

ISO 19642-2:2023-08 (E)

Road vehicles - Automotive cables - Part 2: Test methods

Contents		Page
Foreword.....		v
Introduction.....		vi
1	Scope.....	1
2	Normative references.....	1
3	Terms and definitions.....	3
4	Specifications.....	3
4.1	General test conditions.....	3
4.1.1	General information on dimensional tests.....	3
4.2	Safety concerns.....	4
4.3	Ovens.....	4
5	Test methods for single core cables.....	4
5.1	General.....	4
5.2	Dimensional tests.....	4
5.2.1	Cable outside diameter.....	4
5.2.2	Insulation thickness.....	5
5.2.3	Conductor diameter.....	5
5.2.4	Cross-sectional area (CSA).....	5
5.2.5	In-process cable outside diameter.....	6
5.3	Electrical tests.....	7
5.3.1	Conductor resistance.....	7
5.3.2	Determination of temperature coefficients.....	8
5.3.3	Withstand voltage.....	10
5.3.4	Withstand voltage after environmental testing.....	11
5.3.5	Insulation faults.....	11
5.3.6	Insulation volume resistivity.....	12
5.4	Mechanical tests.....	12
5.4.1	Strip force.....	12
5.4.2	Abrasion.....	13
5.4.3	Breaking force of the finished cable.....	16
5.4.4	Cyclic bending.....	17
5.4.5	Flexibility.....	18
5.5	Environmental tests.....	20
5.5.1	Test specimen preparation and winding tests.....	20
5.5.2	Long term heat ageing, 3 000 h at temperature class rating.....	22
5.5.3	Short term heat ageing, 240 h at temperature class rating +25 °C.....	22
5.5.4	Thermal overload, 6 h at temperature class rating +50 °C.....	23
5.5.5	Pressure test at high temperature.....	23
5.5.6	Shrinkage by heat.....	25
5.5.7	Low temperature winding.....	25
5.5.8	Cold impact.....	25
5.5.9	Temperature and humidity cycling.....	27
5.5.10	Resistance to hot water.....	29
5.5.11	Resistance to liquid chemicals.....	30
5.5.12	Durability of cable marking.....	32
5.5.13	Stress cracking resistance.....	32
5.5.14	Resistance to ozone.....	33
5.5.15	Resistance to flame propagation.....	34
6	Test methods for sheathed and/or multi-conductor cables.....	35

6.1	General.....	35
6.2	Dimensional tests.....	36
6.2.1	Cable outside diameter.....	36
6.2.2	Ovality of sheath.....	36
6.2.3	Thickness of sheath.....	36
6.2.4	In-process cable outside diameter.....	36
6.2.5	Lay length.....	37
6.3	Electrical tests.....	38
6.3.1	Electrical continuity.....	38
6.3.2	Withstand voltage at final inspection.....	38
6.3.3	Screening effectiveness.....	38
6.3.4	Sheath fault on screened cables.....	41
6.3.5	General information on electrical test setups of unscreened balanced cables.....	42
6.3.6	General information on low frequency electrical tests.....	46
6.3.7	Resistance unbalance.....	46
6.3.8	Capacitance.....	47
6.3.9	Inductance.....	48
6.3.10	General information on high radio frequency (RF) electrical tests.....	48
6.3.11	Velocity of propagation.....	51
6.3.12	Characteristic impedance in frequency domain (CIF).....	55
6.3.13	Characteristic impedance in time domain (CIT).....	56
6.3.14	Insertion loss, (IL).....	58
6.3.15	Return loss, (RL).....	58
6.3.16	Unbalance attenuations.....	58
6.3.17	Near-end crosstalk, NEXT.....	59
6.3.18	Far-end crosstalk, FEXT.....	59
6.3.19	PS alien near-end crosstalk, PS-ANEXT – exogenous crosstalk.....	59
6.3.20	PS attenuation to alien far-end crosstalk ratio, PS-AACR-F - exogenous crosstalk.....	59
6.4	Mechanical tests.....	60
6.4.1	Strip force of sheath.....	60
6.4.2	Cyclic bending.....	60
6.4.3	Flexibility.....	60
6.4.4	Cyclic bending test for RF cables.....	61
6.4.5	Dynamic bending tests for RF cables.....	63
6.4.6	Test for assessment of minimum bending radius.....	67
6.4.7	Strip force of screen.....	68
6.4.8	Abrasion test of sheath.....	70
6.5	Environmental tests.....	70
6.5.1	Test specimen preparation and winding tests.....	70
6.5.2	Long-term heat ageing, 3 000 h at temperature class rating.....	72
6.5.3	Short term heat ageing, 240 h at temperature class rating +25 °C.....	73
6.5.4	Thermal overload, 6 h at temperature class rating +50 °C.....	73
6.5.5	Pressure test at high temperature.....	73
6.5.6	Shrinkage by heat of sheath.....	73
6.5.7	Low temperature winding.....	74
6.5.8	Cold impact.....	74
6.5.9	Temperature and humidity cycling.....	74
6.5.10	Resistance to liquid chemicals.....	75
6.5.11	Durability of sheath marking.....	75
6.5.12	Resistance to ozone.....	76
6.5.13	Artificial weathering.....	76
6.5.14	Resistance to flame propagation.....	76
	Annex A (informative) Examples of materials and sources suppliers.....	78
	Annex B (informative) Flexibility test apparatus.....	80
	Annex C (normative) Flame test apparatus.....	84
	Annex D (informative) Concentricity, A-Factor, $F_{x,A}$.....	86
	Bibliography.....	88