2,500 homes were burned.

The Be-200 performed over 700 flight hours during two months with minimum time in maintenance.

About 600 tons of water in average were dropped by one Be-200ES per day.
Experimental operation in France, 2011

Total flight hours: 51 h 12 min.
Water areas researched for scooping: 44
Number of scoopings/drops performed: 185
Total water dropped: 1387 tons
Operation from DSC bases: Marignane, Bordeaux, Ajaccio (Corsica)
Operational results and conclusions

• International operation confirmed the design solution and helped to identify and modify critical areas.

• Today the Be-200 is the robust fire fighting aircraft which has been tested and proved reliable in the sea operation.

• The aircraft is fully adapted to the infrastructure of the airports and aircraft bases of different countries.

• The aircraft has integrated in the existing organization, technology and strategy of fire fighting in all countries of operation.

• Range of the aircraft allows to deploy the aircraft on one or two bases to cover the extensive territory. The effect of the aircraft engagement was specifically noticeable due to the fast response to fires in the most remote areas.

• Operation of the Be-200 in the mixed aerial groups of the amphibious and non-amphibious fixed-wing aircraft and helicopters showed excellent interaction of various aerial means and complemented the existing operational solutions.
Operational efficiency

• **As a scooper, the aircraft:**
  o does not need to return to the base for refilling after every drop: the cycle “fire-drop” is reduced to increase the number of drops and decrease the time and costs of fire suppression
  o does not need to be tied to particular base for filling – lakes, rivers, dams and sea can be used for scooping and fast response

• **As an airtanker, the aircraft:**
  o can use retardant for drops

• **Due to the jet engines thrust the aircraft is capable to:**
  o fast climb to higher level to reach mountainous fires: overall cycle “fire-scooping area” is reduced
  o safe drop in direction of steep shores and mountains: even in the case of one engine failure the aircraft can climb out of the canyon after water drop

• **Due to high speed the aircraft is capable to:**
  o reach quickly the alternate scooping area in case of adverse sea and wind conditions: overall cycle on fire is maintained
  o get fast to remote areas and stop fires before they start growing.
CERTIFIED IN CIS

In 2003 certification in CIS as:

- Fire fighting
- Cargo
- Passenger
In September, 2010 EASA issued Type Certificate for Be-200ES-E amphibious aircraft. In parallel the Supplement to Type Certificate for the Be-200ES-E aircraft was issued by IAC AR.
# Be-200 Program status

**BE-200ES FLEET STATUS AS OF 2014**

<table>
<thead>
<tr>
<th>2012 Fleet status</th>
<th>Countries</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td><strong>Be-200 in Operation</strong></td>
<td><strong>Russia</strong> 8</td>
<td><strong>Azerbaijan</strong> 1</td>
</tr>
<tr>
<td><strong>Be-200 on Order</strong></td>
<td><strong>Russia</strong> 12</td>
<td><strong>USA</strong> 10</td>
</tr>
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</table>
The Beriev Be 200 in the USA

Tangent Link

2014
The Aircraft

The BE 200
Why?

- The only 3,000 gallon Amphibious Scooper in production
- Puts more water and water enhancers on a fire from more sources for less cost per gallon
- 80% of US wildfires are within 10 miles of scoopable water
- The outlook for a US manufacture to design, develop and certify a new tanker is low
- The BE 200 draws on decades of marine aviation experience
- The US quit developing new large amphibious aircraft 50 years ago
A Better Fire Fighting Aircraft

- Uses Airports, Lakes, Rivers and Oceans
- When not needed for fires, it can carry cargo, people and emergency medical facilities
- Has been tested to Inter Agency Board (IAB) scooper standards with excellent results
- Fast, Flexible and Efficient
BE 200 as a Heavy Scooper + Tanker

Proven in international fires, The BE 200 provides the speed, short field, hot and high, 3,167 gallon payloads in a new 367 Kt aircraft designed at the factory for the fire mission, at a competitive price.

The IES management team will provide full factory supported BE 200 airworthiness+service

The only 3,000 gallon multi purpose tanker that can maximize the rapid delivery of water to include scooping from “Sea State 3”. With a 2 hour conversion, it also carries passengers, cargo, and is being tested for smoke jumpers.
The Aircraft Basics

• P2 / BAE 146 size and weight
• Exceeds USFS specified cruise speed with full payload at 8,000, 12,000 and 18,000 MSL
• Advanced Turbofans with more power than any aircraft in its class and a lighter wing loading
How It Works

Water Scooping Pattern

Total distance includes approach from 15-m (50-ft) and climb up to 10.7-m (35-ft) altitude

Conditions: ISA
The loads can currently be dropped in 1 by 1, 2 by 2 and full salvo. That equals 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, and full salvo drop choices.

Experience shows that in most cases, 3,000 gallons dropped on the head of the fire from two BE 200s working together is the most effective tactic.

The Be 200 has been integrated with 415s in fire operations.

Scooping times range from 14-20 seconds.
California has some of the most costly property which tends to be near the coast and large fires, with many retardant restrictions, it is also the State with the most coastal water that can be rapidly scooped with a BE 200 aircraft.
850 NM
Operating Radius, with 1 HR reserve
The BE 200 is an aircraft that can carry a heavy scoop load to very far away fires.

30 NM scooping radius, @ 3.1 avg. drops per hour = 9,300 gallons of water on the 30 NM fire increasing to more than 37,000 gallons per hour on close in fires.

Note: Black rings are for calculated lakes, blue rings have to be analyzed for terrain & hot and high operations.
2,200 NM range and 1 HR reserve with a 1000 gal ferry tank installed. 850 NM roundtrip radius on a standard tank of fuel.
Radius of action is 8% greater for airport loaded water at 8.3 lb per gallon.
7,600 NM range in 24 hr. with 2,000 gal ferry tank and three fuel stops
IES Organization Chart

COO/Safety Officer
SMS Chief-Pilot

Office Manager

Quality Assurance
Records Configuration Management
Standardization Pilot

Flight Operations Training
Crew Scheduling Pilots
Standardization

Airworthiness
Crew Chiefs Maintenance and Engineering
Special Tools Direct link to Factory

Logistics Crew Trucks Parts Supplies

Board

Advisory Board

President

Vice President

Beriev

Contract Services CPA/Accounting HR Hazmat Environmental Compliance Consultants

3/15/2014
By IES
Test Matrix Elements

- T&E instrumentation
- Wind, temp, elevation at Take Off and Drop
- Distance from Take Off to Drop
- Distance from land airport to Scoop
- Scoop water surface conditions
- Time from Start to Take Off
- Distance from Scoop to fire
- Elevation of fire
- Type of fire
- Load quantity and water temp.
- Load drop amounts and sequence
- Load mix if enhancers are used
- Types of enhancers used
- Accuracy of Drop
- Height of Drop
- Time in Drop Zone
- Fire Terrain
- Scooping time
- Block Speed
- Block fuel used
- Fuel used per gallon of drop delivered and CO2E
- Noise measurements
- FLIR recording
- Video recording
- GPS tracking

3/15/2014
By IES
Value Comparison Chart
Be-200 vs. other USFS Tankers

Fire Fighting Aircraft Deviation from Prediction

Relatively Overpriced - Higher is Worse
Relatively Underpriced - Lower is Better

Yearly Prediction Deviation

3/15/2014
By IES
• Build a heavy support base in Santa Maria, CA
• FAA Certification in progress
• IAB Criteria: Phase I tests completed 2012, Phase 2 pending
• US pilots
• US maintenance and technicians
• Factory spare parts readily available in Santa Maria, CA
• Supply the Be-200 (“Rainmaker”) to existing contractors, county, state and federal agencies
• US assembly option
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