



## **Concorde Battery Corporation**

2009 San Bernardino Road  
West Covina, California, USA 27106

### **RG-407**

24 VOLT 27 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<br>IEC 60952-1  | Requirement/Performance  | Test Report / Reference |
|----------------------------------|---|--|-------------------------|
| <b>Description</b>               | <p>The RG-407 is a 24 volt valve regulated lead-acid aircraft storage battery.</p> <p>The monoblock consists of twelve 2 volt cells connected in series. The monoblock is constructed of a one piece plastic container and cover which are secured together with an epoxy cement. The container and cover are both made of high-impact polypropylene.</p> <p>The monoblock is housed within an epoxy fuse coated aluminum container and cover. The cover is attached to the container with high retention rivets. The battery hold down is incorporated into the outer housing. Vent tubes are incorporated into the outer container walls. The RG-407 is fitted with an MS3509 conforming receptacle.</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 No. RG-407  |                         |
| Connector                        | IEC 60952-2   | The battery is available with a Type Q terminal conforming to MS-3509.   |                         |
| Mass                             |   | 28.2 kg Max (62 lbs).  |                         |
| Charging method                  | IEC 60952-1, 4.3  | Constant potential at 28.25 V  |                         |
| Any auxiliary requirement:       |   | The battery may be fitted with a temperature sensor (optional as required by the aircraft installation or STC). Connector for the temperature sensor depends on the type used. |                         |
| Ventilation                      | DO-293, 1.9<br>IEC 60952-2  | Battery is equipped with vent tubes  |                         |
| Flammability                     | IEC 60952-2   | Outer container is fire resistant  |                         |
| Spillability                     |   | Non spill  |                         |
| <b>Electrical Performance</b>    |   |  |                         |
| Rated Capacity (C1)              | DO-293, 2.2.2<br>IEC 60952-1, 5.1.1   | 27 Ah  |                         |
| Capacity at -18°C                | DO-293, 2.2.3<br>IEC 60952-1, 5.1.2   | 23 Ah when discharged at the C1 rate.  |                         |
| Capacity at -30°C                | DO-293, 2.2.4<br>IEC 60952-1, 5.1.3   | 16 Ah when discharged at the C1 rate.  |                         |
| Capacity at +50°C                | DO-293, 2.2.5<br>IEC 60952-1, 5.1.4   | 30 Ah when discharged at the C1 rate.  |                         |
| Power Rating +23°C               | DO-293, 2.2.6.1<br>IEC 60952-1, 5.2.1.1   | I <sub>pp</sub> = 1225 A, I <sub>pr</sub> = 900 A  |                         |
| Power Rating -18°C               | DO-293, 2.2.6.2<br>IEC 60952-1, 5.2.1.2   | I <sub>pp</sub> = 1000 A, I <sub>pr</sub> = 825 A  |                         |
| Power Rating -30°C               | DO-293, 2.2.6.3<br>IEC 60952-1, 5.2.1.3   | I <sub>pp</sub> = 800 A, I <sub>pr</sub> = 650 A   |                         |
| Rapid Discharge Capacity at 23°C | DO-293, 2.3.1<br>IEC 60952-1, 5.3.1   | 15 Ah when discharged at 10 times the C1 rate to 10 volts.   |                         |

| <b>Characteristic</b>             | <b>RTCA DO-293<br/>IEC 60952-1</b>          | <b>Requirement/Performance</b>   | <b>Test Report / Reference</b> |
|-----------------------------------|---|--|--------------------------------|
| Rapid Discharge Capacity at -30°C | DO-293, 2.3.2<br>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<br>IEC 60952-1, 5.4             | +23 C - Rating value for design = 90 %   |                                |
|                                   |   | +50 C - Rating value for design = 65 %   |                                |
| Storage                           | DO-293, 2.5<br>IEC 60952-1, 5.5             | DO-293 - 1 year storage life test in process   |                                |
| Charge Stability                  | DO-293, 2.6<br>IEC 60952-1, 5.6, Class I    | OK. Max battery temperature on charge = 60°C. Charge current fell during the charge period. Capacity at end of test > C1 |                                |
| Short-circuit Current             | DO-293, 2.7<br>IEC 60952-1, 5.7             | Peak current = 2565 A<br>Last recorded current = 42.7 A at 5.7s  |                                |
| Charge Acceptance                 | DO-293, 2.8<br>IEC 60952-1, 5.8             | +23 C = 101%   |                                |
|                                   |   | -18 C (battery with heaters only) N/A  |                                |
|                                   |   | -40 C (battery with heaters only) N/A  |                                |
| Insulation Resistance             | DO-293, 2.9.1<br>IEC 60952-1, 5.9.1         | All samples successfully met the test requirement.   |                                |
| Dielectric Strength               | DO-293, 2.9.2<br>IEC 60952-1, 5.9.2         | All samples successfully met the test requirement.   |                                |
| Duty Cycle Performance            | DO-293, 2.10<br>IEC 60952-1, 5.10           | 100 cycles successfully completed.   |                                |
| Water Consumption Test            | DO-293, 2.11<br>IEC 60952-1, 5.11           | N/A  |                                |
| Overcharge Endurance              | DO-293, no requirement<br>IEC 60952-1, 5.12 | Not tested   |                                |
| Cyclic Endurance                  | DO-293, 2.12<br>IEC 60952-1, 5.13           | 100 cycles successfully completed.   |                                |
| Deep Discharge                    | DO-293, 2.13<br>IEC 60952-1, 5.14           | The RG-407 successfully met the test requirement.  |                                |
| Induced Destructive Overcharge    | DO-293, 2.14<br>IEC 60952-1, 5.15           | The RG-407 successfully met the test requirement.  |                                |
| Electrical Emissions              | DO-293, 2.15<br>IEC 60952-1, 5.16           | N/A Battery contains no active electronics.  |                                |
| <b>Environmental Performance</b>  |   |  |                                |
| Vibration                         | DO-293, 3.1<br>IEC 60952-1, 6.1             | Qualified to DO-293 and DO-160E, Random Vibration test per Curve C, section 8, 1 hour per axis.                          |                                |
| Acceleration                      | DO-293, no requirement<br>IEC 60952-1, 6.2  | Not tested   |                                |
| Operational Shock                 | DO-293, 3.3.1<br>IEC 60952-1, 6.3, Class I  | Qualified to DO-293 and DO-160E, Category B.   |                                |

| Characteristic        | RTCA DO-293<br>IEC 60952-1          | Requirement/Performance   | Test Report / Reference |
|-----------------------|-------------------------------------|---|-------------------------|
| Crash Safety Shock    | DO-293, 3.3.2<br>IEC 60952-1, 6.4   | Qualified to DO-293 and DO-160E, Category B, impulse and sustained. Sustained per DO-160E Table 7-1, Aircraft type 5, Test type R, 20g's in each orientation.   |                         |
| Explosion Containment | DO-293, 3.4<br>IEC 60952-1, 6.5     | Qualified to DO-293 and DO-160E. The RG-407 successfully met the test requirement.  |                         |
| Altitude              | DO-293, 3.5<br>IEC 60952-1, 6.6     | Tested to 20621m (67654 ft) IAW DO-293.   |                         |
| Rapid Decompression   | DO-293, 3.5.2<br>IEC 60952 no reqmt | Tested from 2300m (8000 ft) to 20621m (67654 ft) IAW DO-293.  |                         |
| Temperature Shock     | DO-293, 3.6<br>IEC 60952-1, 6.7     | Tested from +85°C to -55°C IAW DO-293. The RG-407 successfully met the test requirement.  |                         |
| Fungus Resistance     | DO-293, 3.7<br>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<br>IEC 60952-1, 6.9     | Qualified to DO-293 and DO-160E, Category B   |                         |
| Fluid Contamination   | DO-293, 3.9<br>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> |                         |

| Characteristic                         | RTCA DO-293<br>IEC 60952-1                  | Requirement/Performance                               | Test Report / Reference |
|--|---|---|-------------------------|
| Salt Spray                             | DO-293, 3.10<br>IEC 60952-1, 6.11           | Qualified to DO-293 and DO-160E, Category S.          |                         |
| Physical Integrity at High Temperature | DO-293, 3.11<br>IEC 60952-1, 6.12           | The RG-407 successfully met the test requirement.     |                         |
| Flammability                           | DO-293, no requirement<br>IEC 60952-1, 6.13 | Not tested.   |                         |
| Electrolyte Resistance                 | DO-293, 3.12<br>IEC 60952-1, 6.14           | All samples met the specification requirements.       |                         |
| Thermal Sensors                        | DO-293, 3.13<br>IEC 60952-1, 6.15           | N/A   |                         |
| Component Qualification tests          | DO-293, 3.14<br>IEC 60952-1, 6.16           | All components successfully met the test requirement. |                         |
| Battery Airtightness                   | DO-293, no requirement<br>IEC 60952-1, 6.17 | N/A   |                         |
| Cell Baffle                            | DO-293, no requirement<br>IEC 60952-1, 6.18 | N/A. Applies only to nickel-cadmium batteries only.   |                         |
| Strength of Receptacle                 | DO-293, 3.15<br>IEC 60952-1, 6.19           | OK  |                         |
| Handle Strength                        | DO-293, 3.16<br>IEC 60952-1, 6.20           | OK  |                         |

N/A = Not Applicable

**Authentication:**

Manufacturer.                      Concorde Battery Corporation

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