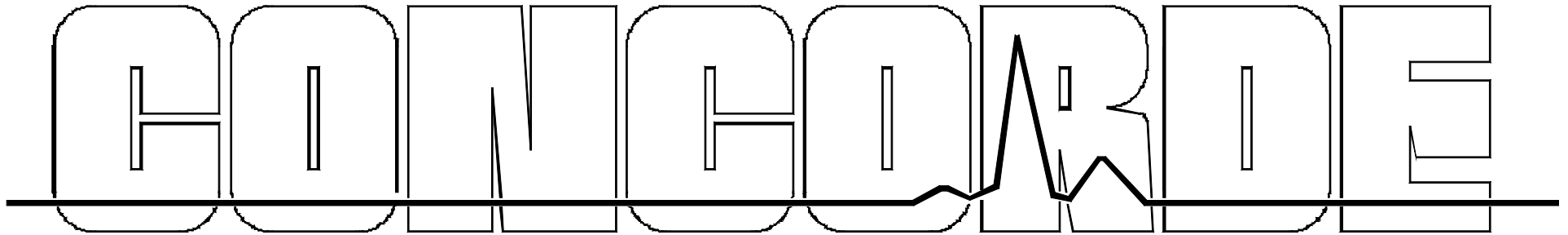


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## **Concorde Battery Corporation**

**2009 San Bernardino Road  
West Covina, California, USA 27106**

### **RG-121 Series and RG-122 Series**

**24 VOLT Various Ah, VALVE REGULATED, LEAD-ACID, AIRCRAFT BATTERY**

## **DECLARATION OF DESIGN PERFORMANCE**

**TO THE REQUIREMENTS OF**

**TSO-C173, RTCA DO-293 and IEC 60952-1**

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

*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				Remarks
Description	<p>The RG-121 Series and RG-122 Series are 24 volt, valve regulated lead-acid aircraft storage batteries. This series of batteries consists of two basic battery capacities with a variety of packaging assemblies.</p> <p>The basic RG-121 Series and RG-122 Series battery consists of twelve 2 volt cells connected in series. The cells are enclosed by an epoxy fuse coated aluminum container and cover which incorporates the hold down. 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> <p>The RG-121 series and RG-122 series batteries are identical in construction except for the mounting provisions that are built into the outer container.</p> <p>The RG-121-1, RG-121-2, RG-122-1, and RG-122-2 contain the identical cell with a C1 capacity of 2.0 Ah. The RG-121-3, RG-121-4, RG-122-3, and RG-122-4 contain the identical cell with a C1 capacity of 3.3 Ah. The cells are identical in construction except for the height of the electrodes, separators, and the corresponding height of the cells.</p> <p>The RG-121-2, RG-122-2, RG-121-4 and RG-122-4 are equipped with heater blankets for improved cold performance. Heater blankets are interwoven between the cells and operate when the battery temperature is below 60°F. The heater blankets are connected through the primary electrical connector and operate on 28 VDC. Heaters are controlled by redundant military specification snap action thermal switches which open on rising temperature, removing the heater blankets from the power source.</p>					
Format	IEC 60952-2	Concorde Drawing No. RG-121 and RG-122				
Connector	IEC 60952-2	The battery is available with a military specification circular connector. See individual envelop drawings for details.				
Mass		RG-121-1, RG-121-2, RG-122-1, RG-122-2.	2.9 kg			
		RG-121-3, RG-121-4, RG-122-3, RG-122-4	4.6 kg			
Charging method	IEC 60952-1, 4.3	Constant potential at 28.25 V				
Any auxiliary requirement:		RG-121-2, RG-122-2, RG-121-4, RG-122-4 are equipped with internal DC powered heaters and controls.				
Ventilation	DO-293, 1.9 IEC 60952-2	Battery is not equipped with vent tubes				
Flammability	IEC 60952-2	RG-121 Series and RG-122 Series outer container is fire resistant				
Unspillability		Non spill				
<b>Electrical Performance</b>		RG-121-1 RG-122-1	RG-121-2 RG-122-2	RG-121-3 RG-122-3	RG-121-4 RG-122-4	
Rated Capacity (C1)	DO-293, 2.2.2 IEC 60952-1, 5.1.1	2.0 Ah	2.0 Ah	3.3 Ah	3.3 Ah	
Capacity at -18°C	DO-293, 2.2.3 IEC 60952-1, 5.1.2	1.3 Ah	1.5 Ah	2.1 Ah	2.6 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	0.5 Ah	1.0 Ah	1.5 Ah	2.1 Ah	
Capacity at +50°C	DO-293, 2.2.5 IEC 60952-1, 5.1.4	2.3 Ah	2.3 Ah	3.7 Ah	3.7 Ah	

Characteristic	RTCA DO-293 IEC 60952-1	Requirement/Performance				Remarks
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					
Power Rating -30°C	DO-293, 2.2.6.3 IEC 60952-1, 5.2.1.3					
Rapid Discharge Capacity at 23°C	DO-293, 2.3.1 IEC 60952-1, 5.3.1	RG-121-1 RG-122-1	RG-121-2 RG-122-2	RG-121-3 RG-122-3	RG-121-4 RG-122-4	Ah when discharged at 10 times the C1 rate to the cutoff voltage, power was applied across the internal heaters and controls for 1 hour prior to test.
		1.1	1.1	1.9	1.9	
Rapid Discharge Capacity at -30°C	DO-293, 2.3.2 IEC 60952-1, 5.3.2	RG-121-1 RG-122-1	RG-121-2 RG-122-2	RG-121-3 RG-122-3	RG-121-4 RG-122-4	
		0.38	0.95	0.7	1.47	
Charge Retention	DO-293, 2.4 IEC 60952-1, 5.4	+23 C - Rating value for design = 95%				
		+50 C - Rating value for design = 70%				
Storage	DO-293, 2.5 IEC 60952-1, 5.5	DO-293 - 1 year storage life test in process. See Change 1 to DO-293, this test is for information only and is not required for TSO approval..				
Charge Stability	DO-293, 2.6 IEC 60952-1, 5.6, Class I	OK. For all battery types, 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	RG-121-1 RG-122-1	RG-121-2 RG-122-2			
		Peak current = 431 A at 0.01s. Last recorded current = 213 A at 2.86s				
		RG-121-3 RG-122-3	RG-121-4 RG-122-4			
		Peak current = 376 A, Last recorded current = 213 A at 3.52s				
Charge Acceptance	DO-293, 2.8 IEC 60952-1, 5.8	RG-121-1, RG-121-2, RG-122-1, RG-122-2	+23°C = 102%			Test at low temperatures is conducted on batteries with heaters only.
		RG-121-3, RG-121-4 RG-122-3, RG-122-4	+23 °C = 102%			
		RG-121-2, RG-122-2	-18°C = 141%			
		RG-121-4, RG-122-4	-18°C = 115%			
		RG-121-2, RG-122-2	-40°C = 208%			
		RG-121-4, RG-122-4	-40°C = 181%			
Insulation Resistance	DO-293, 2.9.1 IEC 60952-1, 5.9.1	All samples successfully met the test requirement.				
Dielectric Strength	DO-293, 2.9.2 IEC 60952-1, 5.9.2	All samples successfully met the test requirement.				
Duty Cycle Performance	DO-293, 2.10 IEC 60952-1, 5.10	N/A Not rated for engine starting.				

<b>Characteristic</b>	<b>RTCA DO-293 IEC 60952-1</b>	<b>Requirement/Performance</b>	<b>Remarks</b>
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	
Deep Discharge	DO-293, 2.13 IEC 60952-1, 5.14	All samples successfully met the test requirement.	
Induced Destructive Overcharge	DO-293, 2.14 IEC 60952-1, 5.15	All samples successfully met the test requirement.	
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	All samples successfully met the test requirement.	
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	All samples successfully met the test requirement.	
Crash Safety Shock	DO-293, 3.3.2 IEC 60952-1, 6.4	All samples successfully met the test requirement.	
Explosion Containment	DO-293, 3.4 IEC 60952-1, 6.5	All samples successfully met the test requirement.	
Altitude	DO-293, 3.5 IEC 60952-1, 6.6	All samples successfully met the test requirement.	
Rapid Decompression	DO-293, 3.5.2 IEC 60952 no requirement	All samples successfully met the test requirement.	
Temperature Shock	DO-293, 3.6 IEC 60952-1, 6.7	All samples successfully met the test requirement.	
Fungus Resistance	DO-293, 3.7 IEC 60952-1, 6.8	All samples successfully met the test requirement.	
Humidity	DO-293, 3.8 IEC 60952-1, 6.9	All samples successfully met the test requirement.	

Characteristic	RTCA DO-293 IEC 60952-1	Requirement/Performance	Remarks
Fluid Contamination	DO-293, 3.9 IEC 60952-1, 6.10	Test was performed on representative material samples. 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-293, 3.10 IEC 60952-1, 6.11	All samples successfully met the test requirement.	
Physical Integrity at High Temperature	DO-293, 3.11 IEC 60952-1, 6.12	All samples successfully met the test requirement.	
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	All samples successfully met the test requirement.	
Thermal Sensors	DO-293, 3.13 IEC 60952-1, 6.15	All samples successfully met the test requirement.	
Component Qualification tests	DO-293, 3.14 IEC 60952-1, 6.16	All samples successfully met the test requirement.	
Battery Airtightness	DO-293, no requirement IEC 60952-1, 6.17	N/A	
Cell Baffle	DO-293, no requirement IEC 60952-1, 6.18	N/A. Applies only to nickel-cadmium batteries only.	
Strength of Receptacle	DO-293, 3.15 IEC 60952-1, 6.19	N/A. Connector strength dictated by military specification for connector.	

Characteristic	RTCA DO-293 IEC 60952-1	Requirement/Performance	Remarks
Handle Strength	DO-293, 3.16 IEC 60952-1, 6.20	N/A. No handles	

N/A = Not Applicable

**Authentication:**

Manufacturer.

Name of signatory:

John B. Timmons, PE

Title or Function:

Vice President Engineering

Approval Reference No:

Signed:

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On behalf of:

Concorde Battery Corporation

Date: