



SLOVENSKI STANDARD
oSIST prEN 16603-20-07:2021
01-september-2021

Vesoljska tehnika - Elektromagnetna združljivost

Space engineering - Electromagnetic compatibility

Raumfahrttechnik - Elektromagnetische Kompabilität

Ingéniérie spatiale - Compatibilité électromagnétique

Ta slovenski standard je istoveten z: prEN 16603-20-07

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Space engineering - Electromagnetic compatibility

Ingénierie spatiale - Compatibilité électromagnétique

Raumfahrttechnik - Elektromagnetische Kompatibilität

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/CLC/JTC 5.

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European Foreword

This document (prEN 16603-20-07:2021) has been prepared by Technical Committee CEN/CLC/TC 5 "Space", the secretariat of which is held by DIN (Germany).

This document (prEN 16603-20-07:2021) originates from ECSS-E-ST-20-07C Rev.2-DIR1.

This document is currently submitted to the ENQUIRY.

This document will supersede EN 16603-20-07:2014.

This document has been developed to cover specifically space systems and will therefore have precedence over any EN covering the same scope but with a wider do-main of applicability (e.g. : aerospace).

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Introduction

Electromagnetic compatibility (EMC) of a space system or equipment is the ability to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment.

The space system is designed to be compatible with its external natural, induced, or man-made electromagnetic environment. Natural components are lightning for launchers, the terrestrial magnetic field for space vehicles. Spacecraft charging is defined as voltage building-up of a space vehicle or spacecraft units when immersed in plasma. Electrostatic discharges result from spacecraft charging with possible detrimental effects. External man-made interference, intentional or not, are caused by radar or telecommunication beams during ground operations and the launching sequence. Intersystem EMC also applies between the launcher and its payload or between space vehicles.

Intrasystem EMC is defined between all electrical, electronic, electromagnetic, and electromechanical equipment within the space vehicle and by the presence of its self-induced electromagnetic environment. It comprises the intentional radiated electromagnetic fields and parasitic emission from on-board equipment. Both conducted and radiated emissions are concerned. An electromagnetic interference safety margin is defined at system critical points by comparison of noise level and susceptibility at these points.

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1 Scope

EMC policy and general system requirements are specified in ECSS-E-ST-20.

This ECSS-E-ST-20-07 Standard addresses detailed system requirements (Clause 4), general test conditions, verification requirements at system level, and test methods at subsystem and equipment level (Clause 5) as well as informative limits (5.4.14.4d.6).

Associated to this standard is ECSS-E-ST-20-06 “Spacecraft charging”, which addresses charging control and risks arising from environmental and vehicle-induced spacecraft charging when ECSS-E-ST-20-07 addresses electromagnetic effects of electrostatic discharges.

Annexes A to C of ECSS-E-ST-20 document EMC activities related to ECSS-E-ST-20-07: the EMC Control Plan (Annex A) defines the approach, methods, procedures, resources, and organization, the Electromagnetic Effects Verification Plan (Annex B) defines and specifies the verification processes, analyses and tests, and the Electromagnetic Effects Verification Report (Annex C) document verification results. The EMEVP and the EMEVR are the vehicles for tailoring this standard.

This standard may be tailored for the specific characteristic and constrains of a space project in conformance with ECSS-S-ST-00-02.

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Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this ECSS Standard. For dated references, subsequent amendments to, or revision of any of these publications do not apply, However, parties to agreements based on this ECSS Standard are encouraged to investigate the possibility of applying the more recent editions of the normative documents indicated below. For undated references, the latest edition of the publication referred to applies.

EN reference	Reference in text	Title
EN 16601-00-01	ECSS-S-ST-00-01	ECSS system - Glossary of terms
EN 16603-20	ECSS-E-ST-20	Space engineering - Electrical and electronic
EN 16603-20-06	ECSS-E-ST-20-06	Space engineering - Spacecraft charging
EN 16603-33-11	ECSS-E-ST-33-11	Space engineering - Explosive systems and devices
EN 16603-51-14	ECSS-E-ST-50-14	Space engineering – Spacecraft discrete interfaces
	IEC 61000-4-2 (Edition 1.2)	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test

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Terms, definitions and abbreviated terms

3.1 Terms from other standards

For the purpose of this Standard, the terms and definitions from ECSS-S-ST-00-01 apply, in particular for the following terms:

critical item

customer

equipment

item

launcher, launch vehicle

mission

requirement

safety critical function

supplier

spacecraft, space vehicle

subsystem

system

test

verification

For the purposes of this Standard, the following terms have a specific definition contained in ECSS-E-ST-20:

conducted emission

electromagnetic compatibility

electromagnetic compatibility control

electromagnetic interference

electromagnetic interference safety margin

emission

high-voltage

lightning indirect effects

radiated emission

radiofrequency

susceptibility

susceptibility threshold

For the purposes of this document, the following terms have a specific definition contained in ECSS-E-ST-20-06:

electrostatic discharge (ESD)**secondary arc**

For the purposes of this document, the following term has a specific definition contained in ECSS-E-ST-33-11:

electro-explosive device (EED)

3.2 Terms specific to the present standard

3.2.1 ambient level

level of radiated and conducted signal, and noise that exist at the specified test location and time when the equipment under test is not operating

NOTE E.g. atmospherics, interference from other sources, and circuit noise or other interference generated within the measuring set compose the "ambient level".

3.2.2 antenna factor

factor that, when properly applied to the voltage at the input terminals of the measuring instrument, yields the electric or magnetic field strength

NOTE 1 This factor includes the effects of antenna effective length, mismatch, and transmission losses.

NOTE 2 The electric field strength is normally expressed in V/m and the magnetic field strength in A/m or T.

3.2.3 common mode voltage

voltage difference between source and receiver ground references

3.2.4 contact discharge method

method of testing in which the electrode of the high-voltage test generator is held in contact with the discharge circuit, and the discharge actuated by a discharge switch

3.2.5 electromagnetic environmental effects

impact of the electromagnetic environment upon equipment, systems, and platforms

NOTE It encompasses all electromagnetic disciplines, including electromagnetic compatibility; electromagnetic interference, electromagnetic vulnerability, hazards of electromagnetic radiation

to personnel, electro-explosive devices, volatile materials, and natural phenomena effects.

3.2.6 field strength

resultant of the radiation, induction and quasi-static components of the electric or magnetic field

NOTE The term “electric field strength” or “magnetic field strength” is used, according to whether the resultant, electric or magnetic field, respectively, is measured.

3.2.7 ground plane

metal sheet or plate used as a common reference point for circuit returns and electrical or signal potentials

3.2.8 improper response

subsystem or equipment response which can be either inadvertent or unacceptable

3.2.9 inadvertent response

proper subsystem functional response (within normal range of limits) actuated by electromagnetic interference, but occurring at other than the normal operational cycle, which in turn causes improper response to the total space system

3.2.10 line impedance stabilization network (LISN)

network inserted in the supply leads of an apparatus to be tested which provides, in a given frequency range, a specified source impedance for the measurement of disturbance currents and voltages and which can isolate the apparatus from the supply mains in that frequency range

3.2.11 not operating

condition wherein no power is applied to the equipment

3.2.12 overshield

shield surrounding a bundle or a shielded cable

3.2.13 passive intermodulation product

generation of a signal at frequency $f = n \cdot f_1 + m \cdot f_2$ from two signals at frequencies f_1 and f_2 , where n and m are positive or negative integers, by a passive device, usually an electrical contact

3.2.14 port

place of access to a device or network where energy can be supplied or withdrawn, or where the device or network variables can be observed or measured