



## **Concorde Battery Corporation**

2009 San Bernardino Road  
West Covina, California, USA 91790

### **RG-380E/60 Series**

24 VOLT 48 Ah, VALVE REGULATED, LEAD-ACID, AIRCRAFT BATTERY

### **DECLARATION OF DESIGN PERFORMANCE**

TO THE REQUIREMENTS OF

RTCA DO-293 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-293 IEC 60952-1	Requirement/Performance	Test Report / Reference
<b>Description</b>		<p>The RG-380E/60 Series is a 24 volt, 48 Ah, valve regulated lead-acid aircraft storage battery. This series of batteries consist of a basic battery and a variety of outer packaging assemblies.</p> <p>The basic RG-380E/60 monoblock 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 monoblock is not sold as a separate battery but is incorporated into the assemblies described below. 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/60F, RG-380E/60L, and RG-380/60K incorporate the RG-380E/60 monoblock with 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/60LS and RG-380E/60KS incorporate the RG-380E/60 monoblock with 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>The RG-380E/60B incorporates the RG-380E/60 monoblock with 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/60 series is similar to the RG-380E/44 series. All external housings for the L, K, LS, and KS versions are identical.</p> <p>All RG-380E/60 series models are electrically identical. Electrical results are therefore representative of all models.</p>	
Format	IEC 60952-2	Concorde Drawing No. RG-380E/60B, RG-380E/60F, RG-380E/60L(S), RG-380E/60K(S)	
Connector	IEC 60952-2	The battery is available with a Type Q terminal conforming to MS-3509.	
Mass		RG-380E/60B – 43.6 kg Max (96.0 lbs). RG-380E/60F – 43.6 kg Max (96.0 lbs). RG-380E/60L – 43.6 kg Max (96.0 lbs). RG-380E/60LS – 44.5 kg Max (98.0 lbs). RG-380E/60K – 43.6 kg Max (96.0 lbs). RG-380E/60KS – 44.5 kg Max (98.0 lbs).	
Charging method	IEC 60952-1, 4.3	Constant potential at 28.25 V	
Any auxiliary requirement:		The RG-380E/60L and /60LS series batteries are equipped with a mounting plate for the attachment of a temperature sensor.	
Ventilation	DO-293, 1.9 IEC 60952-2	RG-380E/60B battery is equipped with vent louvers RG-380E/60F battery is equipped with vent louvers RG-380E/60K and /60KS batteries are equipped with vent louvers. RG-380E/60L and /60LS batteries are equipped with vent tubes.	
Flammability	IEC 60952-2	RG-380E/60B, /60F, /60K and /60L outer container is fire resistant. RG-380E/60KS and /60LS outer container is fire proof.	
Spillability		Non spill	

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<b>Electrical Performance</b>			
Rated Capacity (C1)	DO-293, 2.2.2 IEC 60952-1, 5.1.1	48.0 Ah	
Capacity at -18°C	DO-293, 2.2.3 IEC 60952-1, 5.1.2	30.0 Ah when discharged at the C1 rate.	
Capacity at -30°C	DO-293, 2.2.4 IEC 60952-1, 5.1.3	22.0 Ah when discharged at the C1 rate.	
Capacity at +50°C	DO-293, 2.2.5 IEC 60952-1, 5.1.4	48.0 Ah when discharged at the C1 rate.	
Power Rating +23°C	DO-293, 2.2.6.1 IEC 60952-1, 5.2.1.1	I <sub>pp</sub> = 1600 A, I <sub>pr</sub> = 1200 A	
Power Rating -18°C	DO-293, 2.2.6.2 IEC 60952-1, 5.2.1.2	I <sub>pp</sub> = 1200 A, I <sub>pr</sub> = 950 A	
Power Rating -30°C	DO-293, 2.2.6.3 IEC 60952-1, 5.2.1.3	I <sub>pp</sub> = 900 A, I <sub>pr</sub> = 700 A	
Rapid Discharge Capacity at 23°C	DO-293, 2.3.1 IEC 60952-1, 5.3.1	30.0 Ah when discharged at 10 times the C1 rate to 10 volts.	
Rapid Discharge Capacity at -30°C	DO-293, 2.3.2 IEC 60952-1, 5.3.2	8 Ah when discharged at 10 times the C1 rate to 10 volts.	
Charge Retention	DO-293, 2.4 IEC 60952-1, 5.4	+23 C - Rating value for design = 85 %	
		+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	
Charge Stability	DO-293, 2.6 IEC 60952-1, 5.6, Class I	OK. Max battery temperature on charge = 52°C. Charge current fell during the charge period. Capacity at end of test >C <sub>1</sub>	
Short-circuit Current	DO-293, 2.7 IEC 60952-1, 5.7	Peak current = 2755 A Last recorded current = 1876 A at 5 s	
Charge Acceptance	DO-293, 2.8 IEC 60952-1, 5.8	+23 C = 97.5%	
		+23 C, 27.5 Volt Charge = 91.6%	
		-18 C (battery with heaters only) N/A	
		-40 C (battery with heaters only) N/A	
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.	

<b>Characteristic</b>	<b>RTCA DO-293 IEC 60952-1</b>	<b>Requirement/Performance</b>	<b>Test Report / Reference</b>
Water Consumption Test	DO-293, 2.11 IEC 60952-1, 5.11	N/A	
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 successfully completed.	
Deep Discharge	DO-293, 2.13 IEC 60952-1, 5.14	The RG-380E/60 series successfully met the test requirements.	
Induced Destructive Overcharge	DO-293, 2.14 IEC 60952-1, 5.15	The RG-380E/60 series successfully met the test requirements.	
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	RG-380E/60L and /60LS are qualified to DO-293 and DO-160E, random vibration test per Curve C, section 8, 1 hour per axis. The RG-380E/60K and /60KS are qualified based on similarity to the RG-380E/60L and /60LS. The RG-380E/60B is qualified to DO-293A and DO-160G, random vibration test per Curve C, section 8, 1 hour 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	RG-380E/60L and /60LS are qualified to DO-293 and DO-160E. The RG-380E/60K and /60KS are qualified based on similarity to the RG-380E/60L and /60LS. The RG-380E/60B is qualified to DO-293A and DO-160G.	
Crash Safety Shock	DO-293, 3.3.2 IEC 60952-1, 6.4	RG-380E/60L and /60LS are qualified to DO-293 and DO-160E, Category B, impulse and sustained. 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 directions. The RG-380E/60B is qualified to DO-293A and DO-160G, Category B, impulse and sustained. Sustained per DO-160G Table 7-1, Aircraft type 5, Test R, 20g's in all directions. The RG-380E/60K and /60KS are qualified based on similarity to the RG-380E/60L and /60LS.	
Explosion Containment	DO-293, 3.4 IEC 60952-1, 6.5	RG-380E/60L is qualified to DO-293 and DO-160E. All other RG-380E/60 series models are qualified based on similarity to the RG-380E/60L.	
Altitude	DO-293, 3.5 IEC 60952-1, 6.6	RG-380E/60L and /60LS tested and qualified to 20621m (67654 ft) IAW DO-293. All other RG-380E/60 series models are qualified based on similarity to the /60L and /60LS.	

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Rapid Decompression	DO-293, 3.5.2 IEC 60952 no reqmt	RG-380E/60L and /60LS tested and qualified from 2300m (8000 ft) to 20621m (67654 ft) IAW DO-293. All other RG-380E/60 series models are qualified based on similarity to the /60L and /60LS.	
Temperature Shock	DO-293, 3.6 IEC 60952-1, 6.7	RG-380E/60L, RG-380E/60B and RG-380E/44LS tested from +85°C to -55°C IAW DO-293. All samples successfully met the test requirement. The RG-380E/60K is qualified based on similarity to the RG-380E/60L. The RG-380E/60KS is qualified based on similarity to the RG-380E/44LS.	
Fungus Resistance	DO-293, 3.7 IEC 60952-1, 6.8	Qualified to DO-293 and DO-160E Category F. All samples successfully met the test requirement.	
Humidity	DO-293, 3.8 IEC 60952-1, 6.9	RG-380E/44L and /44LS are qualified to DO-293 and DO-160E, Category B. All other RG-380E/60 series models are considered qualified based on similarity to the RG-380E/44L and /44LS.	
Fluid Contamination	DO-293, 3.9 IEC 60952-1, 6.10	<p>Test was performed on representative material samples. All samples successfully met the test requirement.</p> <p>Fluids tested:</p> <p>Fuels.</p> <ul style="list-style-type: none"> <li>Aviation Jet A fuel</li> <li>Aviation piston engine fuel (100LL AVGAS)</li> </ul> <p>Hydraulic fluids</p> <ul style="list-style-type: none"> <li>Mineral based (MIL-H-5606)</li> <li>Non-mineral based synthetic (MIL-PRF-83282 and MIL-PRF-87257)</li> </ul> <p>Lubricating oils</p> <ul style="list-style-type: none"> <li>Mineral based (MIL-L-6081)</li> <li>Ester based synthetic (MIL-L-23699)</li> <li>Internal combustion engine SAE 15W40</li> </ul> <p>Solvents and cleaning fluids</p> <ul style="list-style-type: none"> <li>Isopropyl alcohol (TT-I-735)</li> <li>Denatured alcohol</li> </ul> <p>De-icing fluid</p> <ul style="list-style-type: none"> <li>Ethylene Glycol</li> <li>Propylene Glycol</li> <li>AMS 1424 (SAE AEA Type I)</li> <li>AMS 1428 (SAE AEA Type VI)</li> </ul> <p>Insecticides - none</p> <p>Sullage - none</p> <p>Disinfectants (heavy duty phenolics) - none</p> <p>Coolant dielectric fluid - none</p> <p>Fire extinguishants - none</p>	
Salt Spray	DO-293, 3.10 IEC 60952-1, 6.11	RG-380E/44L and RG-380E/44LS qualified to DO-293 and DO-160E, Category S. All other RG-380E/60 series models are qualified based on similarity to the RG-380E/44L and /44LS.	

