



Concorde Battery Corporation

2009 San Bernardino Road
West Covina, California, USA 91790

RG-390E/30 Series

24 VOLT 30 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	<p>The RG-390E/30 series of batteries are designed for engine starting and emergency power. Within this series of batteries there are four types. All types are electrically identical. The battery monobloc within each assembly type are identical with exception to the RG-390E/30S version which has vent tubes that have been machined (shortened and threaded) to accept a pipe thread connection.</p> <p>The RG-390E/30 and RG-390E/30S are themselves the basic monobloc and are assembled with a fuse coated aluminum cover fitted with a hold down bar. The RG-390E/30L and RG-390E/30LS monoblocs are encased in an outer housing of either fuse coated aluminum (L) or stainless steel (LS). The outer housings provide the assembly with increased protection from fire with the aluminum housing being flame resistant and the stainless steel housing being fire proof. The metal cased batteries also provide an aperture for the mounting of a temperature sensor if required by the aircraft configuration. In addition, the outer housings are fitted with a hold down bar.</p> <p>The basic monobloc used in each type consists of 12 series connected cells. The cells are enclosed by a one piece plastic container and a plastic one piece cover which is secured to the container with an epoxy cement. The container and cover are made of high-impact polypropylene. Each monobloc is equipped with an integrally molded quick disconnect connector dimensionally conforming to MS3509.</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 Nos. RG-390E/30, RG-390E/30S, RG-390E/30L & RG-390E/30LS	
Connector	IEC 60952-2	Each battery type is equipped with an MS3509 conforming receptacle.	
Mass		RG-390E/30: 28.6 kg Max (63 lb) RG-390E/30S: 28.6 kg Max (63 lb) RG-390E/30L: 29.5 kg Max (65 lb) RG-390E/30: 29.9 kg Max (66 lb)	
Charging method	IEC 60952-1, 4.3	Constant potential at 28.25 V	
Any auxiliary requirement:		RG-390E/30L & RG-390E/30LS are fitted with an aperture for the mounting of a temperature sensor.	
Ventilation	DO-293A, 1.9 IEC 60952-2	RG-390E/30 is equipped with vent tubes RG-390E/30S is equipped with threaded vent tubes RG-390E/30L is equipped with vent tubes RG-390E/30LS is equipped with vent tubes	
Flammability	IEC 60952-2	RG-390E/30L is flame resistant RG-390E/30LS is fire proof	
Spillability		Non spill	
Electrical Performance			
Rated Capacity (C1)	DO-293A, 2.2.2 IEC 60952-1, 5.1.1	30 Ah	
Capacity at -18°C	DO-293A, 2.2.3 IEC 60952-1, 5.1.2	21 Ah when discharged at the C ₁ rate.	
Capacity at -30°C	DO-293A, 2.2.4 IEC 60952-1, 5.1.3	15.5 Ah when discharged at the C ₁ rate.	

Characteristic	RTCA DO-293A IEC 60952-1	Requirement/Performance	Test Report / Reference
Capacity at +50°C	DO-293A, 2.2.5 IEC 60952-1, 5.1.4	30 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} = 1525 A, I _{pr} = 1100 A	
Power Rating -18°C	DO-293A, 2.2.6.2 IEC 60952-1, 5.2.1.2	I _{pp} = 1100 A, I _{pr} = 800 A	
Power Rating -30°C	DO-293A, 2.2.6.3 IEC 60952-1, 5.2.1.3	I _{pp} = 875 A, I _{pr} = 600 A	
Rapid Discharge Capacity at 23°C	DO-293A, 2.3.1 IEC 60952-1, 5.3.1	19 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	6.5 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 = 90 %	
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 was 52.4°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 = 3112 A Last recorded current = 774.1 A at 6.0 s	
Charge Acceptance	DO-293A, 2.8 IEC 60952-1, 5.8	+23°C = 98%	
		-18°C, Not Applicable	
		-40°C, Not Applicable	
Insulation Resistance	DO-293A, 2.9.1 IEC 60952-1, 5.9.1	The RG-390E/30 Series successfully met the test requirements.	
Dielectric Strength	DO-293A, 2.9.2 IEC 60952-1, 5.9.2	The RG-390E/30 Series 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 94% of its initial capacity.	
Induced Destructive Overcharge	DO-293A, 2.14 IEC 60952-1, 5.15	All test requirements were successfully met.	

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

