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TECHNICAL BULLETIN

Subject: **IEC 952-1 Ratings**

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All of Concorde's commercial Aircraft Batteries are tested and rated in accordance with the International Electrotechnical Commission (IEC) Standard 952-1, Aircraft Batteries. The following information is provided to assist the user in the interpretation of these ratings. For full text of the current IEC requirements, refer to the standard.

1 Definitions

- 1.1 Current values - All current values shall be expressed in amperes (A).
- 1.2 I_1 rate - The current which the battery delivers to give its rated C_1 capacity in 1 hour (h).
- 1.3 Rated capacity C_1 - Quantity of electricity (in Ah) which the cell or battery is capable of delivering in 1 h, throughout its normal service life, after full charge, under conditions defined with regard to temperature and end discharge voltage.
- 1.4 Power rating current I_{PR} - The discharge current which the battery delivers at the conclusion of a 15 second (s) power discharge, controlled so as to maintain a constant terminal voltage of half the nominal voltage of the battery.
- 1.5 Peak Power Current I_{PP} - The discharge current at $t = 0.3$ s while testing as in 1.4.
- 1.6 Charged battery - A battery which has been fully charged in accordance with the battery manufacturer's instructions.
- 1.7 End Point Voltage (EPV) - Unless otherwise stated, during discharge the battery voltage corresponding to a mean voltage per cell of 1.00 Volts for nickel-cadmium or 1.67 Volts for lead-acid batteries.
- 1.8 Discharged battery - A battery which has been discharged at the I_1 rate down to its EPV.
- 1.9 End of Life - The point in calendar life or cycle life at which, due to elapsed time or cumulative effects of usage, the battery is no longer able to deliver its rated capacity and/or charge acceptance.
- 1.10 Airworthiness - The compliance of a battery or part thereof with all conditions and regulations required by the appropriate Government authorities for their safe operation and performance.

2 Test Procedures:

- 2.1 Capacity tests at the I_1 rate
 - 2.1.1 Rated Capacity C_1 - After standing for not less than 20 h and not more than 24 h at an ambient temperature of $23 \pm 2/C$, a serviced and charged battery shall be discharged at a rate of 1 I_1 to its EPV, maintaining the ambient temperature at $23 \pm 2/C$ during discharge. The battery shall deliver a capacity of not less than 100% C_1 (discharge time 1 h)
 - 2.1.2 Capacity at 1 I_1 and $-18/C$ - After standing for not less than 20 h and not more than 24 h at an ambient temperature of $-18 \pm 2/C$, a serviced and charged battery shall be discharged at a rate of 1 I_1 to its EPV, maintaining the ambient temperature at $-18 \pm 2/C$ during discharge.
 - 2.1.3 Capacity at 1 I_1 and $-30/C$ - After standing for not less than 20 h and not more than 24 h at an

ambient temperature of $-30 \pm 2/C$, a serviced and charged battery shall be discharged at a rate of $1 I_1$ to its EPV, maintaining the ambient temperature at $-30 \pm 2/C$ during discharge

- 2.1.4 Capacity at $1 I_1$ and $50/C$ - After standing for not less than 20 h and not more than 24 h at an ambient temperature of $50 \pm 2/C$, a serviced and charged battery shall be discharged at a rate of $1 I_1$ to its EPV, maintaining the ambient temperature at $50 \pm 2/C$ during discharge

2.2 Power Rating

- 2.2.1 Power rating current at $23/C$ - After standing for not less than 20 h and not more than 24 h at $23 \pm 2/C$, a serviced and charged battery shall be discharged at a rate so as to maintain a constant terminal voltage corresponding to a mean voltage per cell of 1.00 V for not less than 15 s. Loading should be automatically controlled. The plot of current against time shall be recorded throughout the test.

The current at 15 s shall be designated I_{PR} and the current at 0.3 s shall be designated I_{PP} . These shall be not less than the values declared by the manufacturer.

- 2.2.2 Power rating current at $-18/C$ - After standing for not less than 20 h and not more than 24 h at $-18 \pm 2/C$, a serviced and charged battery shall be discharged at a rate so as to maintain a constant terminal voltage corresponding to a mean voltage per cell of 1.00 V for not less than 15 s. Loading should be automatically effected. The plot of current against time shall be recorded throughout the test.

The current at 0.3 s and 15 s shall be not less than the value declared by the manufacturer.

- 2.2.3 Power rating current at $-30/C$ - After standing for not less than 20 h and not more than 24 h at $-30 \pm 2/C$, a serviced and charged battery shall be discharged at a rate so as to maintain a constant terminal voltage corresponding to a mean voltage per cell of 1.00 V for not less than 15 s. Loading should be automatically effected. The plot of current against time shall be recorded throughout the test.

The current at 0.3 s and 15 s shall be not less than the value declared by the manufacturer.

2.3 Rapid discharge capacity

- 2.3.1 Rapid discharge capacity at $23/C$ - After standing for not less than 20 h and not more than 24 h at an ambient temperature of $23 \pm 2/C$, a serviced and charged battery shall be discharged at a rate of $6 I_1$ to an end voltage corresponding to a mean voltage per cell of 1.33 V maintaining the ambient temperature at $-23/ \pm 2/C$ during discharge.

- 2.3.2 Rapid discharge capacity at $-30/C$ - After standing for not less than 20 h and not more than 24 h at an ambient temperature of $30 \pm 2/C$, a serviced and charged battery shall be discharged at a rate of $6 I_1$ to an end voltage corresponding to a mean voltage per cell of 1.33 V maintaining the ambient temperature at $-30/ \pm 2/C$ during discharge.