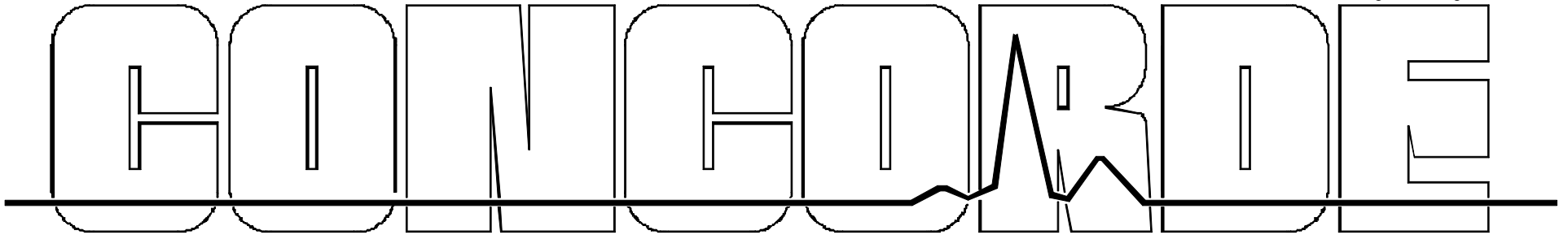


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## Concorde Battery Corporation

2009 San Bernardino Road  
West Covina, California, USA 27106

### RG-150 Series

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

## DECLARATION OF DESIGN PERFORMANCE

TO THE REQUIREMENTS OF

RTCA DO-293 and IEC 60952-1

**Applications: Fixed and Rotary Wing Aircraft, Fuselage Mounted**

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

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*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	RTCA DO-293 IEC 60952-1	Requirement/Performance	Test Report / Reference
Description		<p>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.</p> <p>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.</p> <p>The battery outer container conforms to ARINC 404 1/4 ATR short configuration. 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.</p> <p>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 a 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.</p> <p>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. The control circuits and heaters for both heated batteries are identical.</p> <p>The RG-150 series previously consisted of the following configurations; RG-150-1, RG-150-2, RG-150-3 and RG-150-4. A minor change was made to the RG-150-1 and RG-150-2 configurations, they were thus renamed to the RG-150-1[-Y] and RG-150-2[-Y]. The RG-150-3 and RG-150-4 have been discontinued.</p> <p>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.</p>	
Format	IEC 60952-2	Concorde Drawing No's. RG-150-1-Y and RG-150-2-Y	
Connector	IEC 60952-2	The battery 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)
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 internal DC powered resistance heaters and controls.	
Ventilation	DO-293, 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	

Characteristic	RTCA DO-293 IEC 60952-1	Requirement/Performance		Test Report / Reference
<b>Electrical Performance</b>				
		RG-150-1 and RG-150-1[-Y]	RG-150-2 and RG-150-2[-Y]	
Rated Capacity (C1)	DO-293, 2.2.2 IEC 60952-1, 5.1.1	3.5 Ah	3.5 Ah	
Capacity at -18°C	DO-293, 2.2.3 IEC 60952-1, 5.1.2	3.0 Ah	3.3 Ah*	* Ah when discharged at the C1 rate, power was applied across the internal heaters and controls for 1 hour prior to test.
Capacity at -30°C	DO-293, 2.2.4 IEC 60952-1, 5.1.3	2.0 Ah	2.9 Ah*	
Capacity at +50°C	DO-293, 2.2.5 IEC 60952-1, 5.1.4	4.5 Ah	4.5 Ah	
Power Rating +23°C	DO-293, 2.2.6.1 IEC 60952-1, 5.2.1.1	N/A, Not rated for engine starting		
Power Rating -18°C	DO-293, 2.2.6.2 IEC 60952-1, 5.2.1.2	N/A, Not rated for engine starting		
Power Rating -30°C	DO-293, 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-293, 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-293, 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-293, 2.4 IEC 60952-1, 5.4	+23 C - Rating value for design = 95%		
		+50 C - Rating value for design = 60%		
Storage	DO-293, 2.5 IEC 60952-1, 5.5	DO-293 - 1 year storage life test. Battery delivers 100% of rated capacity after 1 year of storage.		
Charge Stability	DO-293, 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 > C1		
Short-circuit Current	DO-293, 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-293, 2.8 IEC 60952-1, 5.8	RG-150-1 RG-150-2 RG-150-1[-Y] RG-150-2[-Y]	+23°C = 68%	

Characteristic	RTCA DO-293 IEC 60952-1	Requirement/Performance		Test Report / Reference
		RG-150-2 RG-150-2[-Y]	-18°C = 95%	Test at low temperatures is conducted on batteries with heaters only.
		RG-150-2 RG-150-2[-Y]	-40°C = 215%	
Insulation Resistance	DO-293, 2.9.1 IEC 60952-1, 5.9.1	All samples successfully met the test requirements.		
Dielectric Strength	DO-293, 2.9.2 IEC 60952-1, 5.9.2	All samples successfully met the test requirements.		
Duty Cycle Performance	DO-293, 2.10 IEC 60952-1, 5.10	N/A, Not rated for engine starting.		
Water Consumption	DO-293, 2.11 IEC 60952-1, 5.11	N/A, Applies to flooded electrolyte batteries only.		
Overcharge Endurance	DO-293, no requirement IEC 60952-1, 5.12	Not tested		
Cyclic Endurance	DO-293, 2.12 IEC 60952-1, 5.13	100 cycles successfully completed.		
Deep Discharge	DO-293, 2.13 IEC 60952-1, 5.14	RG-150 Series successfully met the test requirements.		
Induced Destructive Overcharge	DO-293, 2.14 IEC 60952-1, 5.15	RG-150 Series successfully met the test requirements.		
Electrical Emissions	DO-293, 2.15 IEC 60952-1, 5.16	N/A, Battery contains no active electronics.		
<b>Environmental Performance</b>				
Vibration	DO-293, 3.1 IEC 60952-1, 6.1	RG-150 Series qualified to DO-293 and DO-160E, Random Vibration test per Curve C, section 8, 1 hour per axis.		
Acceleration	DO-293, no requirement IEC 60952-1, 6.2	Not tested.		
Operational Shock	DO-293, 3.3.1 IEC 60952-1, 6.3, Class I	RG-150 Series qualified to DO-293 and DO-160E, Category B,		
Crash Safety Shock	DO-293, 3.3.2 IEC 60952-1, 6.4	RG-150-2 Series qualified to DO-293 and DO-160E, Category B, impulse and sustained. Sustained shocks per DO-160E Table 7-1, Aircraft type 5, Test type R, 20g's in each orientation.		
Explosion Containment	DO-293, 3.4 IEC 60952-1, 6.5	RG-150 Series qualified to DO-293 and DO-160E. All test requirements were met.		
Altitude	DO-293, 3.5 IEC 60952-1, 6.6	Tested to 20621m (67654 ft) in accordance with DO-293. The RG-150 Series successfully met the test requirements.		
Rapid Decompression	DO-293, 3.5.2 IEC 60952 no requirement	Tested from 2300m (8000 ft) to 20621m (67654 ft) in accordance with DO-293. The RG-150 Series successfully met the test requirements.		

Characteristic	RTCA DO-293 IEC 60952-1	Requirement/Performance	Test Report / Reference
Temperature Shock	DO-293, 3.6 IEC 60952-1, 6.7	Tested from +85°C to -55°C in accordance with DO-293. The RG-150 Series successfully met the test requirements.	
Fungus Resistance	DO-293, 3.7 IEC 60952-1, 6.8	Qualified to DO-293 and DO-160E, Category F. All samples successfully met the test requirements.	
Humidity	DO-293, 3.8 IEC 60952-1, 6.9	Qualified to DO-293 and DO-160E, Category B. The RG-150 Series successfully met the test requirements.	
Fluid Contamination	DO-293, 3.9 IEC 60952-1, 6.10	<p>Test was performed on representative material samples.</p> <p>Fluids tested:</p> <p>Fuels. All samples successfully met the test requirement.</p> <ul style="list-style-type: none"> <li>Aviation Jet A fuel</li> <li>Aviation piston engine fuel (100LL AVGAS)</li> </ul> <p>Hydraulic fluids</p> <ul style="list-style-type: none"> <li>Mineral based (MIL-H-5606)</li> <li>Non-mineral based synthetic (MIL-PRF-83282 and MIL-PRF-87257)</li> </ul> <p>Lubricating oils</p> <ul style="list-style-type: none"> <li>Mineral based (MIL-L-6081)</li> <li>Ester based synthetic (MIL-L-23699)</li> <li>Internal combustion engine SAE 15W40</li> </ul> <p>Solvents and cleaning fluids</p> <ul style="list-style-type: none"> <li>Isopropyl alcohol (TT-I-735)</li> <li>Denatured alcohol</li> </ul> <p>De-icing fluid</p> <ul style="list-style-type: none"> <li>Ethylene Glycol</li> <li>Propylene Glycol</li> <li>AMS 1424 (SAE AEA Type I)</li> <li>AMS 1428 (SAE AEA Type VI)</li> </ul> <p>Insecticides - none</p> <p>Sullage - none</p> <p>Disinfectants (heavy duty phenolics) - none</p> <p>Coolant dielectric fluid - none</p> <p>Fire extinguishants - none</p>	
Salt Spray	DO-293, 3.10 IEC 60952-1, 6.11	Qualified to DO-293 and DO-160E, Category S. The RG-150 Series successfully met the test requirements.	
Physical Integrity at High Temperature	DO-293, 3.11 IEC 60952-1, 6.12	RG-150 Series successfully met the test requirements.	
Flammability	DO-293, no requirement IEC 60952-1, 6.13	Not tested. See Section 1	
Electrolyte Resistance	DO-293, 3.12 IEC 60952-1, 6.14	Component test. All component parts which come in contact with electrolyte are tested to this requirement as part of component qualification. <b>All components met the specification requirements with the exception of the heater blanket material.</b> A deviation to DO-293 has been submitted and accepted by the FAA.	

