Korea Laboratory Accreditation Scheme

CERTIFICATE OF ACCREDITATION

NCT Co., Ltd.

Accreditation No. : KT689

Corporation Registration No. : 134511-0245404

Address of Laboratory : (Branch site) 211-71, Geumgok-ro, Hwaseong-si, Gyeonggi-do, Republic of Korea
(Satellite facilities-1) 370-26, Wonam-ro, Namsa-eup, Cheoin-gu, Yongin-si, Gyeonggi-do, Republic of Korea
(Satellite facilities-2) 10-26, Dongtansandan 5-gil, Hwaseong-si, Gyeonggi-do, Republic of Korea
(Satellite facilities-3) 44, Gongdan 12-ro, Jinryang-eup, Gyeongsan-si, Gyeongsangbuk-do, Republic of Korea

Date of Initial Accreditation : January 21, 2016

Validity of Accreditation : January 21, 2024 ~ January 20, 2028

Scope of Accreditation : Attached Annex

Date of issue : December 11, 2025

This testing laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to Joint ISO-ILAC-IAF Communiqué).

Kim dae ji

Head
Korea Laboratory Accreditation Scheme

Korea Laboratory Accreditation Scheme(KOLAS) is a signatory to the ILAC Mutual Recognition Arrangement

03. Electrical Testing

03.004 Electrical materials and components

Test method	Materials Products	Standard designation	Test range	Site	Field testing
ANSI/CAN/UL 9540:2023	Electrical materials and components	Energy Storage Systems and Equipment (Exception) 36. Electromagnetic Immunity Test 37. Containment of Moving parts 39. Strength Test 41.4 Installation in seismic environments 42.3 Check of safety controls 43. Mechanical Production Test 44. Production Quality Control	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
ANSI/CAN/UL 9540A:2019	Electrical materials and components	Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems (Exception) 10. Installation Level	Peak heat release rate : (0 ~ 5) MW Heat release rate : (0 ~ 5) MW Light transmission : (0 ~ 100) % Total hydrocarbon : (0 ~ 5 000) ppm Hydrogen : (0 ~ 5) %	SF-1	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
ANSI/CAN/UL 9540A:2025	Electrical materials and components	Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems (Exception) 10. Installation Level	Peak heat release rate : (0 ~ 5) MW Heat release rate : (0 ~ 5) MW Light transmission : (0 ~ 100) % Total hydrocarbon : (0 ~ 5 000) ppm Hydrogen : (0 ~ 5) %	SF-1	N
ANSI/CAN/UL-1973:2018	Electrical materials and components	Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications (Exception) 25. Vibration Test (LER Motive Applications) 26. Shock Test (LER Motive Applications) 27. Crush Test (LER Motive Applications) 33. Pressure Release Test 34. Start-To-Discharge Test 35. Thermal Cycling Test (LER Motive Applications) 36. Resistance to Moisture Test 37. Salt Fog Test 38. External Fire Exposure Test	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
ANSI/CAN/UL-1973:2018	Electrical materials and components	Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications (Exception) 27. Crush Test (LER Motive Applications) 33. Pressure Release Test 34. Start-To-Discharge Test 36. Resistance to Moisture Test 37. Salt Fog Test 38. External Fire Exposure Test	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
ANSI/CAN/UL-1973:2022	Electrical materials and components	Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications (Exception) 27. Electromagnetic Immunity Tests 28. Vibration Test (LER Motive and VAP Applications) 29. Shock Test (LER Motive and VAP Applications) 30. Crush Test (LER Motive and VAP Applications) 36. Pressure Release Test 37. Start-To-Discharge Test 38. Thermal Cycling Test (LER Motive and VAP Applications) 39. Resistance to Moisture Test 40. Salt Fog Test 41. External Fire Exposure for Projectile Hazards Test Annex B (Normative) Test program for sodium-beta battery cells Annex E (Normative) Cell Test Program	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
ANSI/CAN/UL-1973:2022	Electrical materials and components	Batteries for Use in Stationary and Motive Auxiliary Power Applications (Exception) 30. Crush Test (LER Motive and VAP Applications) 36. Pressure Release Test 37. Start-To-Discharge Test 39. Resistance to Moisture Test 40. Salt Fog Test 41. External Fire Exposure for Projectile Hazards Test	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
ANSI/CAN/UL/ULC 2271:2018	Electrical materials and components	Batteries for Use In Light Electric Vehicle (LEV) Applications (Exception) 30 Vibration Endurance Test 31 Shock Test 32 Crush Test 36 Roll Over Test 39 Water Exposure Test 40 Thermal Cycling Test	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
ANSI/CAN/UL/ULC 2271:2018	Electrical materials and components	Batteries for Use In Light Electric Vehicle (LEV) Applications (Exception) 32 Crush Test 36 Roll Over Test 39 Water Exposure Test	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
ANSI/CAN/UL/ULC 2271:2023	Electrical materials and components	Batteries for Use In Light Electric Vehicle (LEV) Applications (Exception) 30 Vibration Endurance Test 31 Shock Test 32 Crush Test 36 Roll Over Test 39 Water Exposure Test 40 Thermal Cycling Test	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
ANSI/CAN/UL/ULC 2271:2023	Electrical materials and components	Batteries for Use In Light Electric Vehicle (LEV) Applications (Exception) 32 Crush Test 36 Roll Over Test 39 Water Exposure Test	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
DNV-RU-SHIP Pt.6 Ch.2. Edition July 2021	Electrical materials and components	Part 6 Additional class notations Chapter 2 Propulsion, power generation and auxiliary systems (Exception) Section 2~13 Section 1 external short circuit impact thermal abuse forced discharge pressure test of coolant piping/hoses 5 Electrochemical capacitor system and installations	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
DNV-RU-SHIP Pt.6 Ch.2. Edition July 2021	Electrical materials and components	Part 6 Additional class notations Chapter 2 Propulsion, power generation and auxiliary systems (Exception) Section 2~13 Section 1 pressure test of coolant piping/hoses 5 Electrochemical capacitor system and installations	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
EN 60695-10-2: 2014	Electrical materials and components	Fire hazard testing - Part 10-2: Abnormal heat - Ball pressure test method	R = 2.5 mm, 20 N (50 ~ 200) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN 61960-3:2017	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications - Part 3: Prismatic and cylindrical lithium secondary cells, and batteries made from them	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
EN 61960-3:2017	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications - Part 3: Prismatic and cylindrical lithium secondary cells, and batteries made from them	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
EN 62133-1:2017	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications - Part 1: Nickel systems	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN 62133-2:2017	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications - Part 2: Lithium systems (Exception) 7.3.9 Design evaluation - Forced internal short-circuit (cells)	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
EN 62619:2017	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN 62619:2017	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications (Exception) 7.2.1 External short-circuit test (cell or cell block) 7.2.2 Impact test (cell or cell block) 7.2.4 Thermal abuse test (cell or cell block) 7.2.5 Overcharge test (cell or cell block) 7.2.6 Forced discharge test (cell or cell block) 7.3.2 Internal short-circuit test (cell)	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
EN 62620:2015	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for use in industrial applications	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN 62620:2015	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for use in industrial applications	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
EN 62660-1:2019	Electrical materials and components	Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 1: Performance testing	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
EN 62660-2:2019	Electrical materials and components	Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 2: Reliability and abuse testing	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
EN 62660-3:2016	Electrical materials and components	Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 3: Safety requirements (Exception) 6.4.4 Internal short circuit test	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
EN IEC 60086-4:2019	Electrical materials and components	Primary batteries - Part 4: Safety of lithium batteries	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN IEC 61960-4:2020	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications - Part 4: Coin secondary lithium cells, and batteries made from them	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
EN IEC 62619:2022	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN IEC 62619:2022	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications (Exception) 7.2.1 External short-circuit test (cell or cell block) 7.2.2 Impact test (cell or cell block) 7.2.4 Thermal abuse test (cell or cell block) 7.2.5 Overcharge test (cell or cell block) 7.2.6 Forced discharge test (cell or cell block) 7.3.2 Internal short-circuit test (cell)	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
EN IEC 62660-3:2022	Electrical materials and components	Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 3: Safety requirements (Exception) 6.4.4 Internal short circuit test Annex C Alternative internal short-circuit test(6.4.4.2.2)	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN IEC 63056:2020	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries for use in electrical energy storage systems (Exception) 7.3 Casing material of a battery system that can be transported for installation or maintenance	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
EN IEC 63056:2020	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries for use in electrical energy storage systems (Exception) 7.3 Casing material of a battery system that can be transported for installation or maintenance	(0 ~ 1 500) V d.c., (0 ~ 1 000) A d.c., (-40 ~ 180) ℃	SF-1	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN IEC 63057:2020	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium batteries for use in road vehicles not for the propulsion (Exception) 7.1.11 Crush [reasonably foreseeable misuse]	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN IEC 63057:2020	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium batteries for use in road vehicles not for the propulsion (Exception) 7.1.3 Mechanical shock [intended use] 7.1.4 Vibration [intended use] 7.1.5 Thermal cycling [intended use] 7.1.10 Thermal abuse [reasonably foreseeable misuse] 7.1.11 Crush [reasonably foreseeable misuse] 7.2.4 Vibration [intended use] 7.2.10 Thermal abuse [reasonably foreseeable misuse]	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
IEC 60086-4:2019, Edition 5.0	Electrical materials and components	Primary batteries - Part 4: Safety of lithium batteries	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
IEC 60695-10-2 :2014, Edition 3.0	Electrical materials and components	Fire hazard testing - Part 10-2: Abnormal heat - Ball pressure test method	R = 2.5 mm, 20 N (50 ~ 200) ℃	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 61960-3:2017, Edition 1.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications - Part 3: Prismatic and cylindrical lithium secondary cells, and batteries made from them	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
IEC 61960-3:2017, Edition 1.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications - Part 3: Prismatic and cylindrical lithium secondary cells, and batteries made from them	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
IEC 61960-4:2020, Edition 1.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications - Part 4: Coin secondary lithium cells, and batteries made from them	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 61960:2011, Edition 2.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
IEC 62133-1:2017, Edition 1.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications - Part 1: Nickel systems	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
IEC 62133-2:2017, Edition 1.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications - Part 2: Lithium systems (Exception) 7.3.9 Design evaluation - Forced internal short-circuit (cells)	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 62133-2:2017/AMD1:2021	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications - Part 2: Lithium systems (Exception) 7.3.9 Design evaluation - Forced internal short-circuit (cells)	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
IEC 62133:2012, Edition 2.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications (Exception) 8.3.9 Design evaluation - Forced internal short-circuit (cells)	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 62619:2017, Edition 1.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
IEC 62619:2017, Edition 1.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications (Exception) 7.2.1 External short-circuit test (cell or cell block) 7.2.2 Impact test (cell or cell block) 7.2.4 Thermal abuse test (cell or cell block) 7.2.5 Overcharge test (cell or cell block) 7.2.6 Forced discharge test (cell or cell block) 7.3.2 Internal short-circuit test (cell)	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 62619:2022, Edition 2.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
IEC 62619:2022, Edition 2.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications (Exception) 7.2.1 External short-circuit test (cell or cell block) 7.2.2 Impact test (cell or cell block) 7.2.4 Thermal abuse test (cell or cell block) 7.2.5 Overcharge test (cell or cell block) 7.2.6 Forced discharge test (cell or cell block) 7.3.2 Internal short-circuit test (cell)	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 62620:2014, Edition 1.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for use in industrial applications	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
IEC 62620:2014, Edition 1.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for use in industrial applications	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
IEC 62660-1:2010	Electrical materials and components	Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 1: Performance testing	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
IEC 62660-1:2018	Electrical materials and components	Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 1: Performance testing	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
IEC 62660-2:2010	Electrical materials and components	Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 2: Reliability and abuse testing	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 62660-2:2018	Electrical materials and components	Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 2: Reliability and abuse testing	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
IEC 62660-3:2016	Electrical materials and components	Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 3: Safety requirements (Exception) 6.4.4 Internal short circuit test	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
IEC 62660-3:2022, Edition 2.0	Electrical materials and components	Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 3: Safety requirements (Exception) 6.4.4 Internal short circuit test Annex C Alternative internal short-circuit test(6.4.4.2.2)	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 63056:2020, Edition 1.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries for use in electrical energy storage systems (Exception) 7.3 Casing material of a battery system that can be transported for installation or maintenance	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
IEC 63056:2020, Edition 1.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries for use in electrical energy storage systems (Exception) 7.3 Casing material of a battery system that can be transported for installation or maintenance	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 63057:2020, Edition 1.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium batteries for use in road vehicles not for the propulsion (Exception) 7.1.11 Crush [reasonably foreseeable misuse]	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 63057:2020, Edition 1.0	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium batteries for use in road vehicles not for the propulsion (Exception) 7.1.3 Mechanical shock [intended use] 7.1.4 Vibration [intended use] 7.1.5 Thermal cycling [intended use] 7.1.10 Thermal abuse [reasonably foreseeable misuse] 7.1.11 Crush [reasonably foreseeable misuse] 7.2.4 Vibration [intended use] 7.2.10 Thermal abuse [reasonably foreseeable misuse]	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
JIS C 62133-2:2020	Electrical materials and components	Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications-Part 2: Lithium systems (Exception) 7.3.9 Design evaluation - Forced internal short-circuit (cells)	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
KC 10031:2023 (10.19.2023.)	Electrical materials and components	Safety requirements for lithium secondary batteries for reuse of spent batteries	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
KC 62133-2 (2020-07)	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications - Part 2 : Lithium systems (Exception) 7.3.9 Design evaluation - Forced internal short-circuit (cells)	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KC 62619 (2019-10)	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes — Safety requirements for secondary Lithium cells and batteries, for use in industrial applications	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
KC 62619 (2019-10)	Electrical materials and components	산업용 리튬이차전지 안전 (Exception) 7.2.1 외부단락 시험 7.2.2 충돌 시험 7.2.4 고온 시험 7.2.5 과충전 시험 7.2.6 강제 방전 시험 7.3.2 내부단락 시험	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
KC 62619:2023-03-20	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes — Safety requirements for secondary Lithium cells and batteries, for use in industrial applications	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KC 62619:2023 -03-20	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications (Exception) 7.2.1 External short-circuit test (cell or cell block) 7.2.2 Impact test (cell or cell block) 7.2.4 Thermal abuse test (cell or cell block) 7.2.5 Overcharge test (cell or cell block) 7.2.6 Forced discharge test (cell or cell block) 7.3.2 Internal short-circuit test (cell)	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C IEC 60695-10-2:2001	Electrical materials and components	Fire hazard testing - Part 10-2: Guidance and test methods for the minimzation of the effects of abnormal heat on electrotechnical products involved in fires - Method for testing products made from non-metallic materials for resistance to heat using the ball pressure test	R = 2.5 mm, 20 N (50 ~ 200) ℃	BS	N
KS C IEC 61960-3:2017	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications - Part 3: Prismatic and cylindrical lithium secondary cells, and batteries made from them	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C IEC 61960-3:2017	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications - Part 3: Prismatic and cylindrical lithium secondary cells and batteries made from them	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
KS C IEC 62619:2022	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes — Safety requirements for secondary Lithium cells and batteries, for use in industrial applications	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C IEC 62619:2022	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications (Exception) 7.2.1 External short-circuit test (cell or cell block) 7.2.2 Impact test (cell or cell block) 7.2.4 Thermal abuse test (cell or cell block) 7.2.5 Overcharge test (cell or cell block) 7.2.6 Forced discharge test (cell or cell block) 7.3.2 Internal short-circuit test (cell)	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
KS C IEC 62620:2014	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes — Secondary lithium cells and batteries for use in industrial applications	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C IEC 62620:2014	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for use in industrial applications	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
KS C IEC 62660-1:2018	Electrical materials and components	Secondary lithium-ion cells for the propulsion of electric road vehicles — Part 1: Performance testing	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
KS C IEC 62660-2:2018	Electrical materials and components	Secondary Batteries for the Propulsion of Electric Road Vehicles - Part 2 : Reliability and abuse testing for lithium-ion cells	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
KS C IEC 62660-3:2022	Electrical materials and components	Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 3: Safety requirements (Exception) 6.4.4 Internal short circuit test	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C IEC 63056:2020	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries for use in electrical energy storage systems (Exception) 7.3 Casing material of a battery system that can be transported for installation or maintenance	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
KS C IEC 63056:2020	Electrical materials and components	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries for use in electrical energy storage systems (Exception) 7.3 Casing material of a battery system that can be transported for installation or maintenance	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
Ministerial Ordinance 1, Appendix 9:2008	Electrical materials and components	Technical requirement by the Ministerial Ordinance for electrical appliance Ministerial Ordinance 1, Appendix 9 Lithium ion secondary batteries	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
UL 1642:2015	Electrical materials and components	Lithium Batteries	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
UL 1642:2020	Electrical materials and components	Lithium Batteries	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
UL 1642:2022	Electrical materials and components	Lithium Batteries	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
UL 2054:2011	Electrical materials and components	Household and Commercial Batteries	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
UL 2054:2021	Electrical materials and components	Household and Commercial Batteries	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
UL 2580:2022	Electrical materials and components	Batteries for Use In Electric Vehicles (Exception) 34 Rotation Test 38 Crush Test 40 Salt Spray Test 42 External Fire Exposure Test	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
UL 2580:2022	Electrical materials and components	Batteries for Use In Electric Vehicles (Exception) 34 Rotation Test 38 Crush Test 40 Salt Spray Test 42 External Fire Exposure Test ANNEX B (NORMATIVE) Test Program for Secondary Lithium Cells ANNEX D (NORMATIVE) Alternative Test Program for Secondary Lithium Cells	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N
UL 62133-1:2020	Electrical materials and components	Secondary Cells and Batteries Containing Alkaline or Other Non-Acid Electrolytes - Safety Requirements for Portable Sealed Secondary Cells, and for Batteries Made from Them, for Use in Portable Applications - Part 1: Nickel Systems	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
UL 62133-2:2020	Electrical materials and components	Standard for Safety for Secondary Cells and Batteries Containing Alkaline or Other Non-Acid Electrolytes - Safety Requirements for Portable Sealed Secondary Cells, and for Batteries Made from Them, for Use in Portable Applications - Part 2: Lithium Systems (Exception) 7.3.9 Design evaluation - Forced internal short-circuit (cells)	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N
UL 62133:2017	Electrical materials and components	Standard For Safety For Secondary Cells And Batteries Containing Alkaline Or Other Non-Acid Electrolytes - Safety Requirements For Portable Sealed Secondary Cells, And For Batteries Made From Them, For Use In Portable Applications (Exception) 8.3.9 Design evaluation - Forced internal short-circuit (cells)	(0 ~ 500) V d.c., (0 ~ 800) A d.c., (-70 ~ 180) ℃	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
MOLIT Notice No.2023-481 (08.22.2023.)	Electrical materials and components	Enforcement regulations on performance and standards for automobiles and automobile parts [Appendix 1] No. 48 Drive Battery Safety Test 48.7.4 External short circuit test 48.7.5 Overcharge test 48.7.6 Overdischarge test 48.7.7 Overheating protection Test 48.7.9 Immersion test [Appendix 1] Article 48-2 Safety test of drive shaft battery of two-wheeled vehicle 48 2.7.4 External short circuit test 48-2.7.5 Overcharge test 48-2.7.6 Overdischarge test 48 2.7.7 Overheating protection Test 48.2.7.9 Immersion test 48.2.7.10 Drop test	(0 ~ 1 500) Vd.c., (0 ~ 1 000) Ad.c., (-40 ~ 80) ℃	SF-1	N

03. Electrical Testing

03.011 EMC (Electromagnetic Compatibility)

Test method	Materials Products	Standard designation	Test range	Site	Field testing
ANSI C63.4a:2017	Electrical materials and components	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 30 MHz ~ 40 GHz CE: 9 kHz ~30 MHz	BS	N
AS/NZS 61000.6.3:2021	Electrical machinery for industries	Electromagnetic compatibility (EMC) -Part 6.3 : Generic standards -Emission standard for residential, commercial and light -industrial environments (Exception) -(0 kHz ~ 2 kHz)	RE : 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
AS/NZS 61000.6.4:2012	Electrical machinery for industries	Electromagnetic compatibility (EMC) -Part 6.4 : Generic standards -Emission standard for industrial environments (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase, -(0 kHz ~ 2 kHz)	RE : 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz	BS	N
AS/NZS CISPR 11:2017	Electrical machinery for industries	Industrial, Scientific and medical (ISM) radio frequency equip ment-Electromagnetic disturbance characteristics -Limits and methods of measurement (Exception) 3 phase equipment Equipment input current exceed 16 A per phase	RE: 9 kHz ~ 18 GHz CE: 9 kHz ~ 30 MHz	BS	N
AS/NZS CISPR 15:2017	Lighting devices	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment (Exception) 7.Method of insertion loss measurement	RE: 9 kHz ~ 300 MHz CE: 9 kHz ~ 30 MHz	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
CISPR 11:2024	Electrical machinery for industries	Amendment 2 - Industrial scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 30 MHz ~ 18 GHz CE: 9 kHz ~ 30 MHz	BS	N
CISPR 14-1:2020	Electrical machinery for households	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission	RE: 9 kHz ~ 6 GHz CE: 9 kHz ~ 30 MHz DP: 30 MHz ~ 300 MHz	BS	N
CISPR 14-2: 2020	Electrical machinery for households	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity - Product family standard	ESD: ±8 kV RS: 80 MHz ~ 1 GHz, 3V/m EFT: ±1 kV SURGE: ±2 kV CS: 150 kHz ~ 230 MHz, 3V V-DIP: max 100 %	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
CISPR 15:2018	Lighting devices	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment (Exception) 7. Method of insertion loss measurement 3m,4m loop Antenna test method	RE: 9 kHz ~ 300 MHz CE: 9 kHz ~ 30 MHz	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
CISPR 25:2021	Electrical materials and components	Vehicles, boats and internal combustion engines-Radio disturbance characteristics- Limits and methods of measurement for the protection of on-board receivers (Exception) 5.Measurement of emissions received by an antenna on the same vehicle 6.6 Radiated emissions from components/modules-TEM cell methods 6.7 Radiated emissions from components/modules -Stripline method Annex I Test methods for shielded power supply systems for high voltages in electric and hybrid vehicles	RE: 150 kHz ~ 2.5 GHz CE(Voltage method) : 150 kHz~108 MHz CE(Current Probe Method) : 150 kHz~108 MHz	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
CISPR 32:2015/ AMD1:2019	Wired/wireless communication devices	Electromagnetic compatibility of multimedia equipment - Emission requirements (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30MHz	BS	N
CISPR 35:2016	Wired/wireless communication devices	Electromagnetic compatibility of multimedia equipment - Immunity requirements (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	SD: ±8 kV RS: 80 MHz ~ 6 GHz, 3 V/m EFT: ±1 kV, Surge: ±4 kV CS: 150 kHz ~ 30 MHz, 3V MF: 1 A/m V-DIP: max 100 %	BS	N
DNVGL-CG-0339 Edition August 2021	Electrical materials and components	Environmental test specification for electrical, electronic and programmable equipment and systems (Exception) 14.4 Conducted low frequency immunity test	CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2 GHz, 10 V/m EFT: ±2 kV SURGE: ±1 kV CS: 150 kHz ~ 80 MHz, 10 V/m	BS	N
ECE R-10.06:2019	Electrical materials and components	Uniform provisions concerning the approval of vehicles with regard to electromagnetic	RE : 30 MHz ~ 1 GHz BCI : 20 MHz ~ 80 MHz, 60 mA RI : 80 MHz ~ 2 GHz, 30 V/m	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
		compatibility (Exception) Annex 4 - Method of measurement of radiated broadband electromagnetic emissions form vehicles Annex 5 - Method of measurement of radiated narrowband electromagnetic emissions from vehicles Annex 6 - Method of testing for immunity of vehicles to electromagnetic radiation Annex 9 - Appendix 1 800 mm Stripline testing Annex 9 - Appendix 2 TEM cell Testing Annex 11 Method(s) of testing for emission of harmonics generated on AC power lines from vehicle Annex 12 Method(s) of testing for emission of voltage changes, voltage fluctuations and flicker on AC power lines from vehicle Annex 13 Method(s) of testing	CTE: 12, 24 V system CTI: Pulse 1, 2a, 2b, 3a, 3b, 4		

Test method	Materials Products	Standard designation	Test range	Site	Field testing
		for emission of radiofrequency conducted disturbances on AC or DC power lines from vehicles Annex 14 Method(s) of testing for emission of radiofrequency conducted disturbances on network and telecommunication access from vehicles Annex 15 Method of testing for immunity of vehicles to electrical fast transient/burst disturbances conducted along AC and DC power lines Annex 16 Method of testing for immunity of vehicles to surges conducted along AC and DC power lines			

Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN 50130-4:2011/A1:2014	Wired/wireless communication devices	Alarm systems - Part 4: Electromagnetic compatibility - Product family standard: Immunity requirements for components of fire, intruder, hold up, CCTV, access control and social alarm systems	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 100 MHz, 10V V-DIP: max 100 %	BS	N
EN 50498:2010	Electrical materials and components	Electromagnetic compatibility (EMC) - Product family standard for aftermarket electronic equipment in vehicles	RE : 30 MHz ~ 1 GHz CTE: 12, 24 V system CTI:Pulse 1, 2a, 2b,3a/3b, 4	BS	N
EN 55011:2016/A1:2017	Electrical machinery for industries	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 30 MHz ~ 18 GHz CE: 9 kHz ~ 30 MHz	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN 55032:2015	Wired/wireless communication devices	Electromagnetic compatibility of multimedia equipment - Emission Requirements (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz	BS	N
EN 55035:2017	Wired/wireless communication devices	Electromagnetic compatibility of multimedia equipment - Immunity requirements (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3V/m EFT: ±1 kV, Surge: ±4 kV CS: 150 kHz ~ 30 MHz, 3V MF: 1 A/m V-DIP: max 100 %	BS	N
EN 55103-1:2009/A1:2012	Wired/wireless communication devices	Electromagnetic compatibility - Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use - Part 1: Emissions	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN 55103-2:2009	Electrical machinery for industries	Electromagnetic compatibility — Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use — Part 2: Immunity	ESD: ± 8 kV RS: 80 MHz ~ 2.7 GHz, 10V/m EFT: ±2 kV SURGE: ±2 kV CS: 150 kHz ~ 230 MHz, 10V M/F: 10 A/m V-DIP: (0 ~ 100) %	BS	N
EN 60601-1-2:2015	Medical devices	Medical electrical equipment - Part 1-2: General requirements for basic safety and essential performance - Collateral Standard: Electromagnetic disturbances - Requirements and tests (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 0.15 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 10V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 10V V-DIP: max 100 % M/F: 3 A/m	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN 61000-4-2:2009	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	ESD: max ±30 kV	BS	N
EN 61000-4-4:2012	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	EFT: max ±4 kV	BS	N
EN 61000-4-5:2014	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	SURGE: max ±4 kV	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN 61000-4-8:2010	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	MF: max 30 A/m (Continuous field)	BS	N
EN 61204-3:2018	Electrical materials and components	Low-voltage switch mode power supplies - Part 3: Electromagnetic compatibility (EMC) (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 10V V-DIP: max 100 % MF:30 A/m	BS	N
EN 61326-1:2013	Measuring instruments	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements (Exception) 3 phase equipment -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10 V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 30 A/m	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN IEC 55014-1:2021	Electrical machinery for households	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission	RE: 9 kHz ~ 6 GHz CE: 9 kHz ~ 30 MHz DP: 30 MHz ~ 300 MHz	BS	N
EN IEC 55014-2:2021	Electrical machinery for households	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity - Product family standard	ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3V/m EFT: ±1 kV SURGE: ±2 kV CS: 150 kHz ~ 230 MHz, 3V V-DIP: max 100 %	BS	N
EN IEC 55015:2019/A11:2020	Lighting devices	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment (Exception) 7. Method of insertion loss measurement 3m,4m loop Antenna test method	RE: 9 kHz ~ 1 000 MHz CE: 9 kHz ~ 30 MHz	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN IEC 61000-4-11:2020	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase	V-DIP: max 100 %	BS	N
EN IEC 61000-4-3:2020	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RS: 80 MHz ~ 6 GHz, 10 V/m	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN IEC 61000-4-6:2023	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	CS: 150 kHz ~ 230 MHz, 10 V	BS	N
EN IEC 61000-6-1:2019	Electrical machinery for households	Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3 V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 3 A/m	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN IEC 61000-6-2:2019	Electrical machinery for industries	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 10V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 10V V-DIP: max 100 % M/F: 30 A/m	BS	N
EN IEC 61000-6-3:2021	Electrical machinery for households	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments (Exception) -(0 kHz ~ 2 kHz)	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz	BS	N
EN IEC 61000-6-4:2019	Electrical machinery for industries	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN IEC 61326-1:2021	Measuring instruments	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-1:Particular requirements - Test configurations, operational conditions and performance criteria for sensitive test and measurement equipment for EMC unprotected applications	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10 V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 30 A/m	BS	N
EN IEC 61326-2-1:2021	Measuring instruments	Electrical equipment for measurement, control and laboratory use — EMC requirements — Part 2-1: Particular requirements — Test configurations, operational conditions and performance criteria for sensitive test and measurement equipment for EMC unprotected applications (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10 V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 30 A/m	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN IEC 61326-2-2:2021	Wired/wireless communication devices	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-2: Particular requirements - Test configurations, operational conditions and performance criteria for portable test, measuring and monitoring equipment used in low-voltage distribution systems (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10 V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 30 A/m	BS	N
EN IEC 61326-2-3:2021	Measuring instruments	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-3:Particular requirements-Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10 V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 30 A/m	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN IEC 61326-2-4:2021	Measuring instruments	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-4: Particular requirements - Test configurations, operational conditions and performance criteria for insulation monitoring devices according to IEC 61557-8 and for equipment for insulation fault location according to IEC 61557-9	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10 V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 30 A/m	BS	N
EN IEC 61326-2-5:2021	Measuring instruments	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-5: Particular requirements - Test configurations, operational conditions and performance criteria for field devices with field bus interfaces according to IEC 61784-1	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10 V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 30 A/m	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN IEC 61326-2-6:2021	Measuring instruments	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-6: Particular requirements - In vitro diagnostic (IVD) medical equipment	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10 V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 3 A/m	BS	N
EN IEC 61547:2023	Lighting devices	Equipment for general lighting purposes - EMC immunity requirements (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	ESD: ±15 kV RS: 80 MHz~1 GHz, 3 V/m EFT: ±1 kV Surge: ±4 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 3 A/m	BS	N
EN IEC 62040-2:2018	Electrical materials and components	Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 9 kHz ~ 1 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 1 GHz, 10V/m EFT: ±4 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 10V M/F: 30 A/m V-DIP: max 100 %	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
ETSI EN 300 386 V2.2.1(2022-09)	Wired/wireless communication devices	Electromagnetic compatibility and Radio Spectrum Matters (ERM) : Telecommunication network equipment Electromagnetic compatibility (EMC) requirements	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 10V/m EFT: ±1 kV SURGE: ±2 kV CS: 150 kHz ~ 80 MHz, 3V V-DIP: max 100 %	BS	N
ETSI EN 301 489-1 V2.2.3 (2019-11)	Wired/wireless communication devices	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3V V-DIP: max 100 %	BS	N
ETSI EN 301 489-17 V3.2.4 (2020-09)	Wired/wireless communication devices	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3V V-DIP: max 100 %	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
ETSI EN 301 489-19 V2.2.1 (2022-09)	Wired/wireless communication devices	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 19: Specific conditions for Receive Only Mobile Earth Stations (ROMES) operating in the 1,5 GHz band providing data communications and GNSS receivers operating in the RNSS band (ROGNSS) providing positioning, navigation, and timing data; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3V V-DIP: max 100 %	BS	N
ETSI EN 301 489-3 V2.3.2 (2023-01)	Wired/wireless communication devices	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3V V-DIP: max 100 %	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
ETSI EN 301 489-5 V2.2.1 (2019-04)	Wired/wireless communication devices	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 5: Specific conditions for Private land Mobile Radio (PMR) and ancillary equipment (speech and non-speech) and Terrestrial Trunked Radio (TETRA); Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3V V-DIP: max 100 %	BS	N
ETSI EN 301 489-50 V2.3.1 (2021-03)	Wired/wireless communication devices	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 50: Specific conditions for Cellular Communication Base Station (BS), repeater and ancillary equipment; Harmonised Standard for ElectroMagnetic Compatibility	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3V V-DIP: max 100 %	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
ETSI EN 301 489-52 V1.2.1 (2021-11)	Wired/wireless communication devices	Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 52: Specific conditions for Cellular Communication Mobile and portable (UE) radio and ancillary equipment; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3V V-DIP: max 100 %	BS	N
ETSI EN 301 489-9 V2.1.1	Wired/wireless communication devices	(EMC) standard for radio equipment and services; Part 9: Specific conditions for wireless microphones, similar Radio Frequency (RF) audio link equipment, cordless audio and in-ear monitoring devices	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3V V-DIP: max 100 %	BS	N
FCC PART 15:2018	Wired/wireless communication devices	Radio frequency devices Subpart B-Unintentional Radiators	RE: 30 MHz ~ 40 GHz CE: 150 kHz ~ 30 MHz	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
FCC PART 18:2018	Electrical machinery for industries	Industral, scientific and medical equipment (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase,	RE: 9 kHz ~ 40 GHz CE: 9 kHz ~ 30 MHz	BS	N
ICES-001 Issue 5:2020	Electrical machinery for industries	Spectrum Management and Telecommunications Interference - Causing Equipment Standard Industrial, scientific and medical radio-frequency Generators	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz	BS	N
ICES-003 Issue 7:2020	Wired/wireless communication devices	Spectrum Management and Telecommunications Interference-Causing Equipment Standard Digital Apparatus	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz	BS	N
IEC 60571:2012	Electrical materials and components	Railway applications - Electronic equipment used on rolling stock (Accept only) -12.2.7 Supply over voltage -12.2.8 electrostatic discharge(ESD) and transient burst susceptibility test -12.2.9 Radio frequency test	ESD: ±30 kV RS:80 MHz ~ 6 GHz, 10 V/m EFT: ±4 kV	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 60601-1-2: 2014	Medical devices	Medical electrical equipment - Part 1-2: General requirements for basic safety and essential performance - Collateral Standard: Electromagnetic disturbances - Requirements and tests (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 0.15 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 10V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 10V V-DIP: max 100 % M/F: 3 A/m	BS	N
IEC 61000-4-11 :2020	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase	V-DIP: max 100 %	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 61000-4-2: 2008	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	ESD: max ±30 Kv	BS	N
IEC 61000-4-3: 2020	Electrical materials and components	Amendment 2 - Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RS: 80 MHz ~ 6 GHz, 10 V/m	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 61000-4-4: 2012	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	EFT: max ±4 kV	BS	N
IEC 61000-4-5: 2014/AMD1:2017	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	SURGE: max ±4 kV	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 61000-4-6: 2023	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	CS: 150 kHz ~ 230 MHz, 10 V	BS	N
IEC 61000-4-8: 2009	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	MF: max 30 A/m (Continuous field)	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 61000-6-1: 2016	Electrical machinery for households	Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity standard for residential, commercial and light-industrial environments (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3 V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 3 A/m	BS	N
IEC 61000-6-2: 2016	Electrical machinery for industries	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 10V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 10V V-DIP: max 100 % M/F: 30 A/m	BS	N
IEC 61000-6-3: 2020	Electrical machinery for households	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for equipment in residential environments	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 61000-6-4: 2018	Electrical machinery for industries	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments (Exception) 3 phase equipment Equipment input current exceed 16 A per phase (Exception) -(0 kHz ~ 2 kHz)	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz	BS	N
IEC 61326-1:2020 RLV	Measuring instruments	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10 V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 30 A/m	BS	N
IEC 61326-2-1: 2020	Measuring instruments	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1:General requirements	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10 V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 30 A/m	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 61326-2-2: 2020	Measuring instruments	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-2:Particular requirements - Test configuration, operational conditions and performance criteria for portable test, measuring and monitoring equipment used in low-voltage distribution systems	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10 V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 30 A/m	BS	N
IEC 61326-2-3: 2020	Measuring instruments	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-3:Particular requirements - Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10 V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 30 A/m	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 61326-2-4: 2020	Measuring instruments	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-4:Particular requirements-Test configuration, operational conditions and performance criteria for insulation monitoring devices according to IEC 61557-8 and for equipment for insulation fault location according to IEC 61557-9	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10 V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 30 A/m	BS	N
IEC 61326-2-5: 2020	Measuring instruments	Electrical equipment for Measurement, control and laboratory use - EMC requirements - Part 2-5: Particular requirements - Test configuration, operational conditions and performance criteria for field devices with field bus interfaces according to IEC 61784-1	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10 V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 30 A/m	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 61326-2-6: 2020	Measuring instruments	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-6:Particular requirements - In vitro diagnostic (IVD) medical equipment	RE: 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 2.7 GHz, 10 V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 3 A/m	BS	N
IEC 61547:2020	Lighting devices	Equipment for general lighting purposes. EMC immunity requirements	ESD: ±8 kV RS: 80 MHz~1 GHz, 3 V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 3 A/m	BS	N
IEC 62233:2005	Electrical machinery for households	Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure	1 kHz ~ 400 kHz	BS	N
IEC 62236-1:2018	Electrical materials and components	Railway applications - Electromagnertic compatibility - Part 1: General	General	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 62236-3-2: 2018	Electrical materials and components	Railway applications - Electromagnertic compatibility - Part 3-2: Rolling stock - Apparatus (Exception) THD: 50 Hz ~ 2 kHz	CE: 150 kHz ~ 30 MHz RE: 30 MHz ~ 6 000 MHz ESD: ±8 kV RS: 20 V/m (80 MHz ~ 800 MHz) 20 V/m (800 MHz ~ 1 000 MHz) 10 V/m (1 400 MHz ~ 2 000 MHz) 5 V/m (2 000 MHz ~ 2 700 MHz) 3 V/m (5 100 MHz ~ 6 000 MHz) EFT: ±2 kV SURGE: ±2 kV CS:10 V (150 kHz ~ 80 MHz)	BS	N
IEC 62236-4:2018	Electrical materials and components	Railway applications - Electromagnertic compatibility - Part 4: Emission and immunity of the signalling and telecommunications apparatus (Exception) PFM: 300 A/m	CE: 150 kHz ~ 30 MHz RE: 30 MHz ~ 6 000 MHz ESD: ±8 kV RS: 10 V/m (80 MHz ~ 800 MHz) 20 V/m (800 MHz ~ 1 000 MHz) 10 V/m (1 400 MHz ~ 2 000 MHz) 5 V/m (2 000 MHz ~ 2 700 MHz) 3 V/m (5 100 MHz ~ 6 000 MHz) EFT: ±2 kV SURGE: ±2 kV CS:10 V (150 kHz ~ 80 MHz)	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 62236-5:2018	Electrical materials and components	Railway applications - Electromagnertic compatibility - Part 5: Emission and immunity of fixed power supply installations and apparatus (Exception) RE: 30 MHz ~ 6 000 MHz PFM: 300 A/m Damped oscillatory voltage(oscillatory waves): ±2	CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 10 V/m (80 MHz ~ 800 MHz) 20 V/m (800 MHz ~ 1 000 MHz) 10 V/m (1 400 MHz ~ 2 000 MHz) 5 V/m (2 000 MHz ~ 2 700 MHz) 3 V/m (5 100 MHz ~ 6 000 MHz) EFT: ±4 kV SURGE: ±4 kV CS: 10 V (150 kHz ~ 80 MHz) 5 kV	BS	N
ISO 10605:2023	Electrical materials and components	Road vehicles — Test methods for electrical disturbances from electrostatic discharge	ESD: ±30 kV	BS	N
ISO 11452-1:2015	Electrical materials and components	Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy Part 1: General principles and terminology	General	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
ISO 11452-2:2019	Electrical materials and components	Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy - Part 2: Absorber-lined shielded enclosure (Exception) 8. The setup for DUT powered by a shielded power system	RI : 80 MHz ~ 2 GHz, 25 V/m	BS	N
ISO 11452-4:2020	Electrical materials and components	Road vehicles-Component test methods for electrical disturbances from narrowband radiated electromagnetic energy Part4:Harness excitation methods (Exception) 8. The setup for DUT powered by a shielded power system	BCI : 20 MHz ~ 80 MHz, 60 mA	BS	N
ISO 16750-1:2023	Electrical materials and components	Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 1: General	General	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
ISO 16750-2:2023	Electrical materials and components	Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 2: Electrical loads	12 V, 24 V System	BS	N
ISO 7637-1:2023	Electrical materials and components	Road vehicles — Electrical disturbances from conduction and coupling — Part 1: Definitions and general considerations	General	BS	N
ISO 7637-2:2011	Electrical materials and components	Road vehicles-Electrical disturbances from conduction and coupling Part 2:Electrical transient conduction along supply lines only	12 V, 24 V System Pulse 1, 2a, 2b, 3a, 3b	BS	N
ISO 7637-3:2016	Electrical materials and components	Road vehicles - Electrical disturbances from conduction and coupling Part 3:Electrical transient transmission by capacitive and inductive coupling via lines other than supply lines	12 V, 24 V, 42 V System Pulse a, b	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C 9040-2:2017	Electrical materials and components	Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 9 kHz ~ 1 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 1 GHz, 10V/m EFT: ±4 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 10V M/F: 30 A/m V-DIP: max 100 %	BS	N
KS C 9547:2020	Lighting devices	Equipment for general lighting purposes - EMC immunity requirements (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	ESD : ±8 kV RS: 80 MHz ~ 1 GHz, 3 V/m EFT : ±1 kV SURGE : ±2 kV CS : 150 kHz ~ 80 MHz, 3 V M/F : 3 A/m V-DIP : max 100 %	BS	N
KS C 9610-4-11 :2020	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	V-DIP: max 100 %	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C 9610-4-2:2017	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	ESD: ±30 kV	BS	N
KS C 9610-4-3:2017	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RS: 80 MHz ~ 6 GHz, 10 V/m	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C 9610-4-4:2020	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	EFT: max ±4 kV	BS	N
KS C 9610-4-5:2023	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	SURGE: max ±4 kV	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C 9610-4-6:2020	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	CS: 150 kHz ~ 230 MHz, 10 V	BS	N
KS C 9610-4-8:2017	Electrical materials and components	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	MF: max 30 A/m (Continuous field)	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C 9610-6-1:2019	Electrical machinery for households	Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3 V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3 V V-DIP: max 100 % M/F: 3 A/m	BS	N
KS C 9610-6-2:2019	Electrical machinery for industries	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 10 V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 10V V-DIP: max 100 % M/F: 30 A/m	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C 9610-6-3:2023	Electrical machinery for industries	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz	BS	N
KS C 9610-6-4:2022	Electrical machinery for industries	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 30 MHz ~ 18 GHz CE: 150 kHz ~ 30 MHz	BS	N
KS C 9811:2019	Electrical machinery for industries	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement (Exception) -6.2.2 types 2 of 30 m measurement method	RE: 30 kHz ~ 6 GHz CE: 9 kHz ~ 30 MHz	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C 9814-1:2022	Electrical machinery for households	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission	RE: 30 MHz ~ 6 GHz CE : 9 kHz ~ 30 MHz	BS	N
KS C 9814-2:2022	Electrical machinery for households	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity - Product family standard	ESD : ±30 kV RS : 80 MHz ~ 6 GHz, 10 V/m EFT : ±2 kV SURGE : ±2 kV CS : 150 kHz ~ 230 MHz, 3 V M/F : 10 A/m V-DIP : max 100 %	BS	N
KS C 9815:2023	Lighting devices	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment (Exception) 7. Method of insertion loss measurement	RE: 9 kHz ~ 1 000 MHz CE: 9 kHz ~ 30 MHz	BS	N
KS C 9832:2023	Wired/wireless communication devices	Electromagnetic compatibility of multimedia equipment - Emission Requirements (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C 9835:2019	Wired/wireless communication devices	Electromagnetic compatibility of multimedia equipment - Immunity requirements (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	ESD: ± 8 kV RS: 80 MHz ~ 6 GHz, 3V/m EFT: ±1 kV, Surge: ±4 kV CS: 150 kHz ~ 30 MHz, 3V MF: 1 A/m V-DIP: max 100 %	BS	N
KS C 9990:2017	Electrical materials and components	Electromagnetic compatibility (EMC) test method for automobiles and internal combustion engine driving equipment	RE : 30 MHz ~ 1 GHz BCI: 20 MHz ~ 80 MHz RS: 80 MHz ~ 2 GHz CTE: 12, 24 V system CTI: Pulse 1, 2a, 2b, 3a, 3b, 4	BS	N
KS C IEC 60571:2020	Electrical materials and components	Railway Applications - Electronic Devices for Railway Vehicles (Only the following items are accepted) -12.2.6 Electrostatic discharge -12.2.7 Transient current vs. autonomy test -12.2.8 Radio Interference Test	ESD: ±30 kV RS:80 MHz ~ 6 GHz, 10 V/m EFT: ±4 kV	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C IEC 60601-1-2:2012	Medical devices	Medical electrical equipment - Part 1-2: General requirements for basic safety and essential performance - Collateral Standard: Electromagnetic disturbances - Requirements and tests (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	RE: 0.15 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 10V/m EFT: ±2 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 10V V-DIP: max 100 % M/F: 3 A/m	BS	N
KS C IEC 61204-3:2003	Electrical materials and components	Low-voltage switch mode power supplies - Part 3: Electromagnetic compatibility (EMC) (Exception) -3 phase equipment -Equipment input current exceed 16 A per phase	ESD : ±8 kV RS: 80 MHz ~ 1 GHz, 10 V/m EFT : ±4 kV SURGE : ±2 kV CS : 150 kHz ~ 80 MHz, 10 V M/F : 30 A/m V-DIP : max 100 %	BS	N
KS X 3124:2020	Wired/wireless communication devices	Common EMC test methods for specific low power radio equipment	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3V V-DIP: max 100 %	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS X 3125:2020	Wired/wireless communication devices	EMC test method for specific low power radio equipmetn	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3V V-DIP: max 100 %	BS	N
KS X 3126:2020	Wired/wireless communication devices	EMC test methods for specific low power radio equipment for wireless data communication systems	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3V V-DIP: max 100 %	BS	N
KS X 3127:2014	Wired/wireless communication devices	EMC test method for simple radio station equipmetn	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3V V-DIP: max 100 %	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS X 3130:2014	Wired/wireless communication devices	EMC Test Methods for Specific Low Power Radio Equipment for Transmission of Audio and Sound Signal	RE: 30 MHz ~ 6 GHz CE: 150 kHz ~ 30 MHz ESD: ±8 kV RS: 80 MHz ~ 6 GHz, 3V/m EFT: ±1 kV Surge: ±2 kV CS: 150 kHz ~ 80 MHz, 3V V-DIP: max 100 %	BS	N
VCCI 32-1:2018	Wired/wireless communication devices	Rules for voluntary control measures-Technical	RE : 30 MHz ~ 6 GHz CE: 9 kHz ~ 30 MHz	BS	N

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03. Electrical Testing

03.014 Environmental and Reliability

Test method	Materials Products	Standard designation	Test range	Site	Field testing
DNV-CG-0339: 2021	Ship	Environmental test specification for electrical, electronic and programmable equipment and systems 6. Vibration tests 7. Dry heat test 8. Damp heat test 9. Cold test 12. Insunation test 13. High voltage test	Vibration frequency: (2 ~ 100) Hz Vibration acceleration: (1 ~ 50) ㎨ Temperature: (-30 ~ 75) ℃ Humidity: (50 ~ 95) % R.H. Insulation Resistance: DC (250 ~ 500) V Withstand voltage: Max. 3 000 V a.c.	BS	N
EN 50155:2017	Railroad vehicles and related products	Railway applications-Rolling stock-Electronic equipment 13.4.10 salt mist test	Salt : 35 ˚C, Nacl (5 ± 1) %	SF-2	N
EN 50155:2017	Railroad vehicles and related products	Railway applications-Rolling stock-Electronic equipment 13.4.4 Low temperature start-up test 13.4.5 Dry heat test 13.4.6 :Low temperature storage test 13.4.7 Cyclic damp heat test 13.4.9 Insulation test 13.4.11 Vibration and Shock test	Temperature: (-40 ~ 90) ℃ Humidity: (50 ~ 95) % R.H. Vibration frequency: (1 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 980) ㎨ Withstand voltage: Max. 3 000 V Insulation resistance: DC 500 V	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN 50155:2021	Railroad vehicles and related products	Railway applications-Rolling stock-Electronic equipment 13.4.13 salt mist test	Salt : 35 °C, Nacl (5 ± 1) %	SF-2	N
EN 50155:2021	Railroad vehicles and related products	Railway applications-Rolling stock-Electronic equipment 13.4.4 Low temperature start-up test 13.4.5 Dry heat test 13.4.6 Low temperature storage test 13.4.7 Insulation test 13.4.8 Cyclic damp heat test 13.4.10 Shock and vibration test 13.4.12 Rapid temperature variation test	Temperature: (-40 ~ 90) ℃ Humidity: (50 ~ 95) % R.H. Vibration frequency: (1 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 980) ㎨ Withstand voltage: Max. 3 000 V Insulation resistance: DC 500 V	BS	N
EN 60068-2-14: 2009	Electrical machinery for industries	Environmental Testing - Part2-14: Tests-Test N: Change of temperature (Exception) Test Nc Rapid change of temperature, two-fluid-bath method	Temperature: (-65 ~ 200) ℃	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
EN 60068-2-1:2007	Electrical machinery for industries	Environmental Testing - Part2-1: Tests-Test A: Cold	Temperature: (-70 ~ 10) ℃	BS	N
EN 60068-2-2:2007	Electrical machinery for industries	Environmental Testing - Part2-2: Tests-Test A: Dry heat	Temperature: (25 ~ 150) ℃	BS	N
EN 60068-2-30:2005	Electrical machinery for industries	Environmental Testing - Part 2-30: Tests - Test Db: Damp heat cyclic(12 h + 12 h cycle)	Temperature: (20 ~ 60) ℃ Humidity: (50 ~ 95) % R.H.	BS	N
EN 61373:2010	Railroad vehicles and related products	Railway applications - Rolling stock equipment - Shock and vibration tests	Vibration frequency: (1 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 1 470) ㎨	BS	N
EN IEC 62281:2019	Electrical materials and components	Safety of primary and secondary lithium cells and batteries during transport	Altitude: (5 ~ 93.3) kPa Temperature: (-70 ~ 180) ℃ Vibration frequency: (4 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 980) ㎨ Drop height: (0.1 ~ 1.5)m	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
ES 95400-10:2020	Automobile and related products	Envrionmental Test of Electronic Device For Vehicle (Exception) 6.1.12 EMC Test 6.3.9.1 Salt water spray test 1 6.3.9.2 Salt water spray test 2 6.3.12 Ozone resistance test 6.5.1 Dust test 6.5.2 Water resistance test	DC voltage: (0 ~ 36) V d.c., Temperature: (-70 ~ 150) °C Humidity: (50 ~ 95) % R.H. Vibration frequency: (5 ~ 2 000) Hz Vibration acceleratio: (0.98 ~ 980) ㎨ Shock acceleration: (0.98 ~ 500) ㎨ Drop height: Max 1.5 m	BS	N
ES 95400-10:2020	Automobile and related products	Envrionmental Test of Electronic Device For Vehicle 6.3.9.1 Salt water spray test 1 6.3.9.2 Salt water spray test 2 6.5.1 Dust test 6.5.2 Water resistance test	Temperature: (-70 ~ 150) °C Humidity: (50 ~ 95) % R.H. Salt : (40 ± 2) °C, Nacl (5 ± 1) % Storage: (23 ~ 55) °C, (45 ~ 95) % R.H. Dust , Water: IPX1 to IPX8 IP1X to IP6X, R1, R2, S1, S2	SF-2	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
ES 95400-10:2024	Automobile and related products	Envrionmental Test of Electronic Device For Vehicle (Exception) 6.1.12 Electromagnetic Immunity Test 6.3.9.1 Salt Spray Test 1 6.3.9.1 Salt Spray Test 2 6.3.12 Ozone Resistance Test 6.5.1 Dust Test 6.5.2 Water Resistance Test	Temperature: (-70 ~ 150) °C Humidity: (50 ~ 95) % R.H. Salt : (40 ± 2) °C, Nacl (5 ± 1) % Storage: (23 ~ 55) °C, (45 ~ 95) % R.H. Dust , Water: IPX1 to IPX8 IP1X to IP6X, R1, R2, S1, S2	SF-3	N
ES 95400-10:2024	Automobile and related products	Envrionmental Test of Electronic Device For Vehicle (Exception) 6.1.12 Electromagnetic Immunity Test 6.3.9.1 Salt Spray Test 1 6.3.9.1 Salt Spray Test 2 6.3.12 Ozone Resistance Test 6.5.1 Dust Test 6.5.2 Water Resistance Test	Temperature: (-70 ~ 150) °C Humidity: (50 ~ 95) % R.H. Salt : (40 ± 2) °C, Nacl (5 ± 1) % Storage: (23 ~ 55) °C, (45 ~ 95) % R.H. Dust , Water: IPX1 to IPX8 IP1X to IP6X, R1, R2, S1, S2	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
GMW 3172:2015	Automobile and related products	General specification for electrical/electronic components-Environmental durability 9.3.1 Vibration with Thermal cycling 9.3.2 Mechanical Shock - Pothole 9.3.3 Mechanical Shock - Collision 9.3.4 Mechanical Shock - Closure Slam	Temperature: (-50 ~ 180) ℃ Vibration frequency: (4 ~ 2 000) Hz Vibration acceleration: (0.98 ~ 980) ㎨ Shock acceleration: (0.98 ~ 1 470) ㎨	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
GMW 3172:2018	Automobile and related products	General specification for electrical/electronic components-Environmental durability 9.3.1 Vibration with Thermal cycling 9.3.2 Mechanical Shock - Pothole 9.3.3 Mechanical Shock - Collision 9.3.4 Mechanical Shock - Closure Slam 9.4.1 High Temperature Degradation 9.4.2 Thermal Shock Air-To-Air(TS) 9.4.3 Power Temperature Cycle(PTC) 9.4.5 Humid Heat Cyclic(HHC) 9.4.6 Humid Heat Constant(HHCO) 9.4.9 Minimum Non Operating Temperature	Temperature: (-70 ~ 180) °C Humidity: (10 ~ 95) % R.H. Vibration frequency: (4 ~ 2 000) Hz Vibration acceleration: (0.98 ~ 980) ㎨ Shock acceleration: (0.98 ~ 1 470) ㎨	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
GMW 3172:2023	Automobile and related products	General specification for electrical/electronic components-Environmental durability 9.3.1 Vibration with Thermal cycling 9.3.2 Mechanical Shock - Pothole 9.3.3 Mechanical Shock - Collision 9.3.4 Mechanical Shock - Closure Slam 9.4.1 High Temperature Degradation 9.4.2 Thermal Shock Air-To-Air(TS) 9.4.3 Power Temperature Cycle(PTC) 9.4.5 Humid Heat Cyclic(HHC) 9.4.6 Humid Heat Constant(HHCO) 9.4.9 Minimum Non Operating Temperature	Temperature: (-70 ~ 180) °C Humidity: (10 ~ 95) % R.H. Vibration frequency: (4 ~ 2 000) Hz Vibration acceleration: (0.98 ~ 980) ㎨ Shock acceleration: (0.98 ~ 1 470) ㎨	SF-3	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
GMW 3172:2023	Automobile and related products	General specification for electrical/electronic components-Environmental durability 9.3.1 Vibration with Thermal cycling 9.3.2 Mechanical Shock - Pothole 9.3.3 Mechanical Shock - Collision 9.3.4 Mechanical Shock - Closure Slam 9.4.1 High Temperature Degradation 9.4.2 Thermal Shock Air-To-Air(TS) 9.4.3 Power Temperature Cycle(PTC) 9.4.5 Humid Heat Cyclic(HHC) 9.4.6 Humid Heat Constant(HHCO) 9.4.9 Minimum Non Operating Temperature	Temperature: (-70 ~ 180) °C Humidity: (10 ~ 95) % R.H. Vibration frequency: (4 ~ 2 000) Hz Vibration acceleration: (0.98 ~ 980) ㎨ Shock acceleration: (0.98 ~ 1 470) ㎨	BS	N
IEC 60068-2-11: 2021	Electrical machinery for industries	Environmental testing - Part 2-11: Tests - Test Ka: Salt mist	Salt concentration: (5 ± 1) % Exposure Zone: (35 ± 2) °C	SF-2	N
IEC 60068-2-13 :2021	Electrical machinery for industries	Environmental testing - Part 2-13: Tests - Test M: Low air pressure	Altitude: (5 ~ 101.3) kPa	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 60068-2-14 :2009	Electrical machinery for industries	Environmental testing - Part 2-14: Tests - Test N: Change of temperature (Exception) Test Nc Rapid change of temperature, two-fluid-bath method	Temperature: (-65 ~ 200) ℃	BS	N
IEC 60068-2-1: 2007	Electrical machinery for industries	Environmental testing - Part 2-1: Tests-Test A: Cold	Temperature: (-70 ~ 10) ℃	BS	N
IEC 60068-2-27 :2008	Electrical machinery for industries	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock	Shock acceleration: (0.98 ~ 1 470) ㎨	BS	N
IEC 60068-2-2: 2007	Electrical machinery for industries	Environmental testing - Part 2-2: Tests-Test B: Dry Heat	Temperature: (25 ~ 200) ℃	BS	N
IEC 60068-2-30 :2005	Electrical machinery for industries	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)	Temperature: (20 ~ 60) ℃ Humidity: (50 ~ 95) % R.H.	BS	N
IEC 60068-2-31 :2008	Electrical machinery for industries	Environmental testing - Part 2-31: Tests - Test Ec: Rough handling shocks, primarily for equipment-type specimens	Drop height: (0.1 ~ 1.5) m	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 60068-2-38 :2021	Electrical machinery for industries	Environmental testing - Part 2-38: Tests - Test Z/AD: Composite temperature/humidity cyclic test	Temperature: (-70 ~ 180) ℃ Humidity: (10 ~ 98) % R.H.	BS	N
IEC 60068-2-52: 2017	Electrical machinery for industries	Environmental testing - Part 2-52 Tests - Test Kb: Salt mist, cyclic (sodium chloride solution) (Exception) Test methods 8	Salt : (35 ± 2) °C, Nacl (5 ± 1) % Storage: (23 ~ 55) °C, (45 ~ 95) % R.H.	SF-2	N
IEC 60068-2-57 :2013	Electrical machinery for industries	Environmental testing - Part 2-57: Tests - Test Ff: Vibration - Time-history and sine-beat method	Vibration frequency: (4 ~ 2 000) Hz Vibration acceleration: (0.98 ~ 980) ㎨	BS	N
IEC 60068-2-64 :2019	Electrical machinery for industries	Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance	Vibration frequency: (4 ~ 2 000) Hz Vibration acceleration: (0.98 ~ 980) ㎨	BS	N
IEC 60068-2-66 :1994	Electrical machinery for industries	Environmental testing - Part 2: Test methods - Test Cx: Damp heat steady sate(unsaturated pressurized vapour)	Max 150 ℃ Humidity: (80 ~ 98) % R.H.	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 60068-2-67 :2019	Electrical machinery for industries	Environmental testing - Part 2-67: Tests - Test Cy: Damp heat, steady state, accelerated test primarily intended for components	Max 90 ℃ Humidity: (80 ~ 98) % R.H	BS	N
IEC 60068-2-6: 2007	Electrical machinery for industries	Environmental testing - Part 2-6: Tests-Test Fc: Vibration (Sinusoidal)	Vibration frequency: (4 ~ 2 000)Hz Vibration acceleration: (0.98 ~ 980) ㎨	BS	N
IEC 60068-2-78 :2012	Electrical machinery for industries	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state	Temperature: (25 ~ 45) ℃ Humidity: (80 ~ 98) % R.H.	BS	N
IEC 60255-21-1 :1988	Electrical machinery for industries	Electrical relays - Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment - Section One: Vibration tests (sinusoidal)	Vibration frequency: (4 ~ 2 000) Hz Vibration acceleratio: (0.98 ~ 980) ㎨	BS	N
IEC 60255-21-2 :1988	Electrical machinery for industries	Electrical relays - Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment - Section Two: Shock and bump tests	Vibration frequency: (4 ~ 2 000) Hz Vibration acceleration: (0.98 ~ 980) ㎨	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 60255-27:2023	Electrical machinery for industries	Measuring relays and protection equipment - Part 27: Product safety requirements (Accept only) 9.6.4.3 A.C. or D.C. dielectric voltage 9.6.4.4 Insulation Resistance 9.6.4.5 Protective bonding tests	Withstand voltage: Max.3 kV Insulation Resistance: DC 500 V, DC 1 000 V 8 V a.c. Max.45A	BS	N
IEC 60529: 2013	Electrical machinery for industries	Degrees of protection provided by enclosure(IP Code) (Exception) 14.2.9 Test for second characteristic numerals 9 with the drip box	IPX1 to IPX8 IP1X to IP6X	SF-2	N
IEC 60571:2012	Railroad vehicles and related products	Railway applications-Electronic equipment used on rolling stock 12.2.11 salt mist test	Salt : 35 °C, Nacl (5 ± 1) %	SF-2	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
IEC 60571:2012	Railroad vehicles and related products	Railway applications-Electronic equipment used on rolling stock 12.2.4 Cold start test 12.2.5 Dry heat test 12.2.6 Damp heat test, cyclic 12.2.10 Insulation test 12.2.12 Vibration, Shock and bump test 12.2.15 Low temperature storage test	Temperature: (-50 ~ 150) ˚C Vibration frequency: (1 ~ 2 000) Hz Humidity: (50 ~ 95) % R.H. Vibration/Shock acceleration: (0.98 ~ 980) ㎨ Insulation resistance: DC 500 V Withstand voltage: Max. 3 000 V a.c.	BS	N
IEC 61373:2010	Railroad vehicles and related products	Railway applications - Rolling stock equipment - Shock and vibration tests	Vibration frequency: (1 ~ 2 000) Hz Vibration acceleration: (0.98 ~ 980) ㎨	BS	N
IEC 62281:2023	Electrical materials and components	Safety of primary and secondary lithium cells and batteries during transport	Altitude: (5 ~ 101.3) kPa Temperature: (-70 ~ 180) ℃ Vibration frequency: (4 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 1 470) ㎨ Drop height: (0.1 ~ 1.5) m	BS	N
ISO 16750-3:2012	Automobile and related products	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 3: Mechanical loads	Vibration frequency: (4 ~ 2 000) Hz Vibration shock frequency: (0.98 ~ 1 470) ㎨ Drop Height: (0.1~1.5)m	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
ISO 16750-3:2012	Automobile and related products	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 3: Mechanical loads	Vibration frequency: (4 ~ 2 000) Hz Vibration shock frequency: (0.98 ~ 1 470) ㎨ Drop Height: (0.1~1.5)m	SF-3	N
ISO 16750-4:2010	Automobile and related products	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 4: Climatic loads (Exception) 5.4 Ice water shock test 5.5 Salt spray tests 5.8 Corrosion test with flow of mixed gas 5.9 Solar radiation 5.10 Dust test	Temperature: (-70 ~ 200) ℃ Humidity: (10 ~ 98) % R.H.	SF-3	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
ISO 16750-4:2010	Automobile and related products	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 4: Climatic loads (Exception) 5.4 Ice water shock test 5.5 Salt spray tests 5.8 Corrosion test with flow of mixed gas 5.9 Solar radiation 5.10 Dust test	Temperature: (-70 ~ 200) ℃ Humidity: (10 ~ 98) % R.H.	BS	N
ISO 20653: 2013	Automobile and related products	Road vehicles - Degrees of protection (IP Code) - Protection of electrical equipment against foreign objects, water and access (Exception) IPX4K, IPX9K	IP1X to IP6X IPX1 to IPX8	SF-2	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KR:2021	Ship	Guidance for Approval of Manufacturing Process and Type Approval, Etc. 2015 Chapter 3. Type Approval Section 23. Automatic an Remote Control Systems (Accept only) 1. External test 2. Functional test 3. Power lose test 4. Power change test 6. Dray heat test 7. Temperature and Humidity test 8. Vibration test 10. Insulation resistance test 11. Electric strength test 12. Cold test	Voltage: (0 ~ 380) V Temperature: (-70 ~ 180) ℃ Humidity: (10 ~ 98) % R.H. Vibration frequency: (4 ~ 2 000) Hz Vibration acceleratio: (0.98 ~ 980) ㎨	BS	N
KS C 5078:2015	Automobile and related products	Video recording systems for road vehicle accidents 7.3 Environment test	Temperature: (-25 ~ 90) ℃ Vibration frequency: (4 ~ 2 000) Hz Vibration shock frequency: (0.98 ~ 980) ㎨	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C 7620:2003	Railroad vehicles and related products	Railway car luminaries for fluorescent lamps (Exception) 7.9 Noise test 7.11 Luminous Flux rate test 7.13 Noise strength test	Temperature: (-10 ~ 60) ℃ Vibration frequency: (4 ~ 2 000) Hz Vibration acceleration: (0.98 ~ 980) ㎨"	BS	N
KS C IEC 60068-2-11: 2021	Electrical machinery for industries	Environmental testing - Part 2-11: Tests - Test Ka: Salt mist	Salt : (35 ± 2) °C, Nacl (5 ± 1) %	SF-2	N
KS C IEC 60068-2-13:2021	Electrical machinery for industries	Envrionmental Testing-Part2: Tests-Tests M: Low air pressure	Altitude: (5 ~ 101.3) kPa	BS	N
KS C IEC 60068-2-14:2009	Electrical machinery for industries	Environmental testing - Part 2-14 : Tests - Test N : Change of temperature (Exception) Test Nc: Rapid change of temperatur, two-fluid-bath method	Temperature: (-65 ~ 200) ℃	BS	N
KS C IEC 60068-2-1:2007	Electrical machinery for industries	Environmental Testing - Part 2-1: Tests - Test A: Cold	Temperature: (-70 ~ 10) ℃	BS	N
KS C IEC 60068-2-27:2008	Electrical machinery for industries	Basic Environmental Testing Procedures - Part 2: Tests - Test Ea and guidance: Shock	Shock acceleration: (0.98 ~ 1 470) ㎨	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C IEC 60068-2-2:2007	Electrical machinery for industries	Environmental Testing - Part 2-2: Tests - Test B: Dry heat	Temperature: (25 ~ 200) ℃	BS	N
KS C IEC 60068-2-30:2005	Electrical machinery for industries	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)	Temperature: (20 ~ 60) ℃ Humidity: (50 ~ 95) % R.H.	BS	N
KS C IEC 60068-2-31:2008	Electrical machinery for industries	Environmental testing - Part 2-31 : Tests - Test Ec : Rough handling shocks, primarily for equipment-type specimens	Drop height: (0.1 ~ 1.5) m	BS	N
KS C IEC 60068-2-38:2021	Electrical machinery for industries	Environmental Testing - Part 2-38: Tests - Test Z/AD: Composite temperature/humidity cyclic test	Temperature: (-70 ~ 180) ℃ Humidity: (10 ~ 98) % R.H.	BS	N
KS C IEC 60068-2-52: 2017	Electrical machinery for industries	Environmental testing - Part 2-52: Tests - Test Kb: Salt mist, cyclic (sodium chloride solution) (Exception) Test method 8	Salt : (35 ± 2) °C, Nacl (5 ± 1) % Storage: (23 ~ 55) °C, (45 ~ 95) % R.H.	SF-2	N
KS C IEC 60068-2-57:2013	Electrical machinery for industries	Environmental testing - Part 2-57: Tests - Test Ff: Vibration - Time-history method	Vibration frequency: (4 ~ 2 000) Hz Acceleration: (0.98 ~ 980) ㎨	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C IEC 60068-2-64:2008	Electrical machinery for industries	Environmental Testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance	Vibration frequency: (4 ~ 2 000) Hz Acceleration: (0.98 ~ 980) ㎨	BS	N
KS C IEC 60068-2-66:1994	Electrical machinery for industries	Environmental testing-Part2: Test methods-Test Cx: Damp heat, steady state(unsaturated pressurized vapour)	Max temperature: 150 ℃ Humidity: (80 ~ 95) % R.H.	BS	N
KS C IEC 60068-2-67:1995	Electrical machinery for industries	Environmental testing - Part2: Tests-test Cy: Damp heat, steady state, accelerated test primarily intended for components	Max 90 ℃ Humidity: (80 ~ 95) % R.H	BS	N
KS C IEC 60068-2-6:2015	Electrical machinery for industries	Environmental testing - Part 2-6: Tests - Test Fc: Vibration(sinusoidal)	Vibration frequency: (4 ~ 2 000) Hz Vibration acceleration: (0.98 ~ 980) ㎨	BS	N
KS C IEC 60068-2-78:2012	Electrical machinery for industries	Envrionmental testing - Part1-78: Tests-Test Cab: Damp heat, steady state	Temperature: (25 ~ 45) ℃ Humidity: (80 ~ 98) % R.H	BS	N
KS C IEC 60255-21-1:1988	Electrical machinery for industries	Electrical relays - Part 21 : Vibration, shock, bump and seismic tests on measuring relays and protection equipment- Section 1 : Vibration tests (sinusoidal)	Vibration frequency: (4 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 980) ㎨	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C IEC 60255-21-2:1988	Electrical machinery for industries	Electrical relays- Part 21 : Vibration, shock, bump and seismic tests on measuring relays and protection equipment - Section 2 : Shock and bump tests	Vibration frequency: (4 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 980) ㎨	BS	N
KS C IEC 60255-27:2013	Electrical machinery for industries	Measuring relays and protection equipment - Part 27: Product safety requirements 10.6.4.3 A.C or D.c. .dielectric voltage 10.6.4.4 Insulation Resistance 10.6.4.5 Protective bonding resistance	Withstand voltage: Max 3 kV Insulation Resistance: DC 500 V, DC 1 000 V 8 V a.c. Max 45A	BS	N
KS C IEC 60529: 2013	Electrical machinery for industries	Degrees of protection provided by enclosures (IP Code) (Exception) 14.2.9 Test for second characteristic numerals 9 with the drip box	IPX1 to IPX8 IP1X to IP6X	SF-2	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS C IEC 60571:2012	Railroad vehicles and related products	Electronic equipment used on rail vehicles 12.2.4 Cold start test 12.2.5 Dry heat test 12.2.6 Damp heat test, cyclic 12.2.10 Insulation test 12.2.12 Vibration, Shock and bump test 12.2.15 Low temperature storage test	Temperature: (-50 ~ 150) ℃ Vibration frequency: (1 ~ 2 000) Hz Humidity: (50 ~ 95) % R.H. Vibration/Shock acceleration: (0.98 ~ 980) ㎨ Insulation resistance: DC 500 V withstand voltage: Max. 3 000 V a.c.	BS	N
KS C IEC 61373:2010	Railroad vehicles and related products	Railway applications — Rolling stock equipment — Shock and vibration tests	Vibration frequency: (1 ~ 2 000) Hz Acceleration: (0.98 ~ 980) m/s²	BS	N
KS C IEC 62281:2021	Electrical materials and components	Safety of primary and secondary lithium cells and batteries during transport	Altitude: (5 ~ 101.3) kPa Temperature: (-70 ~ 180) ℃ Vibration frequency: (4 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 1 470) ㎨ Drop height: (0.1 ~ 1.5)m	BS	N
KS R 1034:2006	Railroad vehicles and related products	Vibration Testing Methods For Automobile Parts	Vibration frequency: (4 ~ 2 000) Hz Vibration acceleration: (0.98 ~ 980) ㎨	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
KS R 9144:2021	Railroad vehicles and related products	TEST METHODS FOR VIBRATION OF PARTS OF RAILWAY ROLLING STOCK	Vibration frequency: (1 ~ 2 000) Hz Vibration acceleration: (0.98 ~ 980) ㎨	BS	N
KS R 9186:2021	Railroad vehicles and related products	PARTS FOR RAILWAY SIGNAL - VIBRATION TEST METHODS	Vibration frequency: (1 ~ 2 000) Hz Acceleration: (0.98 ~ 980) ㎨	BS	N
KS R 9187:2021	Railroad vehicles and related products	PARTS FOR RAILWAY SIGNAL - SHOCK TEST METHODS	Shock acceleration: (0.98 ~ 1 470) ㎨	BS	N
KS R ISO 7637-2:2015	Automobile and related products	Road vehicles - Electrical disturbances from conduction and coupling Part 2: Electrical transient conduction along supply lines only	12 V, 24 V System	BS	N
MIL-STD-167-1 A:2005	Electrical machinery for industries	mechanical vibrations of shipboard equipment(Type I-Environmental)	Vibration frequency: (4 ~ 33) Hz Vibration acceleration: (0.98 ~ 980) ㎨	BS	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
MIL-STD-810C: 1975	Electrical machinery for industries	Environmental test Method 501.1 High temperature 502.1 Low temperature 503.1 Temperature shock 507.1 Humidity 514.2 Vibration Procedure Ⅰ, Ⅱ, Ⅴ, Ⅵ, Ⅶ, Ⅷ 516.2 Shock Procedure Ⅰ, Ⅱ, Ⅲ, Ⅴ	Altitude: (5 ~ 101.3) kPa Temperature: (-70 ~ 180) ℃ Humidity: (10 ~ 98) % R.H. Vibration frequency: (1 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 980) ㎨ Drop height: (0.1 ~ 1.5) m	BS	N
MIL-STD-810D: 1983	Electrical machinery for industries	Environmental test method and engineering guidelines 500.2 Low pressure(Altitude) Procedure Ⅰ, Ⅱ 501.2 High temperature 502.2 Low temperature 503.2 Temperature shock 507.2 Humidity 514.3 Vibration Procedure Ⅰ 516.3 Shock Procedure Ⅰ, Ⅱ, Ⅳ, Ⅴ, Ⅵ	Altitude: (5 ~ 101.3) kPa Temperature: (-70 ~ 180) ℃ Humidity: (10 ~ 98) % R.H. Vibration frequency: (1 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 980) ㎨ Drop height: (0.1 ~ 1.5) m	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
MIL-STD-810D: 1983	Electrical machinery for industries	Environmental test method and engineering guidelines 509.3 salt Fog	Salt : 35 °C, Nacl (5 ± 1) %	SF-2	N
MIL-STD-810E:1989	Electrical machinery for industries	Environmental test method and engineering guidelines 500.3 Low pressure(Altitude) Procedure Ⅰ, Ⅱ 501.3 High temperature 502.3 Low temperature 503.3 Temperature shock 507.3 Humidity 514.4 Vibration Procedure Ⅰ 516.4 Shock Procedure Ⅰ, Ⅱ, Ⅳ, Ⅴ, Ⅵ	Altitude: (5 ~ 101.3) kPa Temperature: (-70 ~ 180) ℃ Humidity: (10 ~ 98) % R.H. Vibration frequency: (1 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 980) ㎨ Drop height: (0.1 ~ 1.5) m	BS	N
MIL-STD-810E:1989	Electrical machinery for industries	Environmental test method and engineering guidelines 509.3 salt Fog	Salt : 35 °C, Nacl (5 ± 1) %	SF-2	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
MIL-STD-810F NOTICE 3: 2003	Electrical machinery for industries	Environmental engineering considerations and laboratory tests 500.4 Low pressure(Altitude) Procedure Ⅰ, Ⅱ 501.4 High temperature 502.4 Low temperature 503.4 Temperature shock 507.4 Humidity 514.5 Vibration Procedure Ⅰ 516.6 Shock Procedure Ⅰ, Ⅱ, Ⅳ, Ⅴ, Ⅵ	Altitude: (5 ~ 101.3) kPa Temperature: (-70 ~ 180) ℃ Humidity: (10 ~ 98) % R.H. Vibration frequency: (1 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 980) ㎨ Drop height: (0.1 ~ 1.5) m	BS	N
MIL-STD-810F NOTICE 3: 2003	Electrical machinery for industries	Environmental engineering considerations and laboratory tests 509.4 Salt Fog	Salt : 35 °C, Nacl (5 ± 1) %	SF-2	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
MIL-STD-810F:2000	Electrical machinery for industries	Environmental engineering considerations and laboratory tests 500.4 Low pressure(Altitude) Procedure Ⅰ, Ⅱ 501.4 High temperature 502.4 Low temperature 503.4 Temperature shock 507.4 Humidity 514.5 Vibration Procedure Ⅰ 516.5 Shock Procedure Ⅰ, Ⅱ, Ⅳ, Ⅴ, Ⅵ	Altitude: (5 ~ 101.3) kPa Temperature: (-70 ~ 180) ℃ Humidity: (10 ~ 98) % R.H. Vibration frequency: (1 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 980) ㎨ Drop height: (0.1 ~ 1.5) m	BS	N
MIL-STD-810F:2000	Electrical machinery for industries	Environmental engineering considerations and laboratory tests 509.4 Salt Fog	Salt : 35 °C, Nacl (5 ± 1) %	SF-2	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
MIL-STD-810G w/Change 1: 2014	Electrical machinery for industries	Environmental engineering considerations and laboratory tests 500.6 Low pressure(Altitude) Procedure Ⅰ, Ⅱ 501.6 High temperature 502.6 Low temperature 503.6 Temperature shock 507.6 Humidity 514.7 Vibration Procedure Ⅰ 516.7 Shock Procedure Ⅰ, Ⅱ, Ⅳ, Ⅴ, Ⅵ 528.1 Mechanical vibration of shipboard equipment(Type I Environmental vibration)	Altitude: (5 ~ 101.3) kPa Temperature: (-70 ~ 180) ℃ Humidity: (10 ~ 98) % R.H. Vibration frequency: (1 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 980) ㎨ Drop height: (0.1 ~ 1.5) m	BS	N
MIL-STD-810G w/Change 1: 2014	Electrical machinery for industries	Environmental engineering considerations and laboratory tests 509.6 Salt Fog	Salt : 35 ˚C, Nacl (5 ± 1) %	SF-2	N

Test method	Materials Products	Standard designation	Test range	Site	Field testing
MIL-STD-810G: 2008	Electrical machinery for industries	Environmental engineering considerations and laboratory tests 500.5 Low pressure(Altitude) Procedure Ⅰ, Ⅱ 501.5 High temperature 502.5 Low temperature 503.5 Temperature shock 507.5 Humidity 514.6 Vibration Procedure Ⅰ 516.6 Shock Procedure Ⅰ, Ⅱ, Ⅳ, Ⅴ, Ⅵ 528 Mechanical vibration of shipboard equipment(Type I Environmental vibration)	Altitude: (5 ~ 101.3) kPa Temperature: (-70 ~ 180) ℃ Humidity: (10 ~ 98) % R.H. Vibration frequency: (1 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 980) ㎨ Drop height: (0.1 ~ 1.5) m	BS	N
MIL-STD-810G: 2008	Electrical machinery for industries	Environmental engineering considerations and laboratory tests 509.5 Salt Fog	Salt : 35 ˚C, Nacl (5 ± 1) %	SF-2	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
MIL-STD-810H: 2019	Electrical machinery for industries	Environmental engineering consideration and laboratory tests 500.6 Low Pressure(Altitude) Procedure I, II 501.7 High temperature 502.7 Low temperature 503.7 Temperatures shock 507.6 Humidity 514.8 Vibration Procedure I 516.8 Shock Procedure I, Ⅱ, Ⅳ, Ⅴ, Ⅵ 528.1 Mechanical Vibration of Shipboard equipment(Type I Environmental Vibration) (Exception) Type II - Internally excited	Altitude: (5 ~ 101.3) kPa Temperature: (-70 ~ 180) ℃ Humidity: (10 ~ 98) % R.H. Vibration frequency: (1 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 980) ㎨ Drop height: Max 1.5 m	BS	N
MIL-STD-810H: 2019	Electrical machinery for industries	Environmental engineering consideration and laboratory tests 509.7 Salt Fog	Salt : 35 °C, Nacl (5 ± 1) %	SF-2	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
RTCA DO-160G:2010	Aviation and space related products	Environmental Conditions and Test Procedures for Airborne Equipment Section 4.0 Temperature and Altitude Section 5.0 Temperature Variation Section 6.0 Humidity Section 8.0 Vibration (Exception) 4.6 Altitude, Decompression and Overpressure Tests	Altitude: (5 ~ 101.3) kPa Temperature: (-55 ~ 85) ℃ Humidity: (50 ~ 95) % R.H. Vibration frequency: (1 ~ 2 000) Hz Vibration acceleratio: (0.98 ~ 980) ㎨	BS	N
RTCA DO-160G:2010	Aviation and space related products	Environmental Conditions and Test Procedures for Airborne Equipment Section 14.0 salt Spray(salt Fog) Section 10.0 Waterproofness	Salt : 35 ℃, Nacl (5 ± 1) % Waterproofness : Max 280 L/㎡/h	SF-2	N
ST/SG/AC.10/11/Rev.6 Amend.1:2017	Electrical materials and components	Recommendations on the TRANSPORT OF DANGEROUS GOODS - Manual of Tests and Criteria(38.3 Lithium metal and lithium ion batteries)	Altitude: (5 ~ 101.3) kPa Temperature: (-70 ~ 180) ℃ Humidity: (10 ~ 98) % R.H. Vibration frequency: (4 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 1 470) ㎨ Drop height: (0.1 ~ 1.5) m	BS	N

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Test method	Materials Products	Standard designation	Test range	Site	Field testing
ST/SG/AC.10/11/Rev.6:2015	Electrical materials and components	Recommendations on the TRANSPORT OF DANGEROUS GOODS - Manual of Tests and Criteria(38.3 Lithium metal and lithium ion batteries)	Altitude: (5 ~ 101.3) kPa Temperature: (-70 ~ 180) ℃ Humidity: (10 ~ 98) % R.H. Vibration frequency: (4 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 1 470) ㎨ Drop height: (0.1 ~ 1.5) m	BS	N
ST/SG/AC.10/11/Rev.7:2019	Electrical materials and components	Recommendations on the TRANSPORT OF DANGEROUS GOODS - Manual of Tests and Criteria(38.3 Lithium metal and lithium ion batteries)	Altitude: (5 ~ 101.3) kPa Temperature: (-70 ~ 180) ℃ Humidity: (10 ~ 98) % R.H. Vibration frequency: (4 ~ 2 000) Hz Vibration/Shock acceleration: (0.98 ~ 1 470) ㎨ Drop height: Max 1.5 m	BS	N

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