

## **PRODUCT TECHNICAL BULLETIN #61**

### **“Operating Voltage”**

#### **1.0 PURPOSE:**

The purpose of this technical bulletin is to provide information on operating voltage and its relationship to dielectric withstanding voltage.

#### **2.0 GENERAL INFORMATION:**

Dielectric withstanding voltage (DWV) tests determine if the insulating materials and conductor spacing are sufficient. Failures manifest as disruptive discharge or current leakage. These disruptive discharges or leakages are generally an indication that the insulation between the conductors has been permanently damaged. Therefore, when retested following a discharge or leakage, the test sample will generally fail at a lower voltage during the retest.

Rated operating/working voltage is the maximum voltage to be applied in service.

#### **3.0 SPECIFICATIONS:**

EIA-364-20 and MIL-STD-1344 both dictate that the dielectric withstanding voltage (DWV) be established as 75% of the minimum breakdown voltage of the connector (breakdown voltage is defined as the voltage at which a connector failure is observed). Insulation may degrade if the connector is exposed to repeated DWV tests and the DWV test voltage should never be used as an operating/working voltage. To avoid this potential degradation, EIA-364-20 and MIL-STD-1344 suggest “that the operating rated voltage be established as 1/3 of the withstanding voltage”.

AirBorn connectors are based on military standards (MIL-DTL-83513, MIL-DTL-55302, and MIL-DTL-32139). These standards establish the DWV test voltage but do not specify operating voltage. Table A summarizes the DWV for each specification and the resulting EIA-364-20/MIL-STD-1344 suggested rated operating voltage (1/3 of DWV).

Military Connector Specification	AirBorn Connector Series	DWV sea level (rms 60 Hz)	DWV 70,000 ft (rms 60 Hz)	Rated Operating Voltage Sea level (rms 60 Hz)	Rated Operating Voltage 70,000 ft (rms 60 Hz)
MIL-DTL-83513 all slash sheets	M	600	150	200	50
MIL-DTL-55302 /55 thru /66, /138, /139	W	1000	300	333	100
MIL-DTL-55302 /190 thru /193	R	750	250	250	83
MIL-DTL-32139 all slash sheets	N	250	100	83	33

**TABLE A**  
DWV and suggested rated operating voltage

**4.0 CABLE ASSEMBLIES:**

Ratings for each connection must be considered when multiple connector types are mixed on a single harness. The DWV and operating voltage for each connection must be established based on the lowest rated connector, component, wire, or cable. Example: A jumper wire harness is built connecting an M83513 connector to a M32139 connector. The sea level DWV test voltage used to test the assembly would be 250 volts rms 60 Hz and the suggested operating voltage per EIA-364-20/MIL-STD-1344 would be 83 volts rms 60 Hz.

**5.0 SPECIAL REQUIREMENTS AND CONSTRUCTION:**

The DWV test voltages established by MIL-DTL-83513, MIL-DTL-55302, and MIL-DTL-32139 are dictated by these specifications and are not based on 75% of the minimum AirBorn connector breakdown voltage. In some cases, the AirBorn connector construction is more robust than required to meet the minimum specification requirement and the connector is able to withstand operating voltages somewhat greater than those listed in the table on the previous page. In addition, the values shown in the table above are based on voltage being applied to the most closely spaced adjacent contacts. For applications requiring higher operating voltage than those listed in the table, it is often possible to meet these higher voltage requirements by selectively loading the connector thereby leaving empty positions between the pins where the high voltage is applied. Another similar method of increasing the maximum operating voltage is to leave a “no connect” pin in between the high voltage pins, although in general, this will not provide as much additional voltage margin as selectively loading and leaving a completely empty position in the connector. Contact AirBorn if you have specific operating voltage needs that exceed those listed in Table A. Special construction and/or DWV testing may be available to meet your needs.

*- For additional information or questions contact your customer service representative for the appropriate contact information.-*