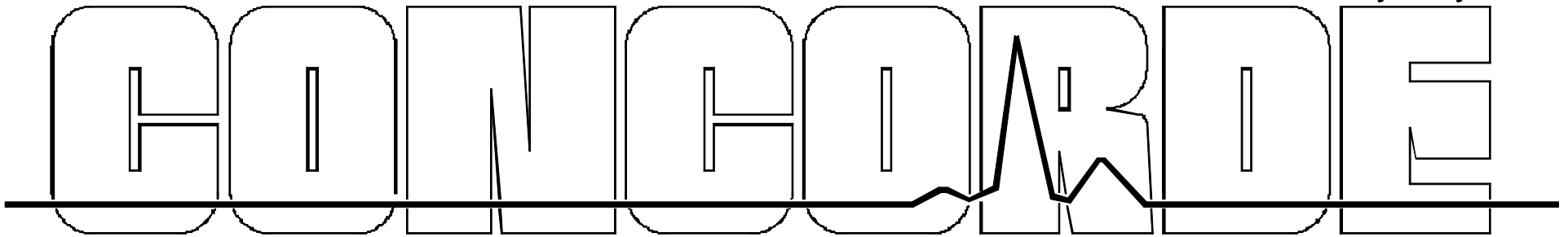


... the heart of your system.®



Concorde Battery Corporation

2009 San Bernardino Road
West Covina, California, USA 91790

RG-380E/44H Series

24 VOLT 42.0 Ah, VALVE REGULATED, LEAD-ACID, AIRCRAFT BATTERY

DECLARATION OF DESIGN PERFORMANCE

TO THE REQUIREMENTS OF

RTCA DO-293 and IEC60952

Applications: Engine Starting and Emergency Power

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

The item or Technical Data contained herein has been reviewed and approved for general release on the basis that it contains no Export-controlled information.

Characteristic	Part / Clause	Requirement/Performance	Test Report / Reference
Description	<p>The RG-380E/44H series consists of four types: RG-380E/44KH, RG-380E/44LH, RG-380E/44KSH and RG-380E/44LSH. All types contain a basic RG-380E/44 battery housed within one of four different outer housing assemblies.</p> <p>The basic RG-380E/44 battery consists of twelve 2 volt cells connected in series. The cells are enclosed by a one piece plastic monoblock container and a plastic one piece top which is secured to the monoblock with an epoxy cement. The monoblock and top are made of high impact polypropylene. The cover of the battery is an epoxy fuse coated aluminum and 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-380E/44LH and RG-380E/44KH incorporate the basic RG-380E/44 battery within an outer housing that is an epoxy fuse coated aluminum fire resistant container and cover. The battery hold down is incorporated into the outer housing.</p> <p>The RG-380E/44LSH and the RG-380E/44KSH incorporate the basic RG-380E/44 battery within an outer housing that is a stainless steel fire proof container and cover. The battery hold down is incorporated into the outer housing.</p> <p>All RG-380E/44H series batteries are equipped with heater blankets and a heater control unit (HCU). The HCU is a completely passive device consisting of redundant military specification bimetallic thermal switches which turn the internal heater in the battery on or off. Temperature sensors in the form of thermistors or resistance temperature devices (RTD) may also be installed in the HCU in order to report a battery temperature signal to the aircraft. These are also passive devices.</p> <p>The RG-380E/44KH, RG-380E/44KSH, RG-380E/44LH and RG-380E/44LSH with heaters deactivated are each electrically identical to the other batteries within the RG-380E/44 series. Mechanically the RG-380E/44KH, RG-380E/44KSH, RG-380E/44LH and RG-380E/44LSH are substantially similar to many of the other batteries within the RG-380E/44 Series therefore the RG-380E/44 series may be representative for the RG-380E/44H series for specific environmental tests. A complete similarity is detailed within Concorde Report CB060710-1A, <i>RG-380E/H Series Qualification by Similarity Report</i>.</p>		
Format	IEC 60952-2	Concorde Drawing No: RG-380E/44KH rev A RG-380E/44LH rev NC	
Connector	IEC 60952-2	The battery is equipped with an IEC Type Q (MS3509) connector	
Mass		RG-380E/44KH - 40.4 Kg (89.0 lbs) Max RG-380E/44LH - 40.4 Kg (89.0 lbs) Max RG-380E/44KSH - 41.3 Kg (91.0 lbs) Max RG-380E/44LSH - 41.3 Kg (91.0 lbs) Max	
Charging method	IEC 60952-1, 4.3	Constant potential at 28.25 VDC \pm 0.25 VDC	
Any auxiliary requirement:	N/A	All batteries are equipped with a Heater Control Unit (HCU).	
Ventilation	DO-293, 2.2.2 IEC 60952-2	RG-380E/44KH and /44KSH batteries are equipped with vent louvers. RG-380E/44LH and /44LSH batteries are equipped with vent tubes.	
Flammability	IEC 60952-2	RG-380E/44KH and /44LH series outer container is fire resistant. RG-380E/44KSH and /44LS series outer container is fire proof.	
Unspillability		Non spill	
Electrical Performance			
Rated Capacity (C ₁)	DO-293, 2.2.2 IEC 60952-1, 5.1.1	42 Ah, without heaters.	42 Ah, with heaters powered for 1 hour prior to test.

Characteristic	Part / Clause	Requirement/Performance	Test Report / Reference
Capacity at -18°C	DO-293, 2.2.3 IEC 60952-1, 5.1.2	30 Ah, without heaters.	40 Ah, with heaters powered for 1 hour prior to test.
Capacity at -30°C	DO-293, 2.2.4 IEC 60952-1, 5.1.3	23 Ah, without heaters.	30 Ah, with heaters powered for 1 hour prior to test.
Capacity at +50°C	DO-293, 2.2.5 IEC 60952-1, 5.1.4	42 Ah, without heaters.	42 Ah, with heaters powered for 1 hour prior to test.
Power Rating +23°C	DO-293, 2.2.6.1 IEC 60952-1, 5.2.1.1	I _{pp} = 1350 A I _{pr} = 1000 A	
Power Rating -18°C	DO-293, 2.2.6.2 IEC 60952-1, 5.2.1.2	I _{pp} = 875 A I _{pr} = 750 A	
Power Rating -30°C	DO-293, 2.2.6.3 IEC 60952-1, 5.2.1.3	I _{pp} = 750 A I _{pr} = 600 A	
Rapid Discharge Capacity at 23°C	DO-293, 2.3.1 IEC 60952-1, 5.3.1	25 Ah, without heaters.	25 Ah, with heaters powered for 1 hour prior to test.
Rapid Discharge Capacity at -30°C	DO-293, 2.3.2 IEC 60952-1, 5.3.2	5 Ah, without heaters.	22 Ah, with heaters powered for 1 hour prior to test.
Charge Retention	DO-293, 2.4 IEC 60952-1, 5.4	23°C - Rating value for design = 90 %	
		50°C - Rating value for design = 70 %	
Storage	DO-293, 2.5 IEC 60952-1, 5.5	Testing in progress.	
Charge Stability	DO-293, 2.6 IEC 60952-1, 5.6, Class I	Max battery temperature on charge = 51°C. Charge current fell during the entire charge period. Capacity at end of test was greater than the C ₁ rate.	
Short-circuit Current	DO-293, 2.7 IEC 60952-1, 5.7	Battery met all test requirements: Peak current: 2677 A Last Current: 2123 A at 4 sec	
Charge Acceptance	DO-293, 2.8 IEC 60952-1, 5.8	+23°C = 101 %	
		-18°C (Heaters powered by DC Voltage) = 93%	
		-18°C (Heaters powered by AC Voltage) = 85%	
		-40°C (Heaters powered by DC Voltage) = 140%	
	-40°C (Heaters powered by AC Voltage) = 147%		
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	100 cycles successfully completed.	
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 cycle requirement successfully completed.	

Characteristic	Part / Clause	Requirement/Performance	Test Report / Reference
Deep Discharge	DO-293, 2.13 IEC 60952-1, 5.14	All test requirements were met.	
Induced Destructive Overcharge	DO-293, 2.14 IEC 60952-1, 5.15	All test requirements were met.	
Electrical Emissions	DO-293, 2.15 IEC 60952-1, 5.16	N/A, battery contains no active electronics.	
Environmental Performance			
Vibration	DO-293, 3.1 IEC 60952-1, 6.1	Tested and qualified to the random vibration test per Curve C, section 8 of DO-160E, 1 hr 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	Tested and qualified to Category B, DO-160	
Crash Safety Shock	DO-293, 3.3.2 IEC 60952-1, 6.3	Tested and qualified to Category B, DO-160. The sustained shocks were performed at an acceleration of 4g's in the up direction, 20g's in the down direction and 18g's in the forward, aft and sides for 3 sec in each direction. All batteries met the test requirements.	
Explosion Containment	DO-293, 3.4 IEC 60952-1, 6.4	Tested and qualified to the DO-293 requirement.	
Altitude	DO-293, 3.5 IEC 60952-1, 6.6	Tested to 20,621m (67,654 ft) and met all test requirements.	
Rapid Decompression	DO-293, 3.5.2 IEC 60952 no requirement	Tested from 2,300m (8,000 ft) to 20,621m (67,654 ft) and met all test requirements.	
Temperature Shock	DO-293, 3.6 IEC 60952-1, 6.7	Tested and qualified meeting all test requirements.	
Fungus Resistance	DO-293, 3.7 IEC 60952-1, 6.8	DO-160E Category F. All samples successfully met the test requirement.	
Humidity	DO-293, 3.8 IEC 60952-1, 6.9	Tested and qualified to Category B of DO-293.	

Characteristic	Part / Clause	Requirement/Performance	Test Report / Reference
Fluid Contamination	DO-293, 3.9 IEC 60952-1, 6.10	Test was performed on representative material samples. All samples successfully met the test requirement. 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 II) 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	Tested and qualified to Category S of DO-293.	
Physical Integrity at High Temperature	DO-293, 3.11 IEC 60952-1, 6.12	Tested and qualified to the test requirements of DO-293.	
Flammability	DO-293, 3.12 IEC 60952-1, 6.14	Not tested. See section 1.	
Electrolyte Resistance	DO-293, 3.13 IEC 60952-1, 6.15	Component test. All components met the specification requirements.	
Thermal Sensors	DO-293, 3.13 IEC 60952-1, 6.15	All thermal sensors met the test requirements.	
Component Qualification tests	DO-293, 3.14 IEC 60952-1, 6.16	All components met the requirements of the test.	
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	Qualified to testing.	

Characteristic	Part / Clause	Requirement/Performance	Test Report / Reference
Handle Strength	DO-293, 3.16 IEC 60952-1, 6.20	Qualified to testing.	

N/A = Not Applicable

Authentication:

Manufacturer. Concorde Battery Corporation.

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