Concorde Battery Corporation

2009 San Bernardino Road
West Covina, California, USA 91790

RG-150 Series

24 VOLT 3.5 Ah, VALVE REGULATED, LEAD-ACID, AIRCRAFT BATTERY

DECLARATION OF DESIGN PERFORMANCE

TO THE REQUIREMENTS OF

RTCA DO-293A and IEC60952

Applications: Fixed and Rotary Wing Aircraft, Fuselage Mounted

NOTE: Applications may not be a complete list of all applications for this battery type.

The data/information contained herein has been reviewed and approved for general release on the basis that this document contains no export-controlled information

Characteristic	Part / Clause	Requirement / Performance	Test Report / Reference
Description	The RG-150 Series of batteries are designed for emergency power to avionics. There are two battery configurations within the RG-150 Series, the RG-150-1[-Y] and the RG-150-2[-Y]. Where the -1 represents a battery configuration without internal heaters and -2 represents a battery with internal heaters; and where [-Y] represents the current rating of the output circuit breaker - from 1A to 25A. Two legacy configurations will be retained, RG-150-1 and RG-150-2, with a 5A circuit breaker on the output. The RG-150-1 and RG-150-2 are not to be used for new designs. The battery outer container conforms to ARINC 404 1/4 ATR short configuration. The outer housing is chem-filmed with an epoxy powder coated exterior. The battery hold down is incorporated into the outer housing. The battery is equipped with a Cannon DPXB quick disconnect connector. See envelope drawings for specific connector details. All battery configurations are electrically identical with regard to the battery. The cells and intercell construction of all battery configurations are identical. Each battery consists of 12 series connected cells. Intercell connections are made on a circuit board at the top of the cells. The output current is limited by an MS3320 circuit breaker. Other common controls consist of a diode to prevent the battery from being discharged to power the aircraft buss in the event of a loss of power to the buss, a power resistor to limit the inrush surge current to the battery when placed on charge, and a single pole double throw relay which allows the battery to be disconnected from the buss for an external load test. These electrical elements are entirely passive. The electrolyte is a sulfuric acid and water solution and is absorbed within the battery plates and separators. There is no free electrolyte. See Material Safety Data Sheet for hazardous material identification and precautions. The RG-150-2 and RG-150-2[-Y], contain DC powered electrical resistance heaters and the controls for the heaters. The controls are entirely passive consisting of two bi-metallic snap action thermal switches in series. The control circuits and heaters for both heated batteries are identical. The RG-150-1[-Y] and RG-150-2[-Y] series batteries conform to Concorde Drawing RG-150-1-Y and RG-150-2-Y. The legacy configurations RG-150-1 and RG-150-2 batteries conform to Concorde Drawing RG-150.		
Format	IEC 60952-2	Concorde Drawing No's. RG-150-1-Y, RG-150-2-Y and RG-150	
Connector	IEC 60952-2	The battery series is available with a Cannon DXPBMA-D8-34P-0107 or equal connector. See envelope drawings for connection details and schematic.	
Mass		RG-150-1, RG-150-2, RG-150-1[-Y] and RG-150-2[-Y]	14.0 lbs (6.4 kg) max
Charging method	IEC 60952-1, 4.3	Constant potential at 28.25 V	
Any auxiliary requirement:		RG-150-2 and RG-150-2[-Y] are equipped with an internal DC powered resistance heater and controls.	
Ventilation	DO-293A, 1.9 IEC 60952-2	Battery is not equipped with vent tubes	
Flammability	IEC 60952-2	RG-150 Series outer container is fire resistant	
Unspillability		Non spill	

Electrical Performance

		RG-150-1 and RG-150-1[-Y]	RG-150-2 and RG-150-2[-Y]	
Rated Capacity (C1)	DO-293A, 2.2.2 IEC 60952-1, 5.1.1	3.5 Ah	3.5 Ah	

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Capacity at –18°C	DO-293A, 2.2.3 IEC 60952-1, 5.1.2	3.0 Ah	3.0 Ah (Heaters not energized)	
			3.3 Ah (Heaters energized 1 hr prior to test)	
Capacity at –30°C	DO-293A, 2.2.4 IEC 60952-1, 5.1.3	2.0 Ah	2.0 Ah (Heaters not energized)	
			2.9 Ah (Heaters energized 1 hr prior to test)	
Capacity at +50°C	DO-293A, 2.2.5 IEC 60952-1, 5.1.4	3.5 Ah	3.5 Ah	
Power Rating +23°C	DO-293A, 2.2.6.1 IEC 60952-1, 5.2.1.1	N/A, Not rated for engine starting		
Power Rating -18°C	DO-293A, 2.2.6.2 IEC 60952-1, 5.2.1.2	N/A, Not rated for engine starting		
Power Rating -30°C	DO-293A, 2.2.6.3 IEC 60952-1, 5.2.1.3	N/A, Not rated for engine starting		
Rapid Discharge Capacity at 23°C	DO-293A, 2.3.1 IEC 60952-1, 5.3.1	N/A, Each RG-150 Series battery has a current limiting device on the output.		
Rapid Discharge Capacity at -30°C	DO-293A, 2.3.2 IEC 60952-1, 5.3.2	N/A, Each RG-150 Series battery has a current limiting device on the output.		
Charge Retention	DO-293A, 2.4 IEC 60952-1, 5.4	+23˚C - Rating value for design = 95%		
		+50˚C - Rating value for design = 60%		
Storage	DO-293A, 2.5 IEC 60952-1, 5.5	DO-293A - 1 year storage life test. Battery delivered 100% of rated capacity after 1 year of storage.		
Charge Stability	DO-293A, 2.6 IEC 60952-1, 5.6, Class I	OK. Max battery temperature on charge = 50°C. Charge current fell during the entire charge period. Capacity at end of test was greater than C_1 rating.		
Short-circuit Current	DO-293A, 2.7 IEC 60952-1, 5.7	Peak current = 0 A at 0.01s, Circuit breaker tripped immediately. Test rerun with circuit breaker bypassed, Peak current = 339A Last recorded current = 2A at 60s		
Charge Acceptance	DO-293A, 2.8 IEC 60952-1, 5.8	RG-150-1 RG-150-2 RG-150-1[-Y] RG-150-2[-Y]	+23°C = 92%	
		RG-150-2 RG-150-2[-Y]	-18°C = 97%	Test at low temperatures is conducted on batteries with heaters only.
		RG-150-2 RG-150-2[-Y]	-40°C = 233%	
Insulation Resistance	DO-293A, 2.9.1 IEC 60952-1, 5.9.1	The RG-150 Series successfully me the test requirements.		

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Dielectric Strength	DO-293A, 2.9.2 IEC 60952-1, 5.9.2	The RG-150 successfully met the test requirements.	
Duty Cycle Performance	DO-293A, 2.10 IEC 60952-1, 5.10	N/A, Not rated for engine starting.	
Water Consumption	DO-293A, 2.11 IEC 60952-1, 5.11	N/A, Applies to flooded electrolyte batteries only.	
Overcharge Endurance	DO-293A, no requirement IEC 60952-1, 5.12	Not tested	
Cyclic Endurance	DO-293A, 2.12 IEC 60952-1, 5.13	100 cycles successfully completed.	
Deep Discharge	DO-293A, 2.13 IEC 60952-1, 5.14	Capacity after Deep Discharge Test: 3.43 Ah, 93% of the initial capacity.	
Induced Destructive Overcharge	DO-293A, 2.14 IEC 60952-1, 5.15	All test requirements were successfully met.	
Electrical Emissions	DO-293A, 2.15 IEC 60952-1, 5.16	N/A, Battery contains no active electronics.	
Environmental Performance			
Vibration	DO-293A, 3.1 IEC 60952-1, 6.1	Qualified per DO-293A to DO-160G section 8, Random Vibration, Curve C, 1hr per axis.	
Acceleration	DO-293A, no requirement IEC 60952-1, 6.2	Not tested.	
Operational Shock	DO-293A, 3.3.1 IEC 60952-1, 6.3, Class I	Qualified per DO-293A to Category B of DO-160G.	
Crash Safety Shock	DO-293A, 3.3.2 IEC 60952-1, 6.4	Qualified per DO-293A to DO-160G, Category B. The battery was tested to Table 7-1, Aircraft type 5, Test type R, 20g's in each orientation.	
Explosion Containment	DO-293A, 3.4 IEC 60952-1, 6.5	Qualified per DO-293A. All tests requirements were met.	
Altitude	DO-293A, 3.5 IEC 60952-1, 6.6	Qualified to 20621m (67654 ft) per DO-293A.	
Rapid Decompression	DO-293A, 3.5.2 IEC 60952 no requirement	Qualified from 2300m (8000 ft) to 20621m (67654 ft) per DO-293A.	
Temperature Shock	DO-293A, 3.6 IEC 60952-1, 6.7	Qualified per DO-293A. Temperature cycles from +85°C to -55°C.	
Fungus Resistance	DO-293A, 3.7 IEC 60952-1, 6.8	Component Test. All components have been test and qualified per DO-160G Category F.	
Humidity	DO-293A, 3.8 IEC 60952-1, 6.9	Qualified per DO-293A to DO-160G, Category B.	

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Fluid Contamination	DO-293A, 3.9 IEC 60952-1, 6.10	Component Test: Test was performed on representative material samples. All samples successfully met the test requirements. *Fluids tested:* Fuels. All samples successfully met the test requirement. Aviation Jet A fuel Aviation piston engine fuel (100LL AVGAS) Hydraulic fluids Mineral based (MIL-H-5606) Non-mineral based synthetic (MIL-PRF-83282 and MIL-PRF-87257) Lubricating oils Mineral based (MIL-L-6081) Ester based synthetic (MIL-L-23699) Internal combustion engine SAE 15W40 Solvents and cleaning fluids Isopropyl alcohol (TT-I-735) Denatured alcohol De-icing fluid Ethylene Glycol Propylene Glycol AMS 1424 (SAE AEA Type I) AMS 1428 (SAE AEA Type VI) Insecticides - none Sullage - none Disinfectants (heavy duty phenolics) - none Coolant dielectric fluid - none Fire extinguishants - none	
Salt Spray	DO-293A, 3.10 IEC 60952-1, 6.11	Qualified per DO-293A to DO-160G, Category S.	
Physical Integrity at High Temperature	DO-293A, 3.11 IEC 60952-1, 6.12	Qualified per DO-293A.	
Flammability	DO-293A, no requirement IEC 60952-1, 6.13	Not tested. See Section 1	
Electrolyte Resistance	DO-293A, 3.12 IEC 60952-1, 6.14	Component test. All components met the specification requirements.	
Thermal Sensors	DO-293A, 3.13 IEC 60952-1, 6.15	Thermal sensors performed as designed during all testing of the RG-150 series.	
Component Qualification tests	DO-293A, 3.14 IEC 60952-1, 6.16	Component test. All components successfully met the performance requirements of the test.	
Battery Airtightness	DO-293A, no requirement IEC 60952-1, 6.17	N/A	
Cell Baffle	DO-293A, no requirement IEC 60952-1, 6.18	N/A. Applies only to nickel-cadmium batteries only.	

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Strength of Receptacle	DO-293A, 3.15 IEC 60952-1, 6.19	N/A. Connector strength dictated by specification for connector. This connector does not hold the battery to the connector. That function is accomplished by the ARINC rack.	
Handle Strength	DO-293A, 3.16 IEC 60952-1, 6.20	Qualified to DO-293A.	

N/A = Not Applicable

Authentication:

Manufacturer. Concorde Battery Corporation

John B. Timmons, PE

Digitally signed by John B. Timmons, PE
DN: cn=John B. Timmons, PE, o=Concorde Battery Corporation, ou=Vice President Engineering, email=jtimmons@concordebattery.com, c=US
Reason: I am approving this document
Date: 2014.03.26 09:30:41 -04'00'

Signed: ……..
Name of Signatory: John B. Timmons, PE
Title or Function: Vice President Engineering