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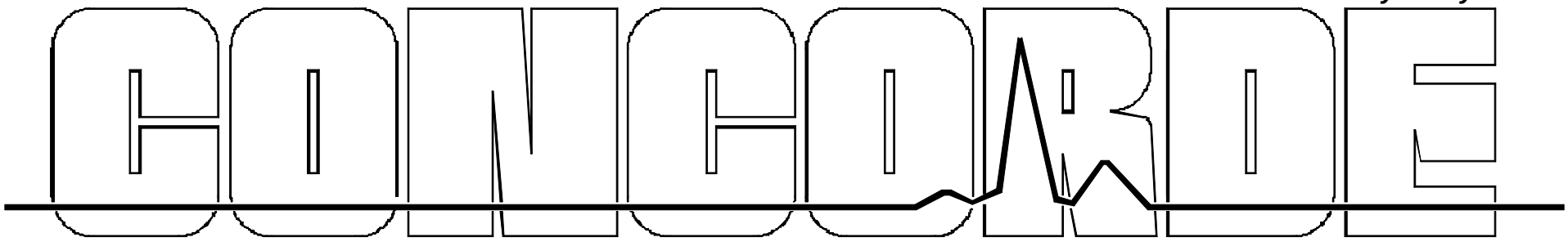

Concorde Battery Corporation
2009 San Bernardino Road
West Covina, California, USA 91790

RG-380E/46 Series

24 VOLT 46.0 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	The RG-380E/46 series of batteries are 24 volt 46 Ah valve regulated lead-acid batteries designed for engine starting and emergency power. The RG-380E/46 series consists of five types all of which are electrically identical: RG-380E/46, RG-380E/46K, RG-380E/46L, RG-380E/46KS and RG-380E/46LS. The basic RG-380E/46 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 are secured together 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. Each monobloc is equipped with an integrally molded quick disconnect connector dimensionally conforming to MS3509. 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-380E/46L and RG-380E/46K incorporate the basic RG-380E/46 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. The RG-380E/46LS and the RG-380E/46KS incorporate the basic RG-380E/46 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. The metal cased batteries of the 'L' and 'LS' versions also provide an aperture for the mounting of a temperature sensor if required by the aircraft configuration. The 'K' and 'L' versions differ in that the 'K' version has vent louvers instead of vent tubes as on the 'L' version. The RG-380E/46 series is substantially identical to the RG-380E/44 series. The outer housings are identical for the 'L' , 'K', 'LS' and 'KS' versions. The monoblocs are mechanically identical with the exception of the RG-380E/44 series having fewer plates per cell. The overall battery weights are substantially identical. Electrical test results obtained from the batteries in the RG-380E/44 series are not representative of the batteries in the RG-380E/46 series. Many environmental test results obtained from the batteries in the RG-380E/44 series are representative of the batteries in the RG-380E/46 series and are considered qualified by similarity.		
Format	IEC 60952-2	Concorde Drawing No: RG-380E/46, rev A RG-380E/46L, rev A RG-380E/46K, rev A	
Connector	IEC 60952-2	The battery is equipped with an IEC Type Q (MS3509) connector	
Mass		RG-380E/46 - 39.0 Kg (86.0 lbs) Max RG-380E/46L - 40.4 Kg (89.0 lbs) Max RG-380E/46K - 40.4 Kg (89.0 lbs) Max RG-380E/46LS - 41.3 Kg (91.0 lbs) Max RG-380E/46KS - 41.3 kg (91.0 lbs) Max	
Charging method	IEC 60952-1, 4.3	Constant potential at 28.25 VDC ± 0.25 VDC	
Any auxiliary requirement:	N/A	The RG-380E/46L and RG-380E/46LS are equipped with a mounting plate for the attachment of a temperature sensor.	
Ventilation	DO-293, 2.2.2 IEC 60952-2	RG-380E/46K and /46KS batteries are equipped with vent louvers. RG-380E/46, /46L & /44LSH batteries are equipped with vent tubes.	
Flammability	IEC 60952-2	RG-380E/46K and /46L series outer container is fire resistant. RG-380E/46KS and /46LS series outer container is fire proof.	

Characteristic	Part / Clause	Requirement/Performance	Test Report / Reference
Unspillability		Non spill	
Electrical Performance			
Rated Capacity (C_1)	DO-293, 2.2.2 IEC 60952-1, 5.1.1	46 Ah	
Capacity at –18°C	DO-293, 2.2.3 IEC 60952-1, 5.1.2	24 Ah	
Capacity at –30°C	DO-293, 2.2.4 IEC 60952-1, 5.1.3	17 Ah	
Capacity at +50°C	DO-293, 2.2.5 IEC 60952-1, 5.1.4	46 Ah	
Power Rating +23°C	DO-293, 2.2.6.1 IEC 60952-1, 5.2.1.1	Ipp = 1375 A Ipr = 1050 A	
Power Rating -18°C	DO-293, 2.2.6.2 IEC 60952-1, 5.2.1.2	Ipp = 1075 A Ipr = 850 A	
Power Rating -30°C	DO-293, 2.2.6.3 IEC 60952-1, 5.2.1.3	Ipp = 875 A Ipr = 675 A	
Rapid Discharge Capacity at 23°C	DO-293, 2.3.1 IEC 60952-1, 5.3.1	22 Ah	
Rapid Discharge Capacity at -30°C	DO-293, 2.3.2 IEC 60952-1, 5.3.2	8 Ah	
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 = 52.8˚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: 3224.5 A Last Current: 1202 A at 1.3 sec	
Charge Acceptance	DO-293, 2.8 IEC 60952-1, 5.8	+23˚C = 99 %	
Insulation Resistance	DO-293, 2.9.1 IEC 60952-1, 5.9.1	All batteries successfully met the test requirements.	
Dielectric Strength	DO-293, 2.9.2 IEC 60952-1, 5.9.2	All batteries 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.	

Characteristic	Part / Clause	Requirement/Performance	Test Report / Reference
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 requirement successfully completed.	
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, meeting all test requirements.	
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 per DO-160, meeting all test requirements.	
Crash Safety Shock	DO-293, 3.3.2 IEC 60952-1, 6.3	Tested and qualified to Category B per DO-160, meeting all test requirements. 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 all remaining directions.	
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 and qualified to 20,621m (67,654 ft), meeting all test requirements.	
Rapid Decompression	DO-293, 3.5.2 IEC 60952 no requirement	Tested and qualified from 2,300m (8,000 ft) to 20,621m (67,654 ft), meeting all test requirements.	
Temperature Shock	DO-293, 3.6 IEC 60952-1, 6.7	Tested and qualified to DO-293, 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 DO-293, meeting all test requirements.	

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 DO-160 category S, meeting all test requirements.	
Physical Integrity at High Temperature	DO-293, 3.11 IEC 60952-1, 6.12	Tested and qualified to DO-293, meeting all test requirements.	
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 component parts which come in contact with electrolyte are tested to this requirement as part of component qualification. All components met the specification requirements.	
Thermal Sensors	DO-293, 3.13 IEC 60952-1, 6.15	Not Applicable	
Component Qualification tests	DO-293, 3.14 IEC 60952-1, 6.16	Component test. All components used in the RG-380E/46 series of batteries are identical or sufficiently similar to components which have previously been tested to these requirements and successfully met the performance requirements of the test.	
Battery Airtightness	DO-293, no requirement IEC 60952-1, 6.17	N/A	

Characteristic	Part / Clause	Requirement/Performance	Test Report / Reference
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	All test requirements were successfully met.	
Handle Strength	DO-293, 3.16 IEC 60952-1, 6.20	All test requirements were successfully met.	

N/A = Not Applicable

Authentication:

Manufacturer. Concorde Battery Corporation.

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