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Concorde Battery Corporation

2009 San Bernardino Road
West Covina, California, USA 91790

RG-365

24 VOLT 40 Ah, VALVE REGULATED, LEAD-ACID, AIRCRAFT BATTERY

DECLARATION OF DESIGN PERFORMANCE

TO THE REQUIREMENTS OF

RTCA DO-293A and IEC 60952-1

Applications: Engine Starting and Emergency Power
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	RTCA DO-293A IEC 60952-1	Requirement/Performance	Test Report / Reference
Description	The RG-365 battery is designed for engine starting and emergency power. The RG-365 battery contains two MB12-40A monoblocks. Each MB12-40A monoblock consists of six 2 volt cell groups connected in series creating a 12 volt monoblock. The cells are housed within a polypropylene container and cover which are attached together using epoxy. The two 12 volt monoblocks are connected in series making the 24 volt battery assembly which is then housed within an outer container made of fuse-coated aluminum. The battery hold down is incorporated into the outer housing. Ventilation tubes are provided which mate with the ventilation system in the aircraft. The battery is equipped with an equivalent IEC Type "B" connector. 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-365 battery conforms to Concorde envelope drawings RG-365 and assembly drawing CB-00247. All testing completed per RTCA/DO-293 and Change No. 1 to RTCA/DO-293 are equivalent to DO-293A., refer to Concorde Report CB061213-01, *Analysis of Equivalency of Aircraft Battery Performance Standards and Test Methods*.		
Format	IEC 60952-2	Concorde Drawing No. RG-365	
Connector	IEC 60952-2	Battery type is equipped with an IEC Type "B" connector.	
Mass		36.7 kg Max (81.0 lb)	
Charging method	IEC 60952-1, 4.3	Constant potential at 28.25 V	
Any auxiliary requirement:		None	
Ventilation	DO-293A, 1.9 IEC 60952-2	RG-365 is equipped with vent tubes	
Flammability	IEC 60952-2	RG-365 is flame resistant	
Spillability		Non spill	
Electrical Performance			
Rated Capacity (C1)	DO-293A, 2.2.2 IEC 60952-1, 5.1.1	40 Ah	
Capacity at –18°C	DO-293A, 2.2.3 IEC 60952-1, 5.1.2	25 Ah when discharged at the C_1 rate.	
Capacity at –30°C	DO-293A, 2.2.4 IEC 60952-1, 5.1.3	18 Ah when discharged at the C_1 rate.	
Capacity at +50°C	DO-293A, 2.2.5 IEC 60952-1, 5.1.4	40 Ah when discharged at the C_1 rate.	
Power Rating +23°C	DO-293A, 2.2.6.1 IEC 60952-1, 5.2.1.1	I_{pp} = 1075 A, I_{pr} = 875 A	
Power Rating -18°C	DO-293A, 2.2.6.2 IEC 60952-1, 5.2.1.2	I_{pp} = 800 A, I_{pr} = 675 A	

Characteristic	RTCA DO-293A IEC 60952-1	Requirement/Performance	Test Report / Reference
Power Rating -30°C	DO-293A, 2.2.6.3 IEC 60952-1, 5.2.1.3	I_{pp} = 650 A, I_{pr} = 550 A	
Rapid Discharge Capacity at 23°C	DO-293A, 2.3.1 IEC 60952-1, 5.3.1	21.5 Ah when discharged at 10 times the C_1 rate to 10 volts.	
Rapid Discharge Capacity at -30°C	DO-293A, 2.3.2 IEC 60952-1, 5.3.2	7 Ah when discharged at 10 times the C_1 rate to 10 volts.	
Charge Retention	DO-293A, 2.4 IEC 60952-1, 5.4	+23˚C - Rating value for design = 95 %	
		+50˚C - Rating value for design = 92 %	
Storage	DO-293A, 2.5 IEC 60952-1, 5.5	DO-293A - 1 year storage life test is in process.	
Charge Stability	DO-293A, 2.6 IEC 60952-1, 5.6, Class I	OK. Max battery temperature on charge = 52.1°C. Charge current fell during the entire charge period. Capacity at end of test was greater than C_1.	
Short-circuit Current	DO-293A, 2.7 IEC 60952-1, 5.7	Peak current = 2111.2 A Last recorded current = 100.7 A at 2.0 s	
Charge Acceptance	DO-293A, 2.8 IEC 60952-1, 5.8	+23˚C = 100%	
		-18˚C, Not Applicable	
		-40˚C, Not Applicable	
Insulation Resistance	DO-293A, 2.9.1 IEC 60952-1, 5.9.1	The RG-365 successfully met the test requirements.	
Dielectric Strength	DO-293A, 2.9.2 IEC 60952-1, 5.9.2	The RG-365 successfully met the test requirements.	
Duty Cycle Performance	DO-293A, 2.10 IEC 60952-1, 5.10	100 cycles of engine start sequence completed. Capacity was greater than C_1 after 4 hour CP charge. All evaluation criteria were met.	
Water Consumption Test	DO-293A, 2.11 IEC 60952-1, 5.11	N/A	
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	After sitting in a discharged condition for 4 weeks: Battery recovered 96% of its 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.	

Characteristic	RTCA DO-293A IEC 60952-1	Requirement/Performance	Test Report / Reference
Environmental Performance			
Vibration	DO-293A, 3.1 IEC 60952-1, 6.1	Qualified per DO-293A to DO-160G, random vibration test per Curve C, section 8, 1 hour per axis.	

Characteristic	RTCA DO-293A IEC 60952-1	Requirement/Performance	Test Report / Reference
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 DO-160G, Category B. All shock pulses were of a saw tooth configuration. Each shock pulse had an amplitude of 6g's for 11ms.	
Crash Safety Shock	DO-293A, 3.3.2 IEC 60952-1, 6.4	Qualified per DO-293A to DO-160G, Category B, impulse and sustain. Impulse shock pulses were of the saw tooth configuration. The battery was tested per DO-160G 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 test 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 reqmt	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 tested and qualified per DO-160G, Category B.	
Humidity	DO-293A, 3.8 IEC 60952-1, 6.9	Qualified per DO-293A to DO-160G, Category B.	

Characteristic	RTCA DO-293A IEC 60952-1	Requirement/Performance	Test Report / Reference
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 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	Not Applicable	
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	

Characteristic	RTCA DO-293A IEC 60952-1	Requirement/Performance	Test Report / Reference
Cell Baffle	DO-293A, no requirement IEC 60952-1, 6.18	N/A, Applies only to nickel-cadmium batteries only.	
Strength of Receptacle	DO-293A, 3.15 IEC 60952-1, 6.19	OK	
Handle Strength	DO-293A, 3.16 IEC 60952-1, 6.20	OK	

N/A = Not Applicable

Authentication:

Manufacturer. Concorde Battery Corporation

Signed: .....
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