



AEROSPACE INFORMATION REPORT	AIR7502™	REV. A
	Issued 2021-01 Revised 2025-12	
	Superseding AIR7502	
(R) Aircraft Electrical Voltage Level Definitions		

RATIONALE

This SAE Aerospace Information Report (AIR) has been revised based on several reviews by SDO committee groups.

INTRODUCTION

The motivation in creating voltage levels helps to delineate magnitudes in the term “high voltage” as it applies to an aerospace application. These voltage levels should not be associated with voltage standards for electrical power systems (EPS), nor particularly with the “system” voltage. Although there is no physical basis for these levels, these demarcations of voltage levels are to facilitate the different regions for insulation system, material, and device design.

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1. SCOPE

The scope of this report will document the various voltage levels and provide a rationale for each level as discussed and agreed to in the AE-7 committee.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 IEC Publications

Available from IEC Secretariat, 3 rue de Varembe, PO Box 131, CH-1211 Geneva 20, Switzerland, Tel: +41 22 919 0211, www.iec.ch.

IEC 60950-1 Information technology equipment – Safety

2.2 Definitions

ABNORMAL TRANSIENT: Abnormal transients occur when normal system control is momentarily lost as a result of equipment malfunction, faults, or lightning strikes.

AIRCRAFT: An airplane, helicopter, or lighter-than-air vehicle.

NOMINAL OPERATING VOLTAGE: Mean voltage value of the operating voltage.

OPERATING VOLTAGE: Voltage level of electric distribution and transmission lines.

NORMAL TRANSIENT: Normal transient is a result of load switching or source power transfers.

2.3 Abbreviations

AC	alternating current
DC	direct current
EPS	electrical power system
L-L	line-to-line
L-N	line-to-neutral
rms	root-mean-square
SELV	safety extra-low voltage
Vac	volts AC
Vdc	volts DC

3. VOLTAGE LEVEL RANGE DEFINITIONS

3.1 DC Voltage Definition

Need to address Unipolar and Bipolar system voltage level:

Several architectures or configurations can be used leading to different voltages levels. In order to be tolerant to those architectures, it is proposed to use:

- **Vdc** voltage as an acronym to define the voltage between cables (go and return) and the same value for active wire and ground
- **Vpg** voltage as an acronym to define the voltage between the positive and ground line
- **Vng** voltage as an acronym to define the voltage between the negative and ground line

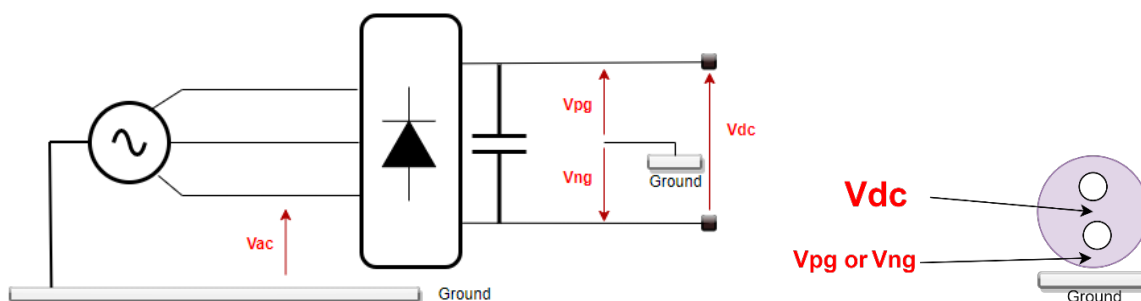


Figure 1 - DC voltage definition

Some topology concepts are given here as examples. This list is not exhaustive and does not represent all possible architectures; it is applicable for regulated and unregulated architectures.