



As a leading technology and solutions development organization, the Alliance for Telecommunications Industry Solutions (ATIS) brings together the top global ICT companies to advance the industry's most pressing business priorities. ATIS' nearly 200 member companies are currently working to address the All-IP transition, network functions virtualization, big data analytics, cloud services, device solutions, emergency services, M2M, cyber security, network evolution, quality of service, billing support, operations, and much more. These priorities follow a fast-track development lifecycle — from design and innovation through standards, specifications, requirements, business use cases, software toolkits, open source solutions, and interoperability testing.

ATIS is accredited by the American National Standards Institute (ANSI). The organization is the North American Organizational Partner for the 3rd Generation Partnership Project (3GPP), a founding Partner of the oneM2M global initiative, a member of and major U.S. contributor to the International Telecommunication Union (ITU), as well as a member of the Inter-American Telecommunication Commission (CITEL). For more information, visit <u>www.atis.org</u>.

#### **AMERICAN NATIONAL STANDARD**

Approval of an American National Standard requires review by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by the standards developer.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made towards their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

**CAUTION NOTICE:** This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this standard. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

#### Notice of Disclaimer & Limitation of Liability

The information provided in this document is directed solely to professionals who have the appropriate degree of experience to understand and interpret its contents in accordance with generally accepted engineering or other professional standards and applicable regulations. No recommendation as to products or vendors is made or should be implied.

NO REPRESENTATION OR WARRANTY IS MADE THAT THE INFORMATION IS TECHNICALLY ACCURATE OR SUFFICIENT OR CONFORMS TO ANY STATUTE, GOVERNMENTAL RULE OR REGULATION, AND FURTHER, NO REPRESENTATION OR WARRANTY IS MADE OFMERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. ATIS SHALL NOT BE LIABLE, BEYOND THE AMOUNT OF ANY SUM RECEIVED IN PAYMENT BY ATIS FOR THIS DOCUMENT, AND IN NO EVENT SHALL ATIS BE LIABLE FOR LOST PROFITS OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES. ATIS EXPRESSLY ADVISES THAT ANY AND ALL USE OF OR RELIANCE UPON THE INFORMATION PROVIDED IN THIS DOCUMENT IS AT THE RISK OF THE USER.

NOTE - The user's attention is called to the possibility that compliance with this standard may require use of an invention covered by patent rights. By publication of this standard, no position is taken with respect to whether use of an invention covered by patent rights will be required, and if any such use is required no position is taken regarding the validity of this claim or any patent rights in connection therewith. Please refer to [http://www.atis.org/legal/patentinfo.asp] to determine if any statement has been filed by a patent holder indicating a willingness to grant a license either without compensation or on reasonable and non-discriminatory terms and conditions to applicants desiring to obtain a license.

ATIS-0600315.01.2015(R2020), Voltage Levels for 380V DC-Powered Equipment Used in the Telecommunications Environment

Is an American National Standard developed by the **Network Power Systems (NPS)** Subcommittee under the **ATIS Sustainability in Telecom: Energy and Protection Committee (STEP)**.

Published by Alliance for Telecommunications Industry Solutions 1200 G Street, NW, Suite 500 Washington, DC 20005

Copyright  $\textcircled{\sc c}$  2015 by Alliance for Telecommunications Industry Solutions All rights reserved.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher. For information contact ATIS at 202.628.6380. ATIS is online at < <u>http://www.atis.org</u> >.

American National Standard for Telecommunications

# Voltage Levels for 380V DC-Powered Equipment Used in the Telecommunications Environment

Alliance for Telecommunications Industry Solutions

Approved February 13, 2015

American National Standards Institute, Inc.

## Abstract

This standard establishes requirements and test procedures for voltage ranges and characteristics associated with the 380V DC input voltage of telecommunications equipment powered from dc power systems in the telecommunications environment.

## Foreword

The information contained in this Foreword is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. As such, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Standard.

The Alliance for Telecommunication Industry Solutions (ATIS) serves the public through improved understanding between providers, customers, and manufacturers. The Sustainability in Telecom: Energy and Protection (STEP) Committee – formerly the Network Interface, Power, and Protection Committee (NIPP) -- engages industry expertise to develop standards and technical reports for telecommunications equipment and environments in the areas of energy efficiency, environmental impacts, power and protection. The work products of STEP enable vendors, operators and their customers to deploy and operate reliable, environmentally sustainable, energy efficient communications technologies. STEP is committed to proactive engagement with national, regional and international standards development organizations and forums that share its scope of work.

ANSI guidelines specify two categories of requirements: mandatory and recommendation. The mandatory requirements are designated by the word *shall* and recommendations by the word *should*. Where both a mandatory requirement and a recommendation are specified for the same criterion, the recommendation represents a goal currently identifiable as having distinct compatibility or performance advantages.

Suggestions for improvement of this document are welcome. They should be sent to the Alliance for Telecommunications Industry Solutions, STEP, 1200 G Street NW, Suite 500, Washington, DC 20005.

At the time of consensus on this document, STEP, which was responsible for its development, had the following leadership:

- K. Biholar, STEP Chair [Alcatel-Lucent]
- J. Krahner, STEP Vice-Chair [Cisco]
- J. Jackson, STEP NPS Chair [AT&T]
- E. Gallo, STEP NPS Vice-Chair [Ericsson]
- S. Lisy, Technical Editor [Emerson Energy Systems]

The NPS Subcommittee was responsible for the development of this document.

# **Table of Contents**

1	SCO	OPE & PURPOSE	. 1		
	1.1 1.2	Scope Purpose	. 1 . 1		
2	NO	RMATIVE REFERENCES	. 1		
3	DEF	FINITIONS, ABBREVIATIONS, & ACRONYMS	. 2		
	3.1 3.2	DEFINITIONS	2		
4	GE	NERAL INFORMATION	. 3		
	4.1 4.2 4.3	POWER PLANT & TELECOMMUNICATIONS LOAD EQUIPMENT APPLICATIONS OF TELECOMMUNICATIONS EQUIPMENT GENERAL TEST REPORT REQUIREMENTS	. 3 . 3 . 3		
5	TEL	ECOMMUNICATIONS LOAD EQUIPMENT PERFORMANCE REQUIREMENTS	. 4		
	5.1 5.2 5.2 5.3 5.3 5.3 5.3 5.3 5.4 5.4 5.4 5.4	STEADY-STATE INPUT DC VOLTAGE REQUIREMENTS   1 Distribution Voltage Drops   UNDERVOLTAGE REQUIREMENTS   1 Minimum Operating Voltage Test Procedure for Nominal 380 Vdc equipment.   OVERVOLTAGE REQUIREMENTS   1 Maximum Operating Voltage Test Procedure.   2 Maximum Operating Voltage Conformance.   3 Maximum Operating Voltage Test Report   PROTECTIVE DEVICE OPERATION TRANSIENT   1 Protective Device Operation Transient for Nominal 380 Vdc Equipment Test Procedure   2 Overvoltage Transient Conformance   3 Protective Device Operation Transient Test Report	4 4 4 5 6 6 6 6 6 6 12 12 12		
6	OTH		13		
	6.1 6.2 6.3 <i>6.3</i> .	BASIS FOR MTBF CALCULATION PERSONNEL HAZARDS MARKING & DOCUMENTATION	13 13 13 <i>13</i>		
A	ANNEX A BIBLIOGRAPHY				
Α			15		
	B.1 T	EST METHOD USING THE SINGLE TRANSIENT IN FIGURES 5.1 & 5.2	15		

# **Table of Figures**

FIGURE 5.1 - TOTAL PROTECTIVE DEVICE OPERATION TRANSIENT - CRITERIA A) TEMPORARY LOSS OF FUNCTION DEGRADATION OF PERFORMAN	ICE,
AUTOMATIC RECOVERY TO NORMAL PERFORMANCE AFTER THE TEST	9
FIGURE 5.2 - TOTAL PROTECTIVE DEVICE OPERATION TRANSIENT - CRITERIA B) NORMAL PERFORMANCE	9
Figure 5.3 - Impulse Protective Device Operation Transient – Criteria A	10
Figure 5.4 - Impulse Protective Device Operation Transient – Criteria B	10
Figure 5.5 - Overvoltage Protective Device Operation Transient - Criteria A & B	11
FIGURE 5.6 - UNDERVOLTAGE PROTECTIVE DEVICE OPERATION TRANSIENT – CRITERIA A & B	12

# ATIS-0600315.01.2015(2020)

# Table of Tables

TABLE 5.1 - TELECOMMUNICATIONS LOAD EQUIPMENT OPERATING REQUIREMENTS	4
TABLE 5.2 - TELECOMMUNICATIONS VOLTAGE SURGES FOR 380V NOMINAL VOLTAGE PLANTS	8
TABLE 6.1 - VOLTAGE REFERENCE FOR MTBF CALCULATIONS	. 13