Korea Laboratory Accreditation Scheme

CERTIFICATE OF ACCREDITATION

Korea Testing and Research Institute

Accreditation No. : KT011

Corporation Registration No. : 134122-0007297

Address of Laboratory : 98, Gyoyukwon-ro, Gwacheon-si, Gyeonggi-do, Korea
68, Gajaeul-ro, Seo-gu, Incheon, Korea
15, Jongga-ro, Jung-gu, Ulsan, Korea
42-27, Jungbu-daero 2517beon-gil, Yangji-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea
5, Myeongji ocean city 9-ro, Gangseo-gu, Busan, Korea
12-63, Sandan-gil, Hwasun-eup, Hwasun-gun, Jeollanam-do, Korea
122-11, Seongseo4chacheomdan-ro, Dalseo-gu, Daegu, Korea

date of Initial Accreditation : December 10, 1994

Duration : April 28, 2014 ~ April 27, 2018

Scope of Accreditation : Attached Annex

Date of issue : August 7, 2017

This testing laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025 : 2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated 8 January 2009).

ilac-MRA

KOREA LABORATORY ACCREDITATION SCHEME KOLAS

Jung Dong Hee

Administrator
Korea Laboratory Accreditation Scheme

No. KT011

Address of Laboratory : 42-27, Jungbu-daero 2517beon-gil, Yangji-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea

03. Electric Test

03.001 Electric cord, cable, wiring

Test Method	Standard designation	Test range
KC 60799 : 2015	Electrical accessories－Cord sets and interconnection cord sets	16 A
KC 60502－1 : 2015	Power cables with extruded insulation and their accessories for rated voltages from 1 kV (Um = 1,2 kV) up to 30 kV (Um = 36 kV) －Part 1 : Cables for rated voltages of 1 kV (Um = 1,2 kV) and 3 kV (Um = 3,6 kV)	(1 ~ 3) kV
KC 60227-1 : 2015	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 1 : General requirements	Up to 450 V/750 V
KC 60227-2 : 2015	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 2 : Test methods	Up to 450 V/750 V
KC 60227-3 : 2015	Polyvinyl chloride insulated cables of rated voltages up to and including 450 / 750 V part 3 : Non-sheathed cable for fixed wiring	Up to 450 V/750 V
KC 60227-4 : 2015	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V－Part 4 : Sheathed cables for fixed wiring	Up to 450 V/750 V
KC 60227-5 : 2015	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 5 : Flexible cables (cords)	Up to 450 V/750 V
KC 60227-6 : 2015	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V－Part 6 : Lift cables and cables for flexible connections	Up to 450 V/750 V

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Test Method	Standard designation	Test range
KC 60227-7 : 2015	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 7 : Flexible cables screened and unscreened with two or more conductors	Up to 450 V/750 V
KC 60245-1 : 2015	Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 1 : General requirements	Up to 450 V/750 V
KC 60245-2 : 2015	Rubber insulated cables－Rated voltages up to and including 450/750 V－Part 2 : Test methods	Up to 450 V/750 V
KC 60245-3 : 2015	Rubber insulated cables of rated voltages up to and including 450/750 V－Part 3 : Heat resistant silicone insulated cables	Up to 450 V/750 V
KC 60245-4 : 2015	Rubber insulated cables of rated voltages up to and including 450/750 V – Part 4 : Cords and flexible cables	Up to 450 V/750 V
KC 60245-5 : 2015	Rubber insulated cables of rated voltages up to and including 450/750 V－Part 5 : Lift cables	Up to 450 V/750 V
KC 60245-6 : 2015	Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 6 : Arc welding electrode cables	Up to 450 V/750 V
KC 60245-7 : 2015	Rubber insulated cables－Rated voltages up to and including 450/750 V－Part 7 : Heat resistant ethylene-vinyl acetate rubber insulated cables	Up to 450 V/750 V
KC 60245-8 : 2015	Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 8 : Cords for applications requiring high flexibility	Up to 450 V/750 V
KS C IEC 60502-1 : 2013	Power cables with extruded insulation and their accessories for rated voltages	(1 ~ 3) kV

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Test Method	Standard designation	Test range
	from 1 kV (Um = 1,2 kV) up to 30 kV (Um = 36 kV) —Part 1 : Cables for rated voltages of 1 kV (Um = 1,2 kV) and 3 kV (Um = 3,6 kV)	
KS C IEC 60799 : 2002	Electrical accessories—Cord sets and interconnection cord sets	16 A
KS C IEC 60227-1 : 2014	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 1 : General requirements	Up to 450 V/750 V
KS C IEC 60227-2 : 2016	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 2 : Test methods	Up to 450 V/750 V
KS C IEC 60227-3 : 2005	Polyvinyl chloride insulated cables of rated voltages up to and including 450 / 750 V part 3 : Non-sheathed cable for fixed wiring	Up to 450 V/750 V
KS C IEC 60227-4 : 2005	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V—Part 4 : Sheathed cables for fixed wiring	Up to 450 V/750 V
KS C IEC 60227-5 : 2016	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 5 : Flexible cables (cords)	Up to 450 V/750 V
KS C IEC 60227-6 : 2005	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V—Part 6 : Lift cables and cables for flexible connections	Up to 450 V/750 V
KS C IEC 60227-7 : 2015	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 7 : Flexible cables screened and unscreened with two or more conductors	Up to 450 V/750 V

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Test Method	Standard designation	Test range
KS C IEC 60245-1 : 2014	Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 1 : General requirements	Up to 450 V/750 V
KS C IEC 60245-2 : 2006	Rubber insulated cables－Rated voltages up to and including 450/750 V－Part 2 : Test methods	Up to 450 V/750 V
KS C IEC 60245-3 : 2013	Rubber insulated cables of rated voltages up to and including 450/750 V－Part 3 : Heat resistant silicone insulated cables	Up to 450 V/750 V
KS C IEC 60245-4 : 2014	Rubber insulated cables of rated voltages up to and including 450/750 V － Part 4 : Cords and flexible cables	Up to 450 V/750 V
KS C IEC 60245-5 : 2013	Rubber insulated cables of rated voltages up to and including 450/750 V－Part 5 : Lift cables	Up to 450 V/750 V
KS C IEC 60245-6 : 2016	Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 6 : Arc welding electrode cables	Up to 450 V/750 V
KS C IEC 60245-7 : 2016	Rubber insulated cables－Rated voltages up to and including 450/750 V－Part 7 : Heat resistant ethylene-vinyl acetate rubber insulated cables	Up to 450 V/750 V
KS C IEC 60245-8 : 2014	Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 8 : Cords for applications requiring high flexibility	Up to 450 V/750 V
KS C IEC 60502-2 : 2016	Power cables with extruded insulation and their accessories for rated voltages from 1 kV(Um＝1.2 kV) up to 30 kV(Um＝36 kV)－Part 2 : Cables for rated voltages from 6 kV(Um＝7.2 kV) up to 30 kV(Um＝36 kV)	(6 ~ 30) kV

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Test Method	Standard designation	Test range
KS C 3001 : 1983	Resistance of Copper Materials for Electrical Purposes	conductivity : less 100.0 %
KS C 3002 : 1996	Testing methods of electrical copper and aluminium wires	conductivity : Up to 100.0 %
KS C 3003 : 1998	Methods of test for fiber or paper insulated copper and aluminum winding wires	(5.7 ~ 15.3) mm
KS C 3005 : 2003	Testing method of electrical insulating compounds	(0 ~ 75) kV
KS C 3006 : 1986	Methods of Test for Enamelled Copper and Enamel1ed Aluminlium Wires	Conductor diameter : Up to 3.2 mm
KS C 3101 : 2003	Annealed copper wires for electrical purposes	Conductor diameter : Up to 12.0 mm
KS C 3102 : 1998	Hard - drawn copper wires for electrical purposes	Conductor diameter : Up to 12.0 mm
KS C 3103 : 2003	Annealed copper stranded wires for electrical purposes	Nominal cross-sectional area : Up to 2 000 mm^2
KS C 3104 : 1996	Hard- drawn copper stranded conductors	Nominal cross-sectional area : Up to 500 mm^2
KS C 3105 : 2014	Rectangular copper wires for electrical purposes	diameter : 9.5 mm thickness : Up to 10.0 mm
KS C 3106 : 1978	Annealed copper wires for winding of electric apparatus	Conductor diameter : Up to 3.2 mm
KS C 3107 : 2003	Enamelled winding wires	Conductor diameter : Up to 3.2 mm

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Test Method	Standard designation	Test range
KS C 3111 : 2003	Hard－drawn aluminium wires for electric purposes	Overal dimensions : Up to 5.0 mm
KS C 3112 : 2003	Hard-drawn aluminium stranded conductors	Nominal cross-sectional area : Up to 1 500 mm^2
KS C 3113 : 1986	Aluminium stranded conductors steel reinforced	Nominal cross-sectional area : Up to 610 mm^2
KS C 3115 : 1980	Tin coated piano wire for armature binding	diameter : Up to 2.60 mm
KS C 3120 : 2014	Tin coated annealed copper wires	Conductor diameter : Up to 12.0 mm
KS C 3123 : 1974	Glass-fiber-covered round copper wires	Conductor diameter : 32.0 mm
KS C 3125 : 1974	Double glass -fiber - covered rectangular copper wires	Conductor diameter : Up to 4.5 mm
KS C 3133 : 1979	Copper wire rods for electrical purposes	Conductor diameter : Up to 25.0 mm
KS C 3134 : 2008	Contact conductors with insulating covers	Up to DC 750 V ,Up to AC 600 V ,Rated current : Up to 2 000 A

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Test Method	Standard designation	Test range
KS C 3138 : 1989	ACSR outdoor cross-linked polyethylene insulated wires for 6.6kV	Nominal cross-sectional area : Up to 95 mm^2
KS C 3139 : 1988	HAl outdoor cross-linked polyethylene insulated wires for 6.6kV	Nominal cross-sectional area : Up to 150 mm^2
KS C 3306 : 2002	Figure 8 type drop wires	Conductor diameter : 1.0 mm, 1.2 mm
KS C 3307 : 1993	Flat type drop wires	Conductor diameter : 1.20 mm
KS C 3308 : 1988	Insulated wires for neon tube	Up to 15 kV
KS C 3311 : 2012	Low-voltage cables for automobile	Nominal cross-sectional area : Up to 100 mm^2
KS C 3312 : 1992	Fiber or paper covered copper winding wires	Conductor diameter : 6.0 mm
KS C 3313 : 2015	Outdoor weather proof polyvinyl chloride insulated wires	Up to 600 V
KS C 3315 : 2015	Polyvinyl chloride insulated drop service wires	Up to 600 V
KS C 3338 : 2005	Polyester nylon enamelled copper wires	Conductor diameter : 3.2 mm

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Test Method	Standard designation	Test range
KS C 3339 : 2002	CATV aluminium pipe coaxial cables	AC 65 V, Current 14 A
KS C 3340 : 2002	PVC indoor telephone wires	Conductor diameter : 0.8 mm
KS C 3341 : 2015	Halogen free flame retardant poly-olefin insulation wire	6 kV / 10 kV
KS C 3342 : 2016	Local area network cable	100 Ω
KS C 3401 : 1990	1000V grade insulated wires for fluorescent lamps	1 000 V
KS C 3403 : 1990	High-Voltage Resistance Cables for Automobile	Resistance : Up to 36 kΩ
KS C 3603 : 2016	Polyethylene insulated polyvinyl chloride sheathed pair cable for telephone	Conductor diameter : Up to 0.9 mm
KS C 3604 : 2002	L.F Cables and wires with P.V.C insulation and P.V.C sheath for telephone	Number of Conductor : Up to 112
KS C 3606 : 2003	Paper－insulated－lead sheathed star cable for telephone	Up to 2 400
KS C 3608 : 1981	Paper-insulated-lead sheathed pair cable for telephone	Up to 2 121
KS C 3610 : 2016	Radio-frequency coaxial cables	50 Ω / 75 Ω
KS C 3612 : 2008	High tension cables for X-ray apparatus	Voltage : Up to 150 kV
KS C 3617 : 2016	Coaxial cables for television receivers	Frequency : Up to 1 800 MHz
KS C 3618 : 1983	Polyethylene insulated metal sheathed cable for telephone	Diameter : Up to 0.9 mm
KS C 3829 : 1990	Insulated wires for cubicle type unit substation for 6.6kV receiving	Nominal voltage : 6.6 kV
KC 60228 : 2015	Conductors of insulated cables	(0.5 ~ 1 200) mm^2

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Test Method	Standard designation	Test range
KS C IEC 60228 : 2015	Conductors of insulated cables	(0.5 ~ 1 200) mm^2
KS C IEC 60331-1 : 2013	Tests for electric cables under fire conditions-Circuit integrity-Part 1: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter exceeding 20 ㎜	(750 ~ 950) ℃
KS C IEC 60331-2 : 2013	Tests for electric cables under fire conditions-Circuit integrity-Part 2: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter not exceeding 20 ㎜	(750 ~ 950) ℃
KS C IEC 60331-3 : 2014	Tests for electric cables under fire conditions-Circuit integrity-Part 1: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter exceeding 20 ㎜	(750 ~ 950) ℃
KS C IEC 60331-11 : 2003	Tests for electric cables under fire conditions-Circuit integrity-Part 11: Apparatus-Fire alone at a flame temperature of at least 750 °C	(750 ~ 950) ℃
KS C IEC 60332-3-21 : 2003	Tests on electric cables under fire conditions-Part 3-21: Test for vertical flame spread of vertically-mounted bunched wires or cables-Category AF/R	Height: (4 000 ± 100) ㎜, Width: (1 000 ± 100) ㎜, Depth: (2 000 ± 100) ㎜
KS C IEC 60332-3-22 : 2003	Tests on electric cables under fire conditions-Part 3-22: Test for vertical flame spread of vertically-mounted bunched wires or cables-Category A	Height: (4 000 ± 100) ㎜, Width: (1 000 ± 100) ㎜, Depth: (2 000 ± 100) ㎜

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Test Method	Standard designation	Test range
KS C IEC 60332-3-23 : 2003	Tests on electric cables under fire conditions-Part 3-23: Test for vertical flame spread of vertically-mounted bunched wires or cables-Category B	Height: (4 000 ± 100) ㎜ Width: (1 000 ± 100) ㎜ Depth: (2 000 ± 100) ㎜
KS C IEC 60332-3-24 : 2003	Tests on electric cables under fire conditions-Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables-Category C	Height: (4 000 ± 100) ㎜ Width: (1 000 ± 100) ㎜ Depth: (2 000 ± 100) ㎜
KS C IEC 60332-3-25 : 2003	Tests on electric cables under fire conditions-Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables-Category D	Height: (4 000 ± 100) ㎜ Width: (1 000 ± 100) ㎜ Depth: (2 000 ± 100) ㎜
GS-6145-0000 : 2016	22.9 kV Concentric Neutral Type Eco-friendly Polypropylene Insulated Extruded-to-Fill Polyethylene Jacketed Water-proof Power Aluminium Cables	(95 ~ 400) mm^2
GS-6145-0086 : 2015	22.9 kV Optical fiber and Concentric Neutral Type Water Tree Retardant XLPE Insulated Extruded-to-Fill Polyethylene Jacketed Water-proof Power Cables	(60 ~ 600) mm^2
GS-6145-0087 : 2015	22.9 kV Optical fiber and Concentric Neutral Type Water Tree Retardant XLPE Insulated Extruded-to-Fill Polyethylene Jacketed Water-proof Power Aluminium Cables	(95 ~ 400) mm^2
IEC 60228 : 2004	Conductors of insulated cables	(0.5 ~ 1 200) mm^2
IEC 60331-1 : 2009	Tests for electric cables under fire conditions-Circuit integrity-Part 1: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter exceeding 20 ㎜	(750 ~ 950) ℃
IEC 60331-2 : 2009	Tests for electric cables under fire conditions-Circuit integrity-Part 2: Test method for fire with shock at a	(750 ~ 950) ℃

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Test Method	Standard designation	Test range
	temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter not exceeding 20 ㎜	
IEC 60331-3 : 2009	Tests for electric cables under fire conditions-Circuit integrity-Part 1: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter exceeding 20 ㎜	(750 ~ 950) ℃
IEC 60331-11 : 1999	Tests for electric cables under fire conditions-Circuit integrity-Part 11: Apparatus-Fire alone at a flame temperature of at least 750 °C	(750 ~ 950) ℃
IEC 60332-3-21 : 2000	Tests on electric cables under fire conditions-Part 3-21: Test for vertical flame spread of vertically-mounted bunched wires or cables-Category AF/R	Height: (4 000 ± 100) ㎜, Width: (1 000 ± 100) ㎜, Depth: (2 000 ± 100) ㎜
IEC 60332-3-22 : 2000	Tests on electric cables under fire conditions-Part 3-22: Test for vertical flame spread of vertically-mounted bunched wires or cables-Category A	Height: (4 000 ± 100) ㎜, Width: (1 000 ± 100) ㎜, Depth: (2 000 ± 100) ㎜
IEC 60332-3-23 : 2000	Tests on electric cables under fire conditions-Part 3-23: Test for vertical flame spread of vertically-mounted bunched wires or cables-Category B	Height: (4 000 ± 100) ㎜, Width: (1 000 ± 100) ㎜, Depth: (2 000 ± 100) ㎜
IEC 60332-3-24 : 2000	Tests on electric cables under fire conditions-Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables-Category C	Height: (4 000 ± 100) ㎜, Width: (1 000 ± 100) ㎜, Depth: (2 000 ± 100) ㎜
IEC 60332-3-25 : 2000	Tests on electric cables under fire conditions-Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables-Category D	Height: (4 000 ± 100) ㎜, Width: (1 000 ± 100) ㎜, Depth: (2 000 ± 100) ㎜
KRS PW 0005 : 2006	Hard-drawn Copper Round Trolley Wire	(110 ~ 170) mm^2

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Test Method	Standard designation	Test range
KRS PW 0006 : 2006	Flexible Annealed Copper Stranded Wire	(38 ~ 100) mm^2
KRS PW 0007 : 2006	Cadmium Copper Stranded Wire	(10 ~ 95) mm^2
KRS PW 0008 : 2016	Bronze Stranded Wire	(12 ~ 65) mm^2
KRS PW 0009 : 2016	Insulated Hard-drawn Copper Stranded Wire	200 mm^2
NEN-HD 620 S2 : 2012	Distribution cables with extruded insulation for rated voltages from 3,6/6 (7,2) kV up to and including 20,8/36 (42) kV	(16 ~ 1 200) mm^2
UL 94 : 2010	Tests for flammability of plastic materials for parts in devices and appliances	Up to 500 W
IEEE 1202 : 2012	IEEE Standard for Flame-Propagation Testing of Wire and Cable	Height: (3 353 ± 25) ㎜, Width: (2 438 ± 25) ㎜, Depth: (2 438 ± 25) ㎜
AS/NZS 1429.1 : 2006	Electric cables-Polymeric insulated Part 1: For working voltages 1.9/3.3(3.6) kV up to and including 19/33(36) kV	(16 ~ 1 600) mm^2
AS/NZS 1429.2 : 2009	Electric cables-Polymeric insulated Part 2: For working voltages above 19/33 (36) kV up to and including 87/150(170) kV	(95 ~ 2 000) mm^2
AS/NZS 5000.1 : 2005	Electric cables-Polymeric insulated Part 1: For working voltages up to and including 0.6/1(1.2) kV	(1 ~ 1 200) mm^2
AS/NZS 5000.2 : 2006	Electric cables-Polymeric insulated Part 2: For working voltages up to and including 450/750 V	(1 ~ 16) mm^2
RS-6145-0026 : 2005	Flame Retardant and Water-Proof Type Aerial Bundled Cable of 22.9 kV	(50 ~ 240) mm^2
ES-5340-0015 : 2014	Binding wires for copper conductors	Φ(2.0 ~ 5.0) mm
ES-5340-0016 : 2011	Binding wires for Aluminium conductors	Φ(4.0 ~ 5.0) mm

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Test Method	Standard designation	Test range
ES-5340-0017 : 2009	Binding wires for Insulated Wires	Φ(1.6 ~ 2.0) mm
ES-5935-0008 : 2014	Underground Cable Connection-Kit for Low-Voltage (Exception) 5.3.3 Water immerse test, 5.3.7 Heating Cycle test and Water immerse test, 5.3.8 Leakage current test, 5.3.12 Pressurization water immerse test, 5.3.13 Weatherproof test, 5.3.14 Connection-Kit thermal test, 5.3.15 Thermal condition bending test	(22 ~ 325) mm^2
ES-5935-0009 : 2010	23 kV CNCV Cable Termination and Joint Kits (Exception) 5.1.1.1 Tracking Resistance test, 5.1.1.2 Initial damage test, 5.1.1.3 Weatherproof test, 5.1.1.4 Water penetration test	(60 ~ 600) mm^2
ES-5935-0010 : 2014	Separable Insulated Elbow Connector For CNCV Cable (Exception) Short time current test, Switching test, Fault test, Current cycle test, Accelerated Leakage test, Cable jointing force test, Operation force test, Operation ring test, Test point cap, Shield test, X-Ray test, Insulated plug torque test	(60 ~ 600) mm^2
ES-6145-0001 : 2009	Galvanized Steel Wire Strands	(7/2.0 ~ 7/3.5) mm
ES-6145-0002 : 2014	CopperWiresforElectricalPurpose	(7/2.0 ~ 61/3.2) mm

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Test Method	Standard designation	Test range
ES-6145-0003 : 2010	Concentric-Lay-Stranded Copper-Clad Steel	(7/2.6 ~ 19/4.0) mm
ES-6145-0005 : 2011	Aluminium Stranded Conductors Steel Reinforced (ACSR)	(6/2.6 ~ 54/3.5) mm
ES-6145-0006 : 2012	ACSR/AW-OC for 22.9 kV-Y (ACSR/AW-OC)	(6/SB ~ 18/SB) mm
ES-6145-0007 : 2009	ACSR Outdoor Cross-linked Polyethylene Insulated Wires for 6.6 kV	6/SB mm
ES-6145-0012 : 2014	Concentric-Lay-Stranded Aluminium Clad Steel (AWS)	(17/3.2 ~ 19/3.7) mm
ES-6145-0013 : 2014	Out Door Weather Proof Polyvinyl Chloride Insulated Wires	(2.0 ~ 19/3.2) mm
ES-6145-0014 : 2014	Polyvinyl Chloride Insulated Drop Wires	(1/2.0 ~ 7/2.0) mm
ES-6145-0015 : 2014	450/750 V Grade Single-core Polyvinyl Chloride Insulated Wire for general purposes	(1.5 ~ 120) mm^2
ES-6145-0017 : 2012	22.9 kV and 6.6 kV Drop Wires for pole Transformers	(7/1.0 ~ 1/5.0) mm
ES-6145-0018 : 2013	Polyvinyl Chloride Insulated and Sheathed Control Cable	(95 ~ 150) mm^2
ES-6145-0019 : 2016	22.9 kV Concentric Neutral Type Crosslinked Polyethylene Insulated Halogen free Polyolefin Jacketed Water-proof Power Cables	(60 ~ 600) mm^2
ES-6145-0020 : 2014	Concentric-Lay-Stranded Aluminum Conductors Aluminum-Clad Steel Reinforced (ACSR/AW)	(32 ~ 160) mm^2
ES-6145-0021 : 2016	ACSR/AW-TR/OC	(58 ~ 240) mm^2
ES-6145-0022 : 2014	OC-W	(38 ~ 150) mm^2

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Test Method	Standard designation	Test range
ES-6145-0024 : 2014	TACSR : Thermal-resistant Aluminum-alloy Conductors Sreel Reinforced	(240 ~ 480) mm^2
ES-6145-0027 : 2009	22.9 kV Concentric Neutral type Tree Retardant XLPE Insulated PVC Sheathed Water-proof Power Cables (TR CNCV-W)	(60 ~ 600) mm^2
ES-6145-0029 : 2014	HSTACIR/AW ; High-Strength Super Thermal-Resistant Aluminum-Alloy Conductors, Aluminium-Clad Invar-Reinforced	(240 ~ 480) mm^2
ES-6145-0025 : 2016	22.9 kV Concentric Neutral Type Water Tree Retardant XLPE Insulated Extruded-to-Fill Polyethylene Jacketed Water-proof Power Cables	(60 ~ 600) mm^2
ES-6145-0026 : 2016	22.9 kV Concentric Neutral Type Water Tree Retardant XLPE Insulated Extruded-to-Fill Polyethylene Jacketed Water-proof Power Aluminium Cables	(60 ~ 600) mm^2
GS-6145-0076 : 2012	0.6/1 kV XLPE Insulated PVC Jacketed Water-proof Aluminium Power Cable	(35 ~ 300) mm^2
GS-6145-0077 : 2011	22.9kV XLPE Insulated Lead sheathed Single Wire Armored Water-proof Power Cables and Accessories	(60 ~ 600) mm^2
GS-6145-0078 : 2010	Aerial Spacer Cable for 22.9 kV	(35 ~ 240) mm^2
KS C 3404 : 2000	22.9 kV Concentric Neutral Type Power Cables	(38 ~ 1 000) mm^2
KS C IEC 60092-350 : 2001	Electrical installations in ships - Part 350 : General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	0.6 kV, 1 kV, 8.7 kV, 15 kV

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Test Method	Standard designation	Test range
KS C IEC 60092-353 : 2003	Electrical installations in ships - Part 353 : Power cables for rated voltages 1 kV and 3 kV	1 kV , 3 kV
KS C IEC 60092-354 : 2003	Electrical installations in ships - Part 354 : Single- and three-core power cables with extruded solid insulation for rated voltages 6 kV (Um = 7,2 kV) up to 30 kV (Um = 36 kV)	6 kV, 10 kV, 15 kV
KS C IEC 60092-375 : 2003	Electrical installations in ships－Part 375 : Shipboard telecommunication cables and radio-frequency cables－General instrumentation, control and communication cables	Up to 250 V
KS C IEC 60092-376 : 2003	Electrical installations in ships - Part 376 : Cables for control and instrumentation circuits 150/250 V (300 V)	250 V
KDC 6145-R4002 : 2006	Cable	(1.6 ~ 2.6) Ω/km
KDC6145-D4001 : 2003	1000 V Cable	(0 ~ 1) kV
6145-0053 : 1977	Power cable	(0 ~ 1) kV
6145-1298 : 1997	Cable, Special purpose, Electrical	(0 ~ 1) kV
GS-6145-0080 : 2016	ACSR/AW polyvinyl chloride insulated outdoor weather-proof wires	6/SB mm
GS-6145-0068 : 2016	22.9kV Concentric Neutral Type Water Tree Retardant XLPE Insulated Halogen free Polyolefin Jacketed Water-proof Power Aluminium Cables	(95 ~ 400)mm^2
GS-6145-0072 : 2013	High-tension Thermal-resistant Aluminum Stranded Conductors Aluminum-Clad Steel Reinforced	(0 ~ 22.9) kV
IEC 60799 : 1998	Electrical accessories - Cord sets and interconnection cord sets	Up to 16 A

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Test Method	Standard designation	Test range
IEC 60502－1 Ed. 2. 1 : 2009	Power cables with extruded insulation and their accessories for rated voltages from 1 kV (Um = 1,2 kV) up to 30 kV (Um = 36 kV) －Part 1 : Cables for rated voltages of 1 kV (Um = 1,2 kV) and 3 kV (Um = 3,6 kV)	(1 ~ 3) kV
IEC 60227-1 : 2007	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 1 : General requirements	Up to 450 V/750 V
IEC 60227-2 : 2003	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 2 : Test methods	Up to 450 V/750 V
IEC 60227-3 : 1997	Polyvinyl chloride insulated cables of rated voltages up to and including 450 / 750 V part 3 : Non-sheathed cable for fixed wiring	Up to 450 V/750 V
IEC 60227-5 : 2011	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 5 : Flexible cables (cords)	Up to 450 V/750 V
IEC 60227-7 : 2012	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 7 : Flexible cables screened and unscreened with two or more conductors	Up to 450 V/750 V
IEC 60245-1 : 2008	Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 1 : General requirements	Up to 450 V/750 V
IEC 60245-4 : 2011	Rubber insulated cables – Rated voltages up to and including 450/750 V – Part 4 : Cords and flexible cables	Up to 450 V/750 V
IEC 60245-6 : 2003	Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 6 : Arc welding electrode cables	Up to 450 V/750 V

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Test Method	Standard designation	Test range
IEC 60245-8 : 2012	Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 8 : Cords for applications requiring high flexibility	Up to 450 V/750 V
IEC 60227-4 : 1997	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 4 : Sheathed cables for fixed wiring	Up to 450 V/750 V
IEC 60227-6 : 2001	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 6 : Lift cables and cables for flexible connections	Up to 450 V/750 V
IEC 60245-2 : 1998	Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 2 : Test methods	Up to 450 V/750 V
IEC 60245-3 : 2011	Rubber insulated cables – Rated voltages up to and including 450/750 V – Part 3 : Heat resistant silicone rubber cables	Up to 450 V/750 V
IEC 60245-5 : 2003	Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 5 : Lift cables	Up to 450 V/750 V
IEC 60245-7 : 1997	Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 7 : Heat resistant ethylene-vinyl acetate rubber insulated cables	Up to 450 V/750 V
IEC 60502-2 ed. 3.0 : 2014	Power cables with extruded insulation and their accessories for rated voltages from 1 kV (Um = 1,2 kV) up to 30 kV (Um = 36 kV) - Part 2 : Cables for rated voltages from 6 kV (Um = 7,2 kV) up to 30 kV (Um = 36 kV)	(6 ~ 30) kV

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Test Method	Standard designation	Test range
IEC 60092-352 : 2005	Electrical installations in ships - Part 352 : Choice and installation of electrical cables	(0 ~ 15) kV
IEC 60230 Ed. 1.0 b : 1966	Impulse tests on cables and their accessories	(0 ~ 1 400) kV / 1 400 kJ
AEIC CS 5 : 1995	SPECIFICATIONS FOR CROSS-LINKED POLYETHYLENE INSULATED SHIELDED POWER CABLES RATED.5 THROUGH 46 KV	(5 ~ 46) kV
ICEA S-94-649 : 2004	SpecificationforImpregnated-Paper-InsulatedLowandsMediumPressureSelf-ContainedLiquidFilledCable	(5 ~ 46) kV
EN 50117-2-1 : 2005	Coaxial cables -- Part 2-1 : Sectional specification for cables used in cabled distribution networks - Indoor drop cables for systems operating at 5 MHz - 1 000 MHz	(5 ~ 1 000) MHz
EN 50117-2-2 : 2004	Coaxial cables -- Part 2-2 : Sectional specification for cables used in cabled distribution networks - Outdoor drop cables for systems operating at 5 MHz - 1 000 MHz	(5 ~ 1 000) MHz
EN 50117-2-3 : 2004	Coaxial cables -- Part 2-3 : Sectional specification for cables used in cabled distribution networks - Distribution and trunk cables for systems operating at 5 MHz - 1 000 MHz	(5 ~ 1 000) MHz
EN 50117-2-4 : 2004	Coaxial cables -- Part 2-4 : Sectional specification for cables used in cabled distribution networks - Indoor drop cables for systems operating at 5 MHz - 3 000 MHz	(5 ~ 3 000) MHz

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Test Method	Standard designation	Test range
EN 50117-2-5 : 2004	Coaxial cables -- Part 2-5 : Sectional specification for cables used in cabled distribution networks - Outdoor drop cables for systems operating at 5 MHz - 3 000 MHz	(5 ~ 3 000) MHz
EN 50117-3-1 : 2002	Coaxial cables -- Part 3-1 : Sectional specifications for cables used in Telecom applications - Miniaturized cables used in digital communication systems	Up to 150 V
EN 50117-4-1 : 2008	Coaxial cables -- Part 4-1 : Sectional specification for cables for BCT cabling in accordance with EN 50173 - Indoor drop cables for systems operating at 5 MHz - 3 000 MHz	(5 ~ 3 000) MHz
EN 50214 : 2006	Flat polyvinyl chloride sheathed flexible cables	Up to 450 V/750 V
EN 50288-2-1 : 2003	Multi-element metallic cables used in analogue and digital communication and control -- Part 2-1 : Sectional specification for screened cables characterised up to 100 MHz - Horizontal and building backbone cables	Up to 100 MHz
EN 50288-2-2 : 2003	Multi-element metallic cables used in analogue and digital communication and control -- Part 2-2 : Sectional specification for screened cables characterised up to 100 MHz - Work area and patch cord cables	Up to 100 MHz
EN 50288-3-1 : 2003	Multi-element metallic cables used in analogue and digital communication and control -- Part 3-1 : Sectional specification for unscreened cables characterised up to 100 MHz - Horizontal and building backbone cables	Up to 100 MHz

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Test Method	Standard designation	Test range
EN 50288-3-2 : 2003	Multi-element metallic cables used in analogue and digital communication and control -- Part 3-2 : Sectional specification for unscreened cables characterised up to 100 MHz - Work area and patch cord cables	Up to 100 MHz
EN 50288-4-1 : 2003	Multi-element metallic cables used in analogue and digital communication and control -- Part 4-1 : Sectional specification for screened cables characterised up to 600 MHz - Horizontal and building backbone cables	Up to 600 MHz
EN 50288-4-2 : 2003	Multi-element metallic cables used in analogue and digital communication and control -- Part 4-2 : Sectional specification for screened cables characterised up to 600 MHz - Work area and patch cord cables	Up to 600 MHz
EN 50288-5-1 : 2003	Multi-element metallic cables used in analogue and digital communication and control -- Part 5-1 : Sectional specification for screened cables characterized up to 250 MHz - Horizontal and building backbone cables	Up to 250 MHz
EN 50288-5-2 : 2003	Multi-element metallic cables used in analogue and digital communication and control -- Part 5-2 : Sectional specification for screened cables characterized up to 250 MHz - Work area and patch cord cables	Up to 250 MHz
EN 50288-6-1 : 2003	Multi-element metallic cables used in analogue and digital communication and control -- Part 6-1 : Sectional	Up to 250 MHz

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Test Method	Standard designation	Test range
	specification for unscreened cables characterised up to 250 MHz - Horizontal and building backbone cables	
EN 50288-6-2 : 2003	Multi-element metallic cables used in analogue and digital communication and control -- Part 6-2 : Sectional specification for unscreened cables characterised up to 250 MHz - Work area and patch cord cables	Up to 250 MHz
EN 50288-7 : 2005	Multi-element metallic cables used in analogue and digital communication and control -- Part 7 : Sectional specification for instrumentation and control cables	Up to 500 V
EN 50363-2-1 : 2005	Insulating, sheathing and covering materials for low voltage energy cables -- Part 2-1 : Cross-linked elastomeric sheathing compounds	Temperature : 60 ℃, 90 ℃, 110 ℃, 180 ℃
EN 50363-2-2 : 2005	Insulating, sheathing and covering materials for low voltage energy cables -- Part 2-2 : Cross-linked elastomeric covering compounds	Temperature : 85 ℃
EN 50363-3 : 2005	Insulating, sheathing and covering materials for low voltage energy cables -- Part 3 : PVC insulating compounds	Temperature : 70 ℃, 90 ℃
EN 50363-4-1 : 2005	Insulating, sheathing and covering materials for low voltage energy cables -- Part 4-1 : PVC sheathing compounds	Temperature : 70 ℃, 90 ℃
EN 50363-4-2 : 2005	Insulating, sheathing and covering materials for low voltage energy cables -- Part 4-2 : PVC covering compounds	Temperature : 70 ℃

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Test Method	Standard designation	Test range
EN 50363-5 : 2005	Insulating, sheathing and covering materials for low voltage energy cables -- Part 5 : Halogen-free, cross-linked insulating compounds	Temperature : 70 ℃, 90 ℃
EN 50363-6 : 2005	Insulating, sheathing and covering materials for low voltage energy cables -- Part 6 : Halogen-free, cross-linked sheathing compounds	Temperature : 70 ℃
EN 50363-7 : 2005	Insulating, sheathing and covering materials for low voltage energy cables -- Part 7 : Halogen-free, thermoplastic insulating compounds	Temperature : 70 ℃
EN 50363-8 : 2005	Insulating, sheathing and covering materials for low voltage energy cables -- Part 8 : Halogen-free, thermoplastic sheathing compounds	Temperature : 70 ℃
EN 50363-9-1 : 2005	Insulating, sheathing and covering materials for low voltage energy cables -- Part 9-1 : Miscellaneous insulating compounds - Cross-linked polyvinyl chloride (XLPVC)	Temperature : 70 ℃
EN 50363-10-1 : 2005	Insulating, sheathing and covering materials for low voltage energy cables -- Part 10-1 : Miscellaneous sheathing compounds - Cross-linked polyvinyl chloride (XLPVC)	Temperature : 70 ℃
EN 50363-10-2 : 2005	Insulating, sheathing and covering materials for low voltage energy cables -- Part 10-2 : Miscellaneous sheathing compounds - Thermoplastic polyurethane	Temperature : 90 ℃
EN 50369 : 2005	Liquid tight sheathing systems for cable management	(0 ~ 1) kV

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Test Method	Standard designation	Test range
EN 50525-2-11 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (Uo/U) -- Part 2-11 : Cables for general applications - Flexible cables with thermoplastic PVC insulation	Up to 450 V/750 V
EN 50525-2-12 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (Uo/U) -- Part 2-12 : Cables for general applications - Cables with thermoplastic PVC insulation for extensible leads	Up to 450 V/750 V
EN 50525-2-21 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (Uo/U) -- Part 2-21 : Cables for general applications - Flexible cables with crosslinked elastomeric insulation	Up to 450 V/750 V
EN 50525-2-22 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U) -- Part 2-22 : Cables for general applications - High flexibility braided cables with crosslinked elastomeric insulation	Up to 450 V/750 V
EN 50525-2-31 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U) -- Part 2-31 : Cables for general applications - Single core non-sheathed cables with thermoplastic PVC insulation	Up to 450 V/750 V
EN 50525-2-41 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U) -- Part 2-41 : Cables for general applications - Single core cables with crosslinked silicone rubber insulation	Up to 450 V/50 V

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Test Method	Standard designation	Test range
EN 50525-2-42 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U) -- Part 2-42 : Cables for general applications - Single core non-sheathed cables with crosslinked EVA insulation	Up to 450 V/750 V
EN 50525-2-51 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U) -- Part 2-51 : Cables for general applications - Oil resistant control cables with thermoplastic PVC insulation	Up to 450 V/750 V
EN 50525-2-71 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U) -- Part 2-71 : Cables for general applications - Flat tinsel cables (cords) with thermoplastic PVC insulation	Up to 450 V/750 V
EN 50525-2-72 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U) -- Part 2-72 : Cables for general applications - Flat divisible cables (cords) with thermoplastic PVC insulation	Up to 450 V/750 V
EN 50525-2-81 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U) -- Part 2-81 : Cables for general applications - Cables with crosslinked elastomeric covering for arc welding	Up to 450 V/750 V
EN 50525-2-82 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U) -- Part 2-82 : Cables for general applications -	Up to 450 V/750 V

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Test Method	Standard designation	Test range
	Cables with crosslinked elastomeric insulation for decorative chains	
EN 50525-2-83 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U) -- Part 2-83 : Cables for general applications - Multicore cables with crosslinked silicone rubber insulation	Up to 450 V/750 V
EN 50525-3-11 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U) -- Part 3-11 : Cables with special fire performance - Flexible cables with halogen-free thermoplastic insulation, and low emission of smoke	Up to 450 V/750 V
EN 50525-3-21 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U) -- Part 3-21 : Cables with special fire performance - Flexible cables with halogen-free crosslinked insulation, and low emission of smoke	Up to 450 V/750 V
EN 50525-3-31 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U) -- Part 3-31 : Cables with special fire performance - Single core non-sheathed cables with halogen-free thermoplastic insulation, and low emission of smoke	Up to 450 V/750 V
EN 50525-3-41 : 2011	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U) -- Part 3-41 : Cables with special fire performance -	Up to 450 V/750 V

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Test Method	Standard designation	Test range
	Single core non-sheathed cables with halogen-free crosslinked insulation, and low emission of smoke	
HD 21.3 S3 : 1995	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V -- Part 3 : Non-sheathed cables for fixed wiring	Up to 450 V/750 V
HD 21.4 S2 : 1990	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V -- Part 4 : Sheathed cables for fixed wiring	Up to 450 V/750 V
HD 21.5 S3 : 1994	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V -- Part 5 : Flexible cables (cords)	Up to 450 V/750 V
HD 21.7 S2 : 1996	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V -- Part 7 : Single core non-sheathed cables for internal wiring for a conductor temperature of 90° C	Up to 450 V/750 V
HD 21.8 S2 : 1999	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V -- Part 8 : Single core non-sheathed cables for decorative chains	Up to 450 V/750 V
HD 21.9 S2 : 1999	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V -- Part 9 : Single core non-sheathed cable for installation at low temperatures	Up to 450 V/750 V
HD 21.10 S2 : 2001	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V -- Part 10 : Extensible leads	Up to 450 V/750 V

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Test Method	Standard designation	Test range
HD 21.11 S1 : 1995	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V -- Part 11 : Cables for luminaires	Up to 450 V/750 V
HD 21.12 S1 : 1994	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V -- Part 12 : Heat-resistant flexible cables (cords)	Up to 450 V/750 V
HD 21.13 S1 : 1995	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V -- Part 13 : Oil resistant PVC sheathed cables with two or more conductors	Up to 450 V/750 V
HD 21.14 S1 : 2003	Cables of rated voltage up to and including 450/750 V and having thermoplastic insulation -- Part 14 : Flexible cables (cords), insulated and sheathed with halogen-free thermoplastic compounds	Up to 450 V/750 V
HD 21.15 S1 : 2006	Cables of rated voltages up to and including 450/750 V and having thermoplastic insulation -- Part 15 : Single core cables, insulated with halogen-free thermoplastic compound, for fixed wiring	Up to 450 V/750 V
HD 308 S2 : 2001	Identification of cores in cables and flexible cords	(0 ~ 1) kV
HD 603 S1/A3 : 2007	Distribution cables of rated 0.6/1kV	0.6 kV / 1 kV
HD 604 S1 : 1994	0.6/1 kV and 1.9/3.3 kV Power cables with special fire performance in power stations	0.6 kV / 1 kV, 1.9 kV / 3.3 kV

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Test Method	Standard designation	Test range
HD 622 S1/A2 : 2005	Power cables having rated voltage from 3.6/6(7.2) kV up to and including 20.8/36(42) kV with special fire performance for use in power stations	3.6 kV / 6 kV, 20.8 kV / 36 kV
HD 626 S1/A2 : 2002	Overhead distribution cables of rated voltage 0.6/1 kV	0.6/1 kV
HD 627 S1 : 1996	Multicore and multipair cables for installation above and belw ground	(0 ~ 1) kV
UL 758 : 2006	Appliance wiring material	Nominal cross-sectional area : 50 AWG ~ 2 000 kcmil
UL 4 : 2004	Armored Cable	(14 ~ 1) AWG
UL 1425 : 2005	Cables for Non-Power-Limited Fire-Alarm Circuits	Conductor diameter : (1.16 ~ 2.32) mm
UL 1424 : 2005	Cables for Power-Limited Fire-Alarm Circuits	Conductor diameter : (0.457 ~ 2.95) mm
UL 444 : 2008	Communications Cables	(30 ~ 6) AWG
UL 1655 : 2009	Community-Antenna Television Cables	Conductor diameter : (0.579 ~ 20.65) mm
UL 1690 : 2006	Data-Processing Cable	Nominal cross-sectional area : (30 ~ 15) AWG
UL 1426 : 2010	Electrical Cables for Boats	Nominal cross-sectional area : (3/0 ~ 18) AWG

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Test Method	Standard designation	Test range
UL 1277 : 2010	Electrical Power and Control Tray Cables with Optional Optical-Fiber Members	Nominal cross-sectional area : 18 AWG ~ 1 000 kcmil
UL 62 : 2010	Flexible Cord and Fixture Wire	(0 ~ 1) kV
UL 814 : 2011	Gas-Tube-Sign and Ignition Cable	(18 ~ 10) AWG
UL 2250 : 2006	Instrumentation Tray Cable	(22 ~ 12) AWG
UL 1063 : 2006	Machine-Tool Wires and Cables	Nominal cross-sectional area : 22 AWG ~ 1 000 kcmil
UL 1309 : 2011	Marine Shipboard Cable	Nominal cross-sectional area : 22 AWG ~ 2 000 kcmil
UL 1072 : 2006	Medium-Voltage Power Cables	Nominal cross-sectional area : 9 AWG ~ 2 000 kcmil
UL 1569 : 1999	Metal-Clad Cables	Nominal cross-sectional area : 12 AWG ~ 2 000 kcmil
UL 2225 : 2011	Metal-Clad Cables and Cable-Sealing Fittings for Use in Hazardous (Classified) Locations	(0 ~ 1) kV
UL 719 : 2006	Nonmetallic-Sheathed Cables	(14 ~ 2) AWG
UL 1651 : 2008	Optical Fiber Cable	(0 ~ 1) kV
UL 13 : 2011	Power-Limited Circuit Cables	(0.552 ~ 4.67) mm
UL 1581 : 2013	Reference Standard for Electrical Wires, Cables, and Flexible Cords	(0.071 ~ 460.0) mm
UL 854 : 2004	Service-Entrance Cables	(1.14 ~ 3.18) mm

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Test Method	Standard designation	Test range
UL 1666 : 2007	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts	0.002 5 mm
UL 493 : 2007	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables	(19.0 ~ 57.3) mm
UL 83 : 2008	Thermoplastic-Insulated Wires and Cables	(5.5 ~ 20.0) mm
UL 44 : 2010	Thermoset-Insulated Wires and Cables	(12.7 ~ 26.42) mm
UL 1685 : 2010	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables	(13 ~ 120) mm
MIL-DTL-24643B : 2002	Cables and cords, electric, low smoke, for shipboard use general specification for	(3 ~ 1 000) V

03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
KS C CISPR 11 : 2011	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 18 GHz
KS C CISPR 13 : 2011	Sound and television broadcast receivers and associated equipment - Radio disturbance characteristics - Limits and methods of measurement	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 18 GHz DP : 30 MHz ~ 300 MHz
KS C CISPR 14-1 : 2011	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1 : Emission	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 1 GHz DP : 30 MHz ~ 300 MHz

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03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
KS C CISPR 14-2 : 2011	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2 : Immunity - Product family standard	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 4 kV Surge : 12 kV CS : 150 kHz ~ 300 MHz V-Dip : Rated current less than 125 A
KS C CISPR 15 : 2011	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment	CE : 9 kHz ~ 30 MHz RE : 9 kHz ~ 1 GHz
KS C CISPR 20 : 2014	Sound and television broadcast receivers and associated equipment - Immunity characteristics - Limits and methods of measurement (Exception) 4.3.2 Requirements for input immunity to RF voltages(differential ode) of television receivers and associated video equipment with tuners (including satellite television receivers) 4.3.4 Requirements for screening effectiveness 4.7.1.2 Television broadcast receivers 4.7.1.3 Associated video tape equipment 5.2.3 Measurement procedure for video assessment 5.3.2 Measurement of television receivers and video tape equipment 5.5 Measurement of screening effectiveness	ESD : 30 kV EFT : 8 kV
KS C CISPR 22 : 2011	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 1 GHz
KS C CISPR 24 : 2014	Information technology equipment - Immunity characteristics - Limits and methods of measurement	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV

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03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
	(Exception) A.2.2 Particular performance criteria	Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
KS C CISPR 61000-6-3 : 2004	Electromagnetic compatibility (EMC) - Part 6-3 : Generic standards - Emission standard for residential, commercial and light-industrial environments	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz
KS C IEC 60601-1-2 : 2012	Medical electrical equipment - Part 1-2 : General requirements for basic safety and essential performance - Collateral Standard : Electromagnetic disturbances - Requirements and tests	CE : 150 kHz ~ 30 MHz RE : 9 kHz ~ 1 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
KS C IEC 60947-1 : 2014	Low-voltage switchgear and controlgear - Part 1 : General rules 7.3 Electro-Magnetic Compatibility	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
KS C IEC 61000-3-11 : 2014	Electromagnetic compatibility (EMC) - Part 3-11 : Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems - Equipment with rated current ≤ 75 A and subject to conditional connection	Rated current less than 125 A
KS C IEC 61000-3-12 : 2013	Electromagnetic compatibility (EMC) - Part 3-12 : Limits - Limits for harmonic	Rated current less than 125 A

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03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
	currents produced by equipment connected to public low-voltage systems with input current >16 A and ≤ 75 A per phase	
KS C IEC 61000-4-2 : 2010	Electromagnetic compatibility (EMC) - Part 4-2 : Testing and measurement techniques - Electrostatic discharge immunity test	ESD : 30 kV
KS C IEC 61000-4-3 : 2013	Electromagnetic compatibility (EMC) - Part 4-3 : Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	RS : 26 MHz ~ 6 GHz
KS C IEC 61000-4-4 : 2013	Electromagnetic compatibility (EMC) - Part 4-4 : Testing and measurement techniques - Electrical fast transient/burst immunity test	EFT : 8 kV
KS C IEC 61000-4-5 : 2014	Electromagnetic compatibility (EMC) - Part 4-5 : Testing and measurement techniques - Surge immunity test	Surge : 15 kV
KS C IEC 61000-4-6 : 2010	Electromagnetic compatibility (EMC) - Part 4-6 : Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	CS : 150 kHz ~ 300 MHz
KS C IEC 61000-4-8 : 2010	Electromagnetic compatibility (EMC) - Part 4-8 : Testing and measurement techniques - Power frequency magnetic field immunity test	M/F : 130 A/m(continuous), 1 000 A/m(short)
KS C IEC 61000-4-11 : 2008	Electromagnetic compatibility (EMC) - Part 4-11 : Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	Rated current less than 125 A
KS C IEC 61000-4-12 : 2008	Electromagnetic compatibility (EMC) - Part 4-12 : Testing and measurement techniques - Ring wave immunity test	Ring wave : 6 kV

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03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
KS C IEC 61000-4-13 : 2010	Electromagnetic compatibility (EMC) - Part 4-13 : Testing and measurement techniques - Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests	Rated current less than 125 A
KS C IEC 61000-4-14 : 2010	Electromagnetic compatibility (EMC) - Part 4-14 : Testing and measurement techniques - Voltage fluctuation immunity test for equipment with input current not exceeding 16 A per phase	Rated voltage less than 270 V
KS C IEC 61000-4-17 : 2010	Electromagnetic compatibility (EMC) - Part 4-17 : Testing and measurement techniques - Ripple on d.c. input power port immunity test	DC output voltage : 380 V
KS C IEC 61000-4-27 : 2014	Electromagnetic compatibility (EMC) - Part 4-27 : Testing and measurement techniques - Unbalance, immunity test for equipment with input current not exceeding 16 A per phase	Rated voltage less than 270 V
KS C IEC 61000-4-28 : 2010	Electromagnetic compatibility (EMC) - Part 4-28 : Testing and measurement techniques - Variation of power frequency, immunity test for equipment with input current not exceeding 16 A per phase	Rated current less than 125 A
KS C IEC 61000-6-1 : 2014	Electromagnetic compatibility (EMC) - Part 6-1 : Generic standards - Immunity for residential, commercial and light-industrial environments	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A

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03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
KS C IEC 61000-6-2 : 2014	Electromagnetic compatibility (EMC) - Part 6-2 : Generic standards - Immunity for industrial environments	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
KS C IEC 61000-6-4 : 2014	Electromagnetic compatibility (EMC) - Part 6-4 : Generic standards - Emission standard for industrial environments	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz
KS C IEC 61547 : 2014	Equipment for general lighting purposes - EMC immunity requirements	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
KS C IEC 62040-2 : 2008	Uninterruptible power systems (UPS) - Part 2 : Electromagnetic compatibility (EMC) requirements	CE : 150 kHz ~ 30 MHz RE : 10 kHz ~ 6 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
KS C IEC 62053-21 : 2003	Electricity metering equipment (a.c.) - Particular requirements - Part 21 : Static meters for active energy (classes 1 and 2) 5.5 Electromagnetic compatibility (EMC)	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV
KS C 0262 : 2014	Electromagnetic compatibility (EMC)	
KS C 4310 : 2013	Uninterruptible power system	-
KS C 4613 : 2011	Circuit-breaker incorporating residual current protection for industrial uses(CBR)	

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Test Method	Standard designation	Test range
KS C 1214 : 2010	Static meters for active/reactive energy(class 0.2, 0.5, 1.0, 2.0 for active energy and class 2.0, 3.0 for reactive energy) 7.17 Electromagnetic compatibility (EMC)	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz EFT : 8 kV Damped osc. : 100 kHz, 1 MHz(slow); 3 MHz, 10 MHz, 30 MHz(fast) RS : 80 MHz ~ 3 GHz CS : 150 kHz ~ 300 MHz ESD : 30 kV Surge : 15 kV
KS X IEC 60945 : 2005	Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results	CE : 10 kHz ~ 30 MHz RE : 150 kHz ~ 2 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz
KN 13 : 2008	Sound and television broadcast receivers and associated equipment - Radio disturbance characteristics - Limits and methods of measurement	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 18 GHz DP : 30 MHz ~ 300 MHz
KN 14-1 : 2014	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1 : Emission	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 1 GHz DP : 30 MHz ~ 300 MHz
KN 14-2 : 2014	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2 : Immunity - Product family standard	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz V-Dip : Rated current less than 125 A
KN 15 : 2015	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment	CE : 9 kHz ~ 30 MHz RE : 9 kHz ~ 1 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz

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Test Method	Standard designation	Test range
		EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
KN 22 : 2009	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 1 GHz
KN 24 : 2011	Information technology equipment - Immunity characteristics - Limits and methods of measurement (Exception) A.2.2 Particular performance criteria	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
KS C IEC 60533 : 2013	Electrical and electronic installations in ships - Electromagnetic compatibility	CE : 10 kHz ~ 30 MHz RE : 150 kHz ~ 2 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz V-Dip : Rated current less than 125 A
KS C 0304 : 2014	Method of measurement for the electromagnetic shielding effectiveness of planar materials 4. Near field shielding effectiveness of measurement (Exclusion)	30 MHz ~ 1.5 GHz
KOFEIS 0101-1 : 2015	Standards of model approval and inspection technology for automatic fire extinguisher	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz

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Test Method	Standard designation	Test range
KOFEIS 0301 : 2015	Standards of model approval and inspection technology for detector	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz
KOFEIS 0303 : 2015	Standards of model approval and inspection technology for transmitter	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz
KOFEIS 0304 : 2016	Standards of model approval and inspection technology for control unit	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz
KOFEIS 0309 : 2015	Standards of model approval and inspection technology for gas leakage alarm device	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz
KOFEIS 0401 : 2015	Standards of model approval and inspection technology for exit light	CE : 9 kHz ~ 30 MHz RE : 9 kHz ~ 1 GHz
KS C IEC 61000-4-16 : 2013	Electromagnetic compatibility (EMC) - Part 4-16 : Testing and measurement techniques - Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz	Voltage frequency : DC, 162/3 , 60 Hz
IEC 60601-1-2 : 2014	Medical electrical equipment - Part 1-2 : General requirements for basic safety and essential performance - Collateral Standard : Electromagnetic disturbances - Requirements and tests	CE : 150 kHz ~ 30 MHz RE : 9 kHz ~ 1 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A

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Test Method	Standard designation	Test range
IEC 60945 : 2002	Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results	CE : 10 kHz ~ 30 MHz RE : 150 kHz ~ 2 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz
IEC 60947-1 : 2014	Low-voltage switchgear and controlgear - Part 1 : General rules 7.3 Electro-Magnetic Compatibility	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
IEC 60974-10 : 2015	Arc welding equipment - Part 10 : Electromagnetic compatibility (EMC) requirements	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz V-Dip : Rated current less than 125 A
IEC 61000-3-2 : 2014	Electromagnetic compatibility (EMC) - Part 3-2 : Limits - Limits for harmonic current emissions (equipment input current ≤16 A per phase)	Rated current less than 125 A
IEC 61000-3-3 : 2013	Electromagnetic compatibility (EMC) - Part 3-3 : Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤16 A per phase and not subject to conditional connection	Rated current less than 125 A

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Test Method	Standard designation	Test range
IEC 61000-3-11 : 2000	Electromagnetic compatibility (EMC) - Part 3-11 : Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems - Equipment with rated current ≤ 75 A and subject to conditional connection	Rated current less than 125 A
IEC 61000-3-12 : 2011	Electromagnetic compatibility (EMC) - Part 3-12 : Limits - Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current >16 A and ≤ 75 A per phase	Rated current less than 125 A
IEC 61000-4-2 : 2008	Electromagnetic compatibility (EMC) - Part 4-2 : Testing and measurement techniques - Electrostatic discharge immunity test	ESD : 30 kV
IEC 61000-4-3 : 2010	Electromagnetic compatibility (EMC) - Part 4-3 : Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	RS : 26 MHz ~ 6 GHz
IEC 61000-4-4 : 2012	Electromagnetic compatibility (EMC) - Part 4-4 : Testing and measurement techniques - Electrical fast transient/burst immunity test	EFT : 8 kV
IEC 61000-4-5 : 2014	Electromagnetic compatibility (EMC) - Part 4-5 : Testing and measurement techniques - Surge immunity test	Surge : 15 kV
IEC 61000-4-6 : 2015	Electromagnetic compatibility (EMC) - Part 4-6 : Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	RS : 150 kHz ~ 300 MHz

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Test Method	Standard designation	Test range
IEC 61000-4-8 : 2009	Electromagnetic compatibility (EMC) - Part 4-8 : Testing and measurement techniques - Power frequency magnetic field immunity test	M/F : 130 A/m(continuous), 1 000 A/m(short)
IEC 61000-4-9 : 2001	Electromagnetic compatibility (EMC) - Part 4-9 : Testing and measurement techniques - Pulse magnetic field immunity test	Pulse M/F : 1 000 A/m
IEC 61000-4-11 : 2010	Electromagnetic compatibility (EMC) - Part 4-11 : Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	Rated current less than 125 A
IEC 61000-4-12 : 2006	Electromagnetic compatibility (EMC) - Part 4-12 : Testing and measurement techniques - Ring wave immunity test	Ring wave : 6 kV
IEC 61000-4-13 : 2015	Electromagnetic compatibility (EMC) - Part 4-13 : Testing and measurement techniques - Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests	Rated current less than 125 A
IEC 61000-4-14 : 2009	Electromagnetic compatibility (EMC) - Part 4-14 : Testing and measurement techniques - Voltage fluctuation immunity test for equipment with input current not exceeding 16 A per phase	Rated voltage less than 270 V
IEC 61000-4-17 : 2009	Electromagnetic compatibility (EMC) - Part 4-17 : Testing and measurement techniques - Ripple on d.c. input power port immunity test	DC output voltage : 380 V
IEC 61000-4-18 : 2011	Electromagnetic compatibility (EMC) - Part 4-18 : Testing and measurement techniques - Damped oscillatory wave immunity test	Damped osc. : 100 kHz, 1 MHz(slow); 3 MHz, 10 MHz, 30 MHz(fast)

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Test Method	Standard designation	Test range
IEC 61000-4-27 : 2014	Electromagnetic compatibility (EMC) - Part 4-27 : Testing and measurement techniques - Unbalance, immunity test for equipment with input current not exceeding 16 A per phase	Rated voltage less than 270 V
IEC 61000-4-28 : 2009	Electromagnetic compatibility (EMC) - Part 4-28 : Testing and measurement techniques - Variation of power frequency, immunity test for equipment with input current not exceeding 16 A per phase	Rated current less than 125 A
IEC 61000-4-29 : 2000	Electromagnetic compatibility (EMC) - Part 4-29 : Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests	DC output voltage : 380 V
IEC 61000-6-1 : 2016	Electromagnetic compatibility (EMC) - Part 6-1 : Generic standards - Immunity for residential, commercial and light-industrial environments	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
IEC 61000-6-2 : 2016	Electromagnetic compatibility (EMC) - Part 6-2 : Generic standards - Immunity for industrial environments	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m(continuous), 1 000 A/m(short) V-Dip : Rated current less than 125 A
IEC 61000-6-3 : 2011	Electromagnetic compatibility (EMC) - Part 6-3 : Generic standards - Emission standard for residential, commercial and light-industrial environments	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz

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03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
IEC 61000-6-4 : 2011	Electromagnetic compatibility (EMC) - Part 6-4 : Generic standards - Emission standard for industrial environments	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz
IEC 61547 : 2009	Equipment for general lighting purposes - EMC immunity requirements	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
IEC 62040-2 : 2016	Uninterruptible power systems (UPS) - Part 2 : Electromagnetic compatibility (EMC) requirements	CE : 150 kHz ~ 30 MHz RE : 10 kHz ~ 6 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
IEC 62233 : 2005	Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure	Less than 400 kHz
IEC 62311 : 2007	Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)	Less than 400 kHz
CISPR 11 : 2016	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement	CE : 9 kHz ~ 30 MHz RE : 30 MHz ~ 18 GHz
CISPR 13 : 2015	Sound and television broadcast receivers and associated equipment - Radio disturbance characteristics - Limits and methods of measurement	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 18 GHz DP : 30 MHz ~ 300 MHz

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Test Method	Standard designation	Test range
CISPR 14-1 : 2011	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1 : Emission	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 1 GHz DP : 30 MHz ~ 300 MHz
CISPR 14-2 : 2015	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2 : Immunity - Product family standard	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz V-Dip : Rated current less than 125 A
CISPR 15 : 2015	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment	CE : 9 kHz ~ 30 MHz RE : 9 kHz ~ 1 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
CISPR 20 : 2013	Sound and television broadcast receivers and associated equipment - Immunity characteristics - Limits and methods of measurement (Exception) 4.3.2 Requirements for input immunity to RF voltages(differential ode) of television receivers and associated video equipment with tuners (including satellite television receivers) 4.3.4 Requirements for screening effectiveness 4.7.1.2 Television broadcast receivers 4.7.1.3 Associated video tape equipment 5.2.3 Measurement procedure for video assessment	ESD : 30 kV EFT : 8 kV

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03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
	5.3.2 Measurement of television receivers and video tape equipment 5.5 Measurement of screening effectiveness	
CISPR 22 : 2008	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz
CISPR 24 : 2015	Information technology equipment - Immunity characteristics - Limits and methods of measurement (Exception) A.2.2. Measurment method : sound pressure level (spl)	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
CISPR 25 : 2008	Vehicles, boats and intenal combustion engines – Radio disturbance characteristics -Limits and methods of measurement for the protection of on-board receivers (Exception) 5. Measurement of emissions receiced by an antenna on the same vehicle 6.5 Radiated emissions from components/modules – TEM cell method 6.6 Radiated emissions from components/modules – Stripline method	CE : 150 kHz ~ 108 MHz RE : 150 kHz ~ 18 GHz
EN 50121-2 : 2015	Railway applications - Electromagnetic compatibility - Part 2 : Emission of the whole railway system to the outside world	RE : 9 kHz ~ 1 GHz
EN 50121-3-1 : 2015	Railway applications - Electromagnetic compatibility - Part 3-1 : Rolling stock - Train and complete vehicle	RE : 9 kHz ~ 1 GHz
EN 50121-3-2 : 2015	Railway applications - Electromagnetic compatibility - Part 3-2 : Rolling stock - Apparatus	CE : 9 kHz ~ 30 MHz THD 50 Hz ~ 2 kHz RE : 30 MHz ~ 6 GHz ESD : 8 kV RS : 80 MHz ~ 6 GHz EFT : 2 kV Surge : 2 kV CS : 150 kHz ~ 80 MHz

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Test Method	Standard designation	Test range
EN 50121-4 : 2015	Railway applications - Electromagnetic compatibility - Part 4 : Emission and immunity of the signalling and telecommunications apparatus	CE : 9 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m Pulse M/F : 1 000 A/m
EN 50121-5 : 2015	Railway applications - Electromagnetic compatibility - Part 5 : Emission and immunity of fixed power supply installations and apparatus	CE : 9 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz
EN 50130-4 : 2014	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	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
EN 50293 : 2012	Electromagnetic compatibility - Road traffic signal systems - Product standard	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A

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Test Method	Standard designation	Test range
EN 55011 : 2010	Industrial, scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement	CE : 150 kHz ~ 30 MHz RE : 9 kHz ~ 18 GHz
EN 55013 : 2013	Sound and television broadcast receivers and associated equipment - Radio disturbance characteristics - Limits and methods of measurement	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 18 GHz DP : 30 MHz ~ 300 MHz
EN 55014-1 : 2011	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1 : Emission	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 1 GHz DP : 30 MHz ~ 300 MHz
EN 55014-2 : 2015	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2 : Immunity - Product family standard	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz V-Dip : Rated current less than 125 A
EN 55015 : 2015	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment	CE : 9 kHz ~ 30 MHz RE : 9 kHz ~ 1 GHz
EN 55020 : 2011	Sound and television broadcast receivers and associated equipment - Immunity characteristics - Limits and methods of measurement (Exception) 4.3.2 Requirements for input immunity to RF voltages(differential mode)of television receivers and	ESD : 30 kV EFT : 8 kV

03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
	associated video equipment with tuners(including satellite television receivers) 4.3.4 Requirements for screening effectiveness 4.7.1.2 Television broadcast receivers 4.7.1.3 Associated video tape equipment 5.2.3 Measurement procedure for video assessment 5.3.2 Measurement of television receivers and video tape equipment 5.5 Measurement of screening effectiveness	
EN 55022 : 2012	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 1 GHz
EN 55024 : 2015	Information technology equipment - Immunity characteristics - Limits and methods of measurement (Exception) A.2.2. Measurment method : sound pressure level (spl)	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz V-Dip : Rated current less than 125 A
EN 60945 : 2002	Maritime navigation and radio communication equipment and systems - General requirements - Methods of testing and required test results 9. Electromagnetic emission 10. Immunity to electromagnetic environment	CE : 10 kHz ~ 30 MHz RE : 150 kHz ~ 2 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz
EN 60947-1 : 2011	Low-voltage switchgear and controlgear - Part 5-1 : Control circuit devices and	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz

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Test Method	Standard designation	Test range
	switching elements - Electromechanical control circuit devices 7.3 Electro-Magnetic Compatibility	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
EN 61000-3-2 : 2014	Electromagnetic compatibility (EMC) - Part 3-2 : Limits - Limits for harmonic current emissions (equipment input current ≤16 A per phase)	Rated current less than 125 A
EN 61000-3-3 : 2013	Electromagnetic compatibility (EMC) - Part 3-3 : Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection	Rated current less than 125 A
EN 61000-3-11 : 2001	Electromagnetic compatibility (EMC) - Part 3-11 : Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems - Equipment with rated current ≤75 A and subject to conditional connection	Rated current less than 125 A
EN 61000-3-12 : 2011	Electromagnetic compatibility (EMC) - Part 3-12 : Limits - Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ≤ 75 A per phase	Rated current less than 125 A
EN 61000-4-2 : 2009	Electromagnetic compatibility (EMC) - Part 4-2 : Testing and measurement techniques - Electrostatic discharge immunity test	ESD : 30 kV

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03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
EN 61000-4-3 : 2010	Electromagnetic compatibility (EMC) - Part 4-3 : Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	RS : 26 MHz ~ 6 GHz
EN 61000-4-4 : 2012	Electromagnetic compatibility (EMC) - Part 4-4 : Testing and measurement techniques - Electrical fast transient/burst immunity test	EFT : 8 kV
EN 61000-4-5 : 2014	Electromagnetic compatibility (EMC) - Part 4-5 : Testing and measurement techniques - Surge immunity test	Surge : 15 kV
EN 61000-4-6 : 2014	Electromagnetic compatibility (EMC) - Part 4-6 : Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	CS : 150 kHz ~ 300 MHz
EN 61000-4-8 : 2010	Electromagnetic compatibility (EMC) - Part 4-8 : Testing and measurement techniques - Power frequency magnetic field immunity test	M/F : 130 A/m(continuous), 1 000 A/m(short)
EN 61000-4-9 : 2001	Electromagnetic compatibility (EMC) - Part 4-9 : Testing and measurement techniques - Pulse magnetic field immunity test	Pulse M/F : 1 000 A/m
EN 61000-4-11 : 2004	Electromagnetic compatibility (EMC) - Part 4-11 : Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	Rated current less than 125 A
EN 61000-4-12 : 2006	Electromagnetic compatibility (EMC) Part 4-12 : Testing and measurement techniques - Ring wave immunity test	Ring wave : 6 kV
EN 61000-4-13 : 2009	Electromagnetic compatibility (EMC) Part 4-13 : Testing and measurement techniques - Harmonics and interharmonics including mains	Rated current less than 125 A

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Test Method	Standard designation	Test range
	signalling at a.c. power port, low frequency immunity tests	
EN 61000-4-14 : 2009	Electromagnetic compatibility (EMC) — Part 4-14 : Testing and measurement techniques — Voltage fluctuation immunity test for equipment with input current not exceeding 16 A per phase	Rated voltage less than 270 V
EN 61000-4-27 : 2009	Electromagnetic compatibility (EMC) Part 4-27 : Testing and measurement techniques - Unbalance, immunity test for equipment with input current not exceeding 16 A per phase	Rated voltage less than 270 V
EN 61000-4-28 : 2009	Electromagnetic compatibility (EMC) - Part 4-28 : Testing and measurement techniques - Variation of power frequency, immunity test for equipment with input current not exceeding 16 A per phase	Rated current less than 125 A
EN 61000-4-29 : 2001	Electromagnetic compatibility (EMC) –Part 4-29 : Testing and measurement techniques –Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests	DC output voltage : 380 V
EN 61000-6-1 : 2007	Electromagnetic compatibility (EMC) - Part 6-1 : Generic standards - Immunity for residential, commercial and light-industrial environments	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
EN 61000-6-2 : 2005	Electromagnetic compatibility (EMC) - Part 6-2 : Generic standards -	ESD : 30 kV RS : 80 MHz ~ 3 GHz

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Test Method	Standard designation	Test range
	Immunity for industrial environments	EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
EN 61000-6-3 : 2011	Electromagnetic compatibility (EMC) - Part 6-3 : Generic standards - Emission standard for residential, commercial and light-industrial environments	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz
EN 61000-6-4 : 2011	Electromagnetic compatibility (EMC) - Part 6-4 : Generic standards - Emission standard for industrial environments	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz
EN 61547 : 2009	Equipment for general lighting purposes - EMC immunity requirements	ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
EN 62040-2 : 2006	Uninterruptible power systems (UPS) - Part 2 : Electromagnetic compatibility (EMC) requirements	CE : 150 kHz ~ 30 MHz RE : 10 kHz ~ 6 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
AS/NZS 3652 : 2000	Electromagnetic compatibility - Arc welding equipment	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz

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Test Method	Standard designation	Test range
		EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz V-Dip : Rated current less than 125 A
AS/NZS 4251.1 : 1999	Electromagnetic compatibility (EMC) - Generic emission standard - Residential, commercial and light industry	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz
AS/NZS 4251.2 : 1999	Electromagnetic compatibility - Generic emission standard - Industrial environments	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz
AS/NZS CISPR 11 : 2011	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement	CE : 9 kHz ~ 30 MHz RE : 30 MHz ~ 18 GHz
AS/NZS CISPR 13 : 2012	Sound and television broadcast receivers and associated equipment - Radio disturbance characteristics - Limits and methods of measurement	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 18 GHz DP : 30 MHz ~ 300 MHz
AS/NZS CISPR 14-1 : 2013	Sound and television broadcast receivers and associated equipment - Radio disturbance characteristics - Limits and methods of measurement - Part 1 : Emission	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 1 GHz DP : 30 MHz ~ 300 MHz
AS/NZS CISPR 15 : 2011	Sound and television broadcast receivers and associated equipment - Radio disturbance characteristics - Limits and methods of measurement	CE : 9 kHz ~ 30 MHz RE : 9 kHz ~ 1 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 4 kV Surge : 12 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
AS/NZS CISPR 22 : 2009	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz
ASTM D4935-10	Standard Test Method for Measuring the Electromagnetic Shielding Effectiveness of Planar Materials	30 MHz ~ 1.5 GHz

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Test Method	Standard designation	Test range
FCC PART 15 : 2013	Radio Frequency Devices (Exception)Larger than 18 GHz	CE : 150 kHz ~ 30 MHz RE : 9 kHz ~ 18 GHz
FCC PART 18 : 2013	Industrial, Scientific and Medical equipment (Exception)Larger than 18 GHz	CE : 150 kHz ~ 30 MHz RE : 9 kHz ~ 18 GHz
IEEE-STD-299 : 2006	IEEE Standard Method for Measuring the Effectiveness of Electromagnetic Shielding Enclosures	9 kHz ~ 18 GHz
MIL-STD-188-125-1 : 2005	High-altitude electromagnetic pulse(HEMP) protection for ground-based C4I facilities performing critical, time-urgent missions part 1 fixed facilities (Exception) - Long pulse	SE : 10 kHz ~ 1 GHz PCI : 5 kA CWI : 100 kHz ~ 1 GHz
IEC 60533 : 1999	Electrical and electronic installations in ships - Electromagnetic compatibility	CE : 10 kHz ~ 30 MHz RE : 150 kHz ~ 2 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz V-Dip : Rated current less than 125 A
EN 60601-1-2 : 2007	Medical electrical equipment - Part 1-2 : General requirements for basic safety and essential performance - Collateral standard : Electromagnetic compatibility - Requirements and tests	CE : 150 kHz ~ 30 MHz RE : 9 kHz ~ 1 GHz ESD : 30 kV RS : 80 MHz ~ 3 GHz EFT : 8 kV Surge : 15 kV CS : 150 kHz ~ 300 MHz M/F : 130 A/m V-Dip : Rated current less than 125 A
IEC 61000-4-16 : 2015	Electromagnetic compatibility (EMC) - Part 4-16 : Testing and measurement techniques	Voltage frequency : DC, 162/3 , 60 Hz

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03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
	- Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz	
EN 61000-4-16 : 2016	Electromagnetic compatibility (EMC). Testing and measurement techniques. Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz	Voltage frequency : DC, 162/3 , 60 Hz
MIL-STD-188-125-2 : 2005	High-altitude electromagnetic pulse(HEMP) protection for ground-based C4I facilities performing critical, time-urgent missions part 2 transportable systems (Exception) - PCI Long Pulse, CWI, TLI	SE : 10 kHz ~ 1 GHz PCI : 5 kA
MIL-STD-220C : 2009	Method of insertion loss measurement	10 kHz ~ 3 GHz
MIL-STD-461F : 2007	Requirements for the control of electromagnetic interference characteristics of subsystems and equipment 5.4 CE101, conducted emissions, power leads, 30 Hz to 10kHz 5.5 CE102, conducted emissions, power leads, 10 kHz to 10 MHz 5.7 CS101, conducted susceptibility, power leads, 30 Hz to 150 kHz 5.11 CS106, conducted susceptibility, transients,	CE101 : 30 Hz ~ 10 kHz CE102 : 10 kHz ~ 10 MHz CS101 : 30 Hz ~ 150 kHz CS106 : 400 V

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03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
	power leads 5.13 CS114, conducted susceptibility, bulk cable injection, 10 kHz to 200 MHz 5.14 CS115, conducted susceptibility, bulk cable injection, impulse excitation 5.15 CS116, conducted susceptibility, damped sinusoidal transients, cables and power leads, 10 kHz to 100 MHz 5.16 RE101, radiated emissions, magnetic field, 30 Hz to 100 KHz 5.17 RE102, radiated emissions, electric field, 10 KHz to 18 GHz 5.19 RS101, radiated susceptibility, magnetic field, 30 Hz to 100 kHz 5.20 RS103, radiated susceptibility, electric field, 2 MHz to 40 GHz	CS114 : 10 kHz ~ 200 MHz CS115 : 5 A CS116 : 10 kHz ~ 100 MHz RE101 : 30 Hz ~ 100 kHz RE102 : 10 kHz ~ 18 GHz RS101 : 30 Hz ~ 100 kHz RS103 : 2 MHz ~ 18 GHz
MIL-STD-461E : 1999	Requirements for the control of electromagnetic interference characteristics of subsystems and equipment 5.4 CE101, conducted emissions, power leads, 30 Hz to 10kHz 5.5 CE102, conducted emissions, power leads, 10 kHz to 10 MHz 5.7 CS101, conducted susceptibility, power leads, 30 Hz to 150 kHz 5.12 CS114, conducted susceptibility, bulk cable injection, 10 kHz to 200 MHz 5.13 CS115, conducted susceptibility, bulk cable injection, impulse excitation 5.14 CS116, conducted susceptibility, damped sinusoidal transients, cables and power leads, 10 kHz to 100 MHz	CE101 : 30 Hz ~ 10 kHz CE102 : 10 kHz ~ 10 MHz CS101 : 30 Hz ~ 150 kHz CS114 : 10 kHz ~ 200 MHz CS115 : 5 A CS116 : 10 kHz ~ 100 MHz

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Test Method	Standard designation	Test range
	5.15 RE101, radiated emissions, magnetic field, 30 Hz to 100 KHz 5,16 RE102, radiated emissions, electric field, 10 KHz to 18 GHz 5.18 RS101, radiated susceptibility, magnetic field, 30 Hz to 100 kHz 5.19 RS103, radiated susceptibility, electric field, 2 MHz to 40 GHz	RE101 : 30 Hz ~ 100 kHz RE102 : 10 kHz ~ 18 GHz RS101 : 30 Hz ~ 100 kHz RS103 : 2 MHz ~ 18 GHz
ISO 7637-1 : 2002	Road vehicles – Electrical disturbances from conduction and coupling – Part 1 : Definitions and general considerations	Input power : dc 60 V , 50 A
ISO 7637-2 : 2011	Road vehicles – Electrical disturbances from conduction and coupling – Part 2 : Electrical transient conduction along supply lines only	Input power : dc 60 V , 50 A
ISO 7637-3 : 2007	Road vehicles – Electrical disturbances from conduction and coupling – Part 3 : Electrical transient transmission by capacitive and inductive coupling via lines other than supplu lines	Input power : dc 60 V , 50 A
ISO 10605 : 2008	Road vehicles – Test methods for electrical disturbances from electrostatic discharge	ESD : ± 30 kV
ISO 11452-1 : 2005	Road vehicles – Component test methods for electrical disturbances from narrowband radiated electromagnetic energy – Part 1 : General principles and terminology	-
ISO 11452-2 : 2004	Road vehicles – Component test methods for electrical disturbances from narrowband radiated electromagnetic energy – Part 2 : Absorber-lined shielded enclosure	80 MHz ~ 18 GHz

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03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
ISO 11452-4 : 2011	Road vehicles — Component test methods for electrical disturbances from narrowband radiated electromagnetic energy — Part 4: Harness excitation methods	BCI : 1 MHz ~ 400 MHz
SAE J1113/4 : 2014	Immunity to Radiated Electromagnetic Fields-Bulk Current Injection (BCI) Method	BCI : 1 MHz ~ 400 MHz
SAE J1113/11 : 2012	Immunity to Conducted Transients on Power Leads	Input power : dc 60 V , 50 A
SAE J1113/12 : 2006	Electrical Interference by Conduction and Coupling - Capacitive and Inductive Coupling via Lines Other than Supply Lines	Input power : dc 60 V , 50 A
SAE J1113/13 : 2011	Electromagnetic Compatibility Measurement Procedure for Vehicle Components--Part 13: Immunity to Electrostatic Discharge	ESD : ± 30 kV
SAE J1113/21 : 2005	Electronmagnetic Compatibility Measurement Procedure for Vehicle Components - Part 21: Immunity to Electromagnetic Fields, 30 MHz to 18 GHz, Absorber-Lined Chamber	RS : 10 kHz ~ 3 GHz , 200 V/m
ES 96200-00 : 2011	ELECTROMAGNETIC COMPATIBILITY SPECIFICATION (HYUNDAI-KIA MOTORS 12 V) (Exception) 4.3 Test method - TEM cell testing	CE : 150 kHz ~ 108 MHz RE : 150 kHz ~ 18 GHz ESD : ± 30 kV RS : 10 kHz ~ 3 GHz

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Test Method	Standard designation	Test range
	- Stripline testing	, 200 V/m BCI : 20 MHz ~ 3 GHz
ES 96202-01 : 2012	ELECTROMAGNETIC COMPATIBILITY SPECIFICATION (HYUNDAI-KIA MOTORS 24 V)	CE : 150 kHz ~ 108 MHz RE : 150 kHz ~ 18 GHz ESD : ± 30 kV RS : 10 kHz ~ 3 GHz , 200 V/m BCI : 20 MHz ~ 3 GHz
GMW3097 : 2012	General Specification for Electrical/Electronic Components and Subsystems, Electromagnetic Compatibility (Exception) 3.4.3 Reverberation Chamber, Mode Tuning 3.4.4 Magnetic Field	BCI : 1 MHz ~ 400 MHz
GMW3100 : 2003	General Specification for Electrical/Electronic Components and Subsystems, Electromagnetic Compatibility- Verification (Exception) 3.4.3 Reverberation Chamber, Mode Tuning 3.4.4 Magnetic Field	Input power : dc 60 V , 50 A
GMW3172 : 2012	General Specification for Electrical/Electronic Component – Environmental/Durability	Input power : dc 60 V , 50 A
R-10.04 : 2012	Uniform provisions conerning the approval of vehicles with regard to electromagnetic compatibility (Exception) 4.2 TEM cell testing Annex 4 : Method of measurement of	CE : 150 kHz ~ 108 MHz RE : 150 kHz ~ 18 GHz ESD : ± 30 kV RS : 10 kHz ~ 3 GHz

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03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
	radiated broadband electromagnetic emission from vehicles Annex 5 : Method of measurement of radiated narrowband electromagnetic emission from vehicles Annex 6 : Method of testing for immunity of vehicle to electromagnetic radiation	, 200 V/m BCI : 20 MHz ~ 3 GHz
R-10.05 : 2014	Uniform provisions conerning the approval of vehicles with regard to electromagnetic compatibility (Exceptions) 4.2 TEM cell testing 4.4 Stripline testing Annex 4 : Method of measurement of radiated broadband electromagnetic emission from vehicles Annex 5 : Method of measurement of radiated narrowband electromagnetic emission from vehicles Annex 6 : Method of testing for immunity of vehicle to electromagnetic radiation	CE : 150 kHz ~ 108 MHz RE : 150 kHz ~ 18 GHz ESD : ± 30 kV RS : 10 kHz ~ 3 GHz , 200 V/m BCI : 20 MHz ~ 3 GHz
ECE R-97.01 : 2007	Uniform provisions concerning the approval for vehicle alarm systems and of motor vehicles with regard to their alarm systems	CE : 150 kHz ~ 108 MHz RE : 150 kHz ~ 18 GHz ESD : ± 30 kV RS : 10 kHz ~ 3 GHz , 200 V/m BCI : 20 MHz ~ 3 GHz
ECE R-116 : 2016	Uniform technical prescription concerning the protection of motor vehicles against unauthorized use	CE : 150 kHz ~ 108 MHz RE : 150 kHz ~ 18 GHz ESD : ± 30 kV RS : 10 kHz ~ 3 GHz , 200 V/m BCI : 20 MHz ~ 3 GHz

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03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
DMFC 4-40-70 : 2012	Electromagnetic waves protection facility designing standard Chapter 4. HEMP protection facility performance test procedure 4-1. SE(shield effectiveness) test procedure 4-2. PCI(pulsed current injection) test procedure 4-3. CWI(continuous wave immersion) test procedure 4-4. SELDS(shielded enclosure leak detection system) inspection procedure	SE : 10 kHz ~ 1 GHz PCI : 5 kA CWI : 100 kHz ~ 1 GHz SELDS : 95 kHz, 1 A
IEC 60945 : 2008	Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results	CE : 10 kHz ~ 30 MHz RE : 150 kHz ~ 2 GHz ESD : 8 kV RS : 80 MHz ~ 2 GHz EFT : 2 kV Surge : 1 kV CS : 150 kHz ~ 80 MHz, V-Dip : Rated current less than 125 A
EN 50121-3-2 : 2008	Railway applications - Electromagnetic compatibility - Part 3-2 : Rolling stock - Apparatus	CE : 9 kHz ~ 30 MHz RE : 30 MHz ~ 1 GHz ESD : 8 kV RS : 80 MHz ~ 2.5 GHz EFT : 2 kV Surge : 2 kV CS : 150 kHz ~ 80 MHz
EN 50121-4 : 2008	Railway applications - Electromagnetic compatibility - Part 4 : Emission and immunity of the signalling and telecommunications apparatus	CE : 9 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz ESD : 8 kV RS : 80 MHz ~ 2.5 GHz EFT : 2 kV Surge : 2 kV CS : 150 kHz ~ 80 MHz M/F : 130 A/m Pulse M/F : 300 A/m

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03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
EN 50121-5 : 2017	Railway applications - Electromagnetic compatibility - Part 5 : Emission and immunity of fixed power supply installations and apparatus	CE : 150 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz ESD : 8 kV RS : 80 MHz ~ 6 GHz EFT : 4 kV Surge : 4 kV CS : 150 kHz ~ 80 MHz M/F : 130 A/m Pulse M/F : 300 A/m, Damped : 2.5 kV
IEC 62236-3-2 : 2008	Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock - Apparatus	CE : 9 kHz ~ 30 MHz RE : 30 MHz ~ 1 GHz ESD : 8 kV RS : 80 MHz ~ 2.5 GHz EFT : 2 kV Surge : 2 kV CS : 150 kHz ~ 80 MHz
IEC 62236-4 : 2008	Railway applications - Electromagnetic compatibility - Part 4: Emission and immunity of the signalling and telecommunications apparatus	CE : 9 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz ESD : 8 kV RS : 80 MHz ~ 2.5 GHz EFT : 2 kV Surge : 2 kV CS : 150 kHz ~ 80 MHz M/F : 130 A/m Pulse M/F : 300 A/m
IEC 62236-5 : 2008	Railway applications - Electromagnetic compatibility - Part 5: Emission and immunity of fixed power supply installations and apparatus	CE : 9 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz ESD : 8 kV RS : 80 MHz ~ 2.5 GHz EFT : 2 kV Surge : 2 kV CS : 150 kHz ~ 80 MHz M/F : 130 A/m Pulse M/F : 300 A/m

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Test Method	Standard designation	Test range
IEEE-STD-299.1 : 2013	IEEE Standard Method for Measuring the Shielding Effectiveness of Enclosures and Boxes Having all Dimensions between 0.1 m and 2 m	Part I - 0.75 m to 2 m SE : 10 kHz ~ 18 GHz
MIL-STD-461G : 2015	DEPARTMENT OF DEFENSE INTERFACE STANDARD 5.4 CE101, conducted emissions, audio frequency currents, power leads 5.5 CE102, conducted emissions, radio frequency potential, power leads 5.7 CS101, conducted susceptibility, power leads 5.12 CS114, conducted susceptibility, bulk cable injection 5.13 CS115, conducted susceptibility, bulk cable injection, impulse excitation 5.14 CS116, conducted susceptibility, damped sinusoidal transients, cables and power leads 5.17 RE101, radiated emissions, magnetic field 5.18 RE102, radiated emissions, electric field 5.20 RS101, radiated susceptibility, magnetic field 5.21 RS103, radiated susceptibility, electric field	CE101 : 30 Hz ~ 10 kHz CE102 : 10 kHz ~ 10 MHz CS101 : 30 Hz ~ 150 kHz CS114 : 10 kHz ~ 200 MHz CS115 : 5 A CS116 : 10 kHz ~ 100 MHz RE101 : 30 Hz ~ 100 kHz RE102 : 10 kHz ~ 18 GHz RS101 : 30 Hz ~ 100 kHz RS103 : 2 MHz ~ 100 MHz(50 V/m), 100 MHz ~ 18 GHz(200 V/m)
KS C IEC 62236-3-2 : 2006	Railway applications－Electromagnetic compatibility－Part 3－2 : Rolling stock－Apparatus	CE : 9 kHz ~ 30 MHz RE : 30 MHz ~ 1 GHz ESD : 8 kV RS : 80 MHz ~ 2.5 GHz EFT : 2 kV Surge : 2 kV CS : 150 kHz ~ 80 MHz V-Dip : Rated current less than 125 A
KS C IEC 62236-4 : 2006	Railway applications - Electromagnetic compatibility - Part 4: Emission and immunity of the signalling and telecommunications apparatus	CE : 9 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz ESD : 8 kV RS : 80 MHz ~ 2 GHz EFT : 2 kV Surge : 2 kV

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03.011 Electromagnetic compatibility (EMC)

Test Method	Standard designation	Test range
		CS : 150 kHz ~ 80 MHz M/F : 100 A/m Pulse M/F : 300 A/m
KS C IEC 62236-5 : 2006	Railway applications－Electromagnetic compatibility－Part 5 : Emission and immunity of fixed power supply installations and apparatus	CE : 9 kHz ~ 30 MHz RE : 30 MHz ~ 6 GHz ESD : 8 kV RS : 80 MHz ~ 6 GHz EFT : 2 kV Surge : 2 kV CS : 150 kHz ~ 80 MHz, M/F : 100 A/m Damped osc. : 2.5 kV

03.014 Environmental and Reliability Test

Test method	Standard designation	Test range
KS C 0248-59 : 2001	Environmental testing - Part 2 : Test methods- Test Fe : Vibration-Sine-beat method	Frequency range : (1 ~ 2 500) ㎐, Acceleration : 140 g
KS C 7620 : 2003	Luminaries for fluorescent lamps for use in railway vehicles	Frequency range : (1 ~ 2 500) ㎐, Acceleration : 140 g
KS C IEC 60068-2-1 : 2010	Environmental testing - Part 2-1 : Tests - Test A : Cold	Temperature : (-60 ~ 150) ℃
KS C IEC 60068-2-27 : 2008	Environmental testing - Part 2-27 : Tests - Test Ea and guidance : Shock	Frequency range : (1 ~ 2 500) ㎐, Acceleration : 140 g
KS C IEC 60068-2-78 : 2002	Environmental testing - Part 2-78 : Tests - Test Cab : Damp heat, steady state	Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H.
KS C IEC 60255-21-1 : 2002	Electrical relays - Part 21 : Vibration, shock, bump and seismic tests on measuring relays and protection	Frequency range : (1 ~ 2 500) ㎐, Acceleration : 140 g

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03.014 Environmental and Reliability Test

Test method	Standard designation	Test range
	equipment - Section One : Vibration tests (sinusoidal)	
KS C IEC 60255-21-2 : 2002	Electrical relays - Part 21 : Vibration, shock, bump and seismic tests on measuring relays and protection equipment - Section Two : Shock and bump tests	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g
KS C IEC 61373 : 2002	Railway applications - Rolling stock equipment - Shock and vibration tests	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g
KS T ISO 13355 : 2015	Packaging -Complete, filled transport packages and unit loads-Vertical random vibration test	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g
KS T ISO 8318 : 2013	Packaging -Complete, filled transport packages and unit loads-Sinusoidal vibration tests using a variable frequency	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g
KS T ISO 2247 : 2013	Packaging -Complete, filled transport packages and unit loads-Vibration tests at fixed low frequency	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g
KS R 9144 : 2014	Test methods for vibration of parts of railway rolling stock	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g
KS R 9146 : 2002	Railway rolling stock parts - Test methods for shock	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g
KS R 9186 : 2001	Parts for railway signal - Vibrations test methods	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g
KS R 9187 : 2003	Parts for railway signal - Shock test methods	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g
KS R 9191 : 1996	High and low temperature testing methods for parts of railway signaling	Temperature : (-60 ~ 150) ℃

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Test method	Standard designation	Test range
KS R 9192 : 1996	Change of temperature testing method for parts of railway signaling	Temperature : (-60 ~ 150) ℃
KS R 9213 : 2007	Railway rolling stock - High and low temperature test methods of parts	Temperature : (-60 ~ 150) ℃
KS R 1034 : 2006	Vibration testing methods for automobile parts	Frequency range : (1 ~ 2 500) ㎐, Acceleration : 140 g
KS V 8016 : 1985	General Requirements for Vibration Test of Electrical Apparatus for Marine Use	Frequency range : (1 ~ 2 500) ㎐, Acceleration : 140 g
KS X IEC 60945 : 2005	Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results (Scope) 8.2 Dry heat 8.3 Damp heat 8.4 Low temperature 8.5 Thermal shock 8.7 Vibration	Frequency range : (1 ~ 2 500) ㎐, Acceleration : 140 g Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H.
KS R 9156 : 2002	General rules for tests of electronic equipmentused on railway rolling stock (Scope) 4.1 Performance test 4.2 Insulation resistance test 4.5 Temperature rising test 4.6 Low Temperature test 4.7 High temperature test 4.8 High temperature and High Humidity test	Frequency range : (1 ~ 2 500) ㎐, Acceleration : 140 g Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H.

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Test method	Standard designation	Test range
	4.9 Temperature cyclic test 4.10 Vibration test 4.11 Shock test 4.12 Waterproof test 4.14 Continuous-current test	
KS R 9193 : 1996	Insulation resistance and withstand voltage testing methods of parts for railway signaling	(0 ~ 1 000) MΩ, DC 500 V, (0 ~ 5 000) V
MIL-STD-810G : 2008	Environmental engineering considerations and laboratory tests (Scope) 500.5 Low Pressure (Altitude) 501.5 High Temperature 502.5 Low Temperature 503.5 Temperature Shock 506.5 Rain 507.5 Humidity 513.6 Acceleration 514.6 Vibration 516.6 Shock 528 Mechanical vibrations of shipboard equipment	Pressure : (100 ~ 0.5) kPa, Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H., Frequency range : (1 ~ 2 000) Hz, Rainfall rate : 1.7 mm/min, Acceleration : 1 400 m/s²
EN 50155 : 2007	Railway applications - Electronic equipment used on rolling stock (scope) 12.2.3 Cooling test 12.2.4 Dryheat test 12.2.5 Dampheat test, cyclic 12.2.11 Vibration, Shock and bump test 12.2.14 Low temperature storage test	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H.
IEC 60068-2-64 : 2008	Environmental testing - Part 2-64 : Tests - Test Fh : Vibration, broadband random and guidance	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g

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Test method	Standard designation	Test range
MIL-STD-810F : 2003	Environmental engineering considerations and laboratory tests (Scope) 500.4 Low Pressure (Altitude) 501.4 High Temperature 502.4 Low Temperature 503.4 Temperature Shock 506.4 Rain 507.4 Humidity 513.5 Acceleration 514.5 Vibration 516.5 Shock	Pressure : (100 ~ 0.5) kPa, Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H., Frequency range : (1 ~ 2 000) Hz, Rainfall rate : 1.7 ㎜/min, Acceleration : 1 400 m/s²
IEC 60068-2-31 : 2008	Environmental testing - Part 2-31 : Tests - Test Ec : Rough handling shocks, primarily for equipment-type specimens	Fall heights : (300 ~ 1 800) mm
IEC 60068-2-1 : 2007(6.0)	Environmental testing - Part 2-1 : Tests - Test A : Cold	Temperature : (-60 ~ 150) ℃
IEC 60068-2-2 : 2007(5.0)	Environmental testing - Part 2-2 : Tests - Test B : Dry heat	Temperature : (RT ~ 300) ℃
IEC 60068-2-6 : 2007(7.0)	Environmental testing - Part 2-6 : Tests - Test Fc : Vibration (sinusoidal)	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g
IEC 60068-2-14 : 2009(6.0)	Environmental testing - Part 2-14 : Tests - Test N : Change of temperature (Exception) 9.Test Nc : Rapid change of temperature, two-fluid-bath method	Temperature : (-60 ~ 150) ℃
IEC 60068-2-27 : 2008(4.0)	Environmental testing - Part 2-27 : Tests - Test Ea and guidance : Shock	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g

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Test method	Standard designation	Test range
IEC 60068-2-30 : 2005(3.0)	Environmental testing - Part 2-30 : Tests - Test Db : Damp heat, cyclic (12 h + 12 h cycle)	Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H.
IEC 60068-2-78 : 2012(2.0)	Environmental testing - Part 2-78 : Tests - Test Cab : Damp heat, steady state	Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H.
IEC 60255-21-1 : 1988(1.0)	Electrical relays - Part 21 : Vibration, shock, bump and seismic tests on measuring relays and protection equipment - Section One : Vibration tests (sinusoidal)	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g
IEC 60255-21-2 : 1988(1.0)	Electrical relays - Part 21 : Vibration, shock, bump and seismic tests on measuring relays and protection equipment - Section Two : Shock and bump tests	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g
IEC 60945 : 2002(4.0)	Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results (Scope) 8.2 Dry heat 8.3 Damp heat 8.4 Low temperature 8.5 Thermal shock 8.7 Vibration	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H.
IEC 61373 : 2010(2.0)	Railway applications - Rolling stock equipment - Shock and vibration tests	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g
EN 61373 : 2010	Railway applications - Rolling stock equipment - Shock and vibration tests	Frequency range : (1 ~ 2 500) Hz, Acceleration : 140 g

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Test method	Standard designation	Test range
KS C IEC 60068-2-2 : 2014	Environmental testing - Part 2-2: Tests - Test B: Dry heat	Frequency range : (1 ~ 2 000) Hz, Acceleration : 200 m/s^2, Temperature : (-60 ~ RT) ℃
KS C IEC 60068-2-6 : 2015	Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)	Frequency range : (1 ~ 2 000) Hz, Acceleration : 500 m/s^2
KS C IEC 60068-2-14 : 2014	Environmental testing - Part 2-14: Tests - Test N: Change of temperature (Exception) 9. Test Nc: Rapid change of temperature, two-fluid-bath method	Temperature : (-60 ~ 150) ℃
KS C IEC 60068-2-30 : 2014	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)	Temperature : (22 ~ 55) ℃, Humidity : (5 ~ 98) % R.H.
KS C IEC 60068-2-31 : 2014	Environmental testing - Part 2-31: Tests - Test Ec: Rough handling shocks, primarily for equipment-type specimens	Fall heights : (300 ~ 1 800) mm
KS C IEC 60068-2-38 : 2014	Environmental testing - Part 2-38: Tests - Test Z/AD: Composite temperature/humidity cyclic test	Temperature : (-10 ~ 70) ℃, Humidity : (5 ~ 98) % R.H.
KS C IEC 60068-2-53 : 2010	Environmental testing - Part 2-53: Tests and guidance - Combined climatic (temperature/humidity) and dynamic (vibration/shock) tests	Frequency range : (1 ~ 2 000) Hz, Acceleration : 500 m/s^2, Temperature : (-60 ~ RT) ℃
KS C IEC 60068-2-64 : 2014	Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance	Frequency range : (1 ~ 2 000) Hz, Acceleration : 1 400 m/s^2

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Test method	Standard designation	Test range
KS C IEC 60068-2-67 : 2002	Environmental testing - Part 2-67: Tests - Test Cy: Damp heat, steady state, accelerated test primarily intended for components	Temperature : (RT ~ 85) ℃, Humidity : (5 ~ 98) % R.H.
KS C IEC 60068-2-81 : 2005	Environmental testing - Part 2-81: Tests - Test Ei: Shock - Shock response spectrum synthesis	Frequency range : (1 ~ 2 000) Hz, Acceleration : 1 400 m/s^2
KS C IEC 60255-21-3 : 2012	Electrical relays - Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment - Section 3: Seismic tests	Frequency range : (1 ~ 50) Hz, Acceleration : 20 m/s^2
KS C IEC 60092-504 : 2007	Electrical installations in ships - Part 504 : Special features - Control and instrumentation (Scope) 5. Insulation resistance 6. Cold with gradual change of temperature 7. Dry heat with gradual change of temperature 8. Damp heat, cyclic(12h+12h cycle) 10. Vibration(sinusoidal)	(0 ~ 1 000) MΩ, DC 500 V, Frequency range : (1 ~ 2 000) Hz, Acceleration : 100 m/s^2, Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H.
IEC 60068-2-38 : 2009	Environmental testing-Part 2-38 : Tests-Test Z/AD : Composite temperature/humidity cyclic test	Temperature : (-10 ~ 70) ℃, Humidity : (5 ~ 98) % R.H.
IEC 60068-2-53 : 2010	Environmental testing - Part 2-53: Tests and guidance - Combined climatic (temperature/humidity) and dynamic (vibration/shock) tests	Frequency range : (1 ~ 2 000) Hz, Acceleration : 500 m/s^2, Temperature : (-60 ~ RT) ℃
IEC 60068-2-67 : 1995	Environmental testing - Part 2-67: Tests - Test Cy: Damp heat, steady state, accelerated test primarily intended for components	Temperature : (RT ~ 85) ℃, Humidity : (5 ~ 98) % R.H.

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03.014 Environmental and Reliability Test

Test method	Standard designation	Test range
IEC 60068-2-81 : 2003	Environmental testing - Part 2-81: Tests - Test Ei: Shock - Shock response spectrum synthesis	Frequency range : (1 ~ 2 000) Hz, Acceleration : 1 400 ㎨
IEC 60255-21-3 : 1993	Electrical relays - Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment - Section 3: Seismic tests	Frequency range : (1 ~ 50) Hz, Acceleration : 20 ㎨
IEC 60092-504 : 2016	Electrical installations in ships - Part 504 : Automation, control and instrumentation (Scope) 5. Insulation resistance 6. Cold with gradual change of temperature 7. Dry heat with gradual change of temperature 8. Damp heat, cyclic(12h+12h cycle) 10. Vibration(sinusoidal)	(0 ~ 1 000) MΩ, DC 500 V, Frequency range : (1 ~ 2 000) Hz, Acceleration : 100 ㎨, Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H.
ISO 16750-3 : 2012	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 3: Mechanical loads	Frequency range : (1 ~ 2 000) Hz, Acceleration : 1 400 ㎨, Temperature : (-60 ~ 150) ℃, Fall heights : (300 ~ 1 000) ㎜
MIL-STD-167-1A : 2005	Mechanical Vibrations of Shipboard Equipment	Frequency range : (1 ~ 2 000) Hz, Acceleration : 1 400 ㎨, Dynamic range : 150 dB
MIL-STD-202G : 2002	Test Method Standard Electronic and Electrical Component Parts (Scope) 103B Humidity(Steady State)	Temperature : (-60 ~ 150) ℃, Humidity :

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03.014 Environmental and Reliability Test

Test method	Standard designation	Test range
	201A Vibration 204D Vibration, High Frequency 212A Acceleration 213B Shock(Specified Pulse) 214A Random Vibration	(5 ~ 98) % R.H., Acceleration : 1 400 m/s², Frequency range : (1 ~ 2 000) Hz
MIL-STD-202H : 2015	Test Method Standard Electronic and Electrical Component Parts (Scope) 103 Humidity(Steady State) 201 Vibration 204 Vibration, High Frequency 212 Acceleration 213 Shock(Specified Pulse) 214 Random Vibration	Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H., Acceleration : 1 400 m/s², Frequency range : (1 ~ 2 000) Hz
MIL-STD-781D : 1986	Reliability Testing for Engineering Development, Qualification, and Production (Scope) 401.2.2.2 Random Vibration 401.2.2.3 Temperature cycling	Frequency range : (1 ~ 2 000) Hz, Acceleration : 1 400 m/s², Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H.
MIL-PRF-28800F : 1996	Test Equipment for Use with Electrical and Electronic Equipment, General Specification for (Scope) 4.5.3.1 c. Environmental stress screening (random vibration) 4.5.3.1 d. Environmental stress screening (temperature cycling) 4.5.5.1 Temperature and Humidity Tests 4.5.5.3.1 Random Vibration Test 4.5.5.3.2 Sinusoidal Vibration Test 4.5.5.4.1 Functional Shock Test	Frequency range : (1 ~ 2 000) Hz, Acceleration : 1 400 m/s², Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H.
MIL-STD-810C : 1975	Test Method Standard for Environmental Engineering Considerations and Laboratory Tests (Scope) 501.1 High Temperature	Temperature : (-60 ~ 150) ℃,

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Test method	Standard designation	Test range
	502.1 Low Temperature 503.1 Temperature Shock 506.1 Rain 507.1 Humidity 513.2 Acceleration 514.2 Vibration (Exception) Procedure XI- Equipment transported as loose cargo 516.2 Shock	Humidity : (5 ~ 98) % R.H., Frequency range : (1 ~ 2 000) Hz, Rainfall rate : 1.7 mm/min, Acceleration : 1 400 m/s²
MIL-STD-810D : 1983	Test Method Standard for Environmental Engineering Considerations and Laboratory Tests (Scope) 500.2 Low Pressure (Altitude) 501.2 High Temperature 502.2 Low Temperature 503.2 Temperature Shock 506.2 Rain 507.2 Humidity 513.3 Acceleration 514.3 Vibration (Exception) Category 3- Loose cargo transport 516.3 Shock	Pressure : (100 ~ 0.5) kPa, Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H., Frequency range : (1 ~ 2 000) Hz, Rainfall rate : 1.7 mm/min, Acceleration : 1 400 m/s²
MIL-STD-810D : 1986	Test Method Standard for Environmental Engineering Considerations and Laboratory Tests (Scope) 500.2 Low Pressure (Altitude) 501.2 High Temperature 502.2 Low Temperature 503.2 Temperature Shock 506.2 Rain 507.2 Humidity 513.3 Acceleration	Pressure : (100 ~ 0.5) kPa, Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H., Frequency range : (1 ~ 2 000) Hz,

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Test method	Standard designation	Test range
	514.3 Vibration (Exception) Category 3- Loose cargo transport 516.3 Shock	Rainfall rate : 1.7 ㎜/min, Acceleration : 1 400 m/s²
MIL-STD-810E : 1989	Test Method Standard for Environmental Engineering Considerations and Laboratory Tests (Scope) 500.3 Low Pressure (Altitude) 501.3 High Temperature 502.3 Low Temperature 503.3 Temperature Shock 506.3 Rain 507.3 Humidity 513.4 Acceleration 514.4 Vibration (Exception) Category 3- Loose cargo transport 516.4 Shock	Pressure : (100 ~ 0.5) ㎪, Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H., Frequency range : (1 ~ 2 000) ㎐, Rainfall rate : 1.7 ㎜/min, Acceleration : 1 400 m/s²
MIL-STD-810F : 2000	Test Method Standard for Environmental Engineering Considerations and Laboratory Tests (Scope) 500.4 Low Pressure (Altitude) 501.4 High Temperature 502.4 Low Temperature 503.4 Temperature Shock 506.4 Rain 507.4 Humidity 513.5 Acceleration 514.5 Vibration (Exception) Category 5- Truck/trailer/tracked - loose cargo 516.5 Shock	Pressure : (100 ~ 0.5) ㎪, Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H., Frequency range : (1 ~ 2 000) ㎐, Rainfall rate : 1.7 ㎜/min, Acceleration : 1 400 m/s²

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Test method	Standard designation	Test range
MIL-STD-810G w/Change 1 : 2014	Test Method Standard for Environmental Engineering Considerations and Laboratory Tests (Scope) 500.6 Low Pressure (Altitude) 501.6 High Temperature 502.6 Low Temperature 503.6 Temperature Shock 506.6 Rain 507.6 Humidity 513.7 Acceleration 514.7 Vibration (Exception) Category 5- Truck/trailer-loose cargo 516.7 Shock 528.1 Mechanical Vibrations of Shipboard Equipment	Pressure : (100 ~ 0.5) kPa, Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H., Frequency range : (1 ~ 2 000) Hz, Rainfall rate : 1.7 ㎜/min, Acceleration : 1 400 m/s²
RTCA/DO-160G : 2010	Environmental Conditions and Test Procedures for Airborne Equipment (Scope) Section 4. Temperature and Altitude Section 6. Humidity Section 7. Operational Shocks and Crash Safety Section 8. Vibration Section 10. Waterproofness	Pressure : (100 ~ 0.5) kPa, Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H., Frequency range : (1 ~ 2 000) Hz, Drip rate : 140 L/㎡/h, Acceleration : 1 400 m/s²
KR : 2015	Korean Register of Shipping : Guidance For Approval Of Manufacturing Process And Type Approval Ch 3, Sec 23 Table 3.23.1 (Scope)	Frequency range : (1 ~ 500) Hz, Acceleration : 40 ㎨, Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H.

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Test method	Standard designation	Test range
	6. Dry heat test 7. Damp heat test 8. Vibration test 12. Cold test	
DNV : 2006	Environmental Test Specification For Instrumentation And Automation Equipment (Scope) 3.6 Vibration Test 3.7 Dry Heat Test 3.8 Damp Heat Test 3.9 Cold Test	Frequency range : (1 ~ 500) Hz, Acceleration : 40 m/s², Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H.
LR : 2013	Performance and Environmental Test Specification for the following Environmentally Tested Products used in Marine Applications: Electrical Equipment Control and Monitoring Equipment Instrumentation and Internal Communication Equipment Programmable Electronic Systems (Scope) Section 12 Vibration Test 1 Section 13 Vibration Test 2 Section 14 Humidity Test 1 - Cyclic Section 14 Humidity Test 2 - Steady State Section 17 Dry Heat Test Section 18 Low Temperature Test	Frequency range : (1 ~ 500) Hz, Acceleration : 40 m/s², Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H.
NK : 2013	Guidance For The Approval And Type Approval Of Materials And Equipment For Marine Use (Scope) Part 7 Control And Instrumentation Equipment And Electrical Installations 1.3 Environmental Test(Table7.1-1(a) Environmental Test Items, Testing Conditions, Methods, and Criteria) Dry Heat Test Damp Heat Test Vibration Test Cold Test	Frequency range : (1 ~ 500) Hz, Acceleration : 40 m/s², Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H.

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Test method	Standard designation	Test range
IACS : 2014	E10 Test Specification For Type Approval (Scope) 5. Dry Heat 6. Damp Heat 7. Vibration 11. Cold	Frequency range : (1 ~ 500) Hz, Acceleration : 40 ㎨, Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H.
KS C IEC 60571 : 2002	Railway applications - Electronic equipment used on rolling stock (Scope) 12.2.3 Cold start test 12.2.4 Dry heat test 12.2.5 Damp heat test, cyclic 12.2.11 Vibration, shock and bump test 12.2.14 Low temperature storage test	Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H., Frequency range : (1 ~ 2 000) Hz, Acceleration : 1 400 m/s²
KS C IEC 60068-2-13 : 2014	Basic environmental testing procedures - Part 2-13: Tests - Test M: Low air pressure	Temperature : (-60 ~ 150) ℃, Pressure : (100 ~ 0.5) kPa
IEC 60571 : 2012	Railway applications - Electronic equipment used on rolling stock (Scope) 12.2.4 Cold start test 12.2.5 Dry heat test 12.2.6 Damp heat test, cyclic 12.2.12 Vibration, shock and bump test 12.2.15 Low temperature storage test	Temperature : (-60 ~ 150) ℃, Humidity : (5 ~ 98) % R.H., Frequency range : (1 ~ 2 000) Hz, Acceleration : 1 400 m/s²
IEC 62498-3 : 2010	Railway applications - Environmental conditions for equipment - Part 3: Equipment for signalling and telecommunications (Scope) 4.13 Vibrations and shocks	Frequency range : (1 ~ 2 000) Hz, Acceleration : 2 500 m/s²
IEC 60068-2-13 : 1983	Basic environmental testing procedures - Part 2-13: Tests - Test M: Low air pressure	Temperature : (-60 ~ 150) ℃, Pressure : (100 ~ 0.5) kPa