DC Requirements for Wire and Cable from Industry Standards

DC resistance , per conductor, measured in accordance with ASTM d 4566 (ref B1.7) shall not exceed 28.6 ohms per 305 m (1000 ft) at or corrected to a temperature of 20 C (Ref B1.32).

- EIA/TIA 568 1991. 10.2.1.2.1

The resistance unbalance between the two conductors of any pair shall not exceed 5% when measured at or corrected to a temperature or 20 C in accordance with ASTM D 4566 (ref B1.7)

- EIA/TIA 568 1991. 10.2.1.2.2

The mutual capacitance of any pair at 1 kHz, measured in accordance with ASTM D 4566 (ref B1.7) and 10.2.1.2.8, shall not exceed 20 nF per 305 m (1000 ft) at or corrected to a temperature or 20 C.

- EIA/TIA 568 1991. 10.2.1.2.3

The capacitance unbalance to ground at 1 kHz or any pair, measured in accordance with ASTM D 4566 (ref B1.7) and 10.2.1.2.8, shall not exceed 1000 pF per 305 m (1000 ft) at or corrected to a temperature or 20° C.

- EIA/TIA 568 1991. 10.2.1.2.4

The resistance of any conductor, measured in accordance with ASTM D4566, shall not exceed 9.38 Ohms per 100m (328 ft) at or corrected to a temperature of 20° C.

- ANSI/TIAEIA-568-A 1995 CLAUSE 10.2.4.1

The resistance unbalance between the two conductors of any pair shall not exceed 5% when measured at or corrected to a temperature or 20 C in accordance with ASTM D 4566

- ANSI/TIAEIA-568-A 1995 CLAUSE 10.2.4.2

The mutual capacitance of any pair at 1 kHz and measured at or corrected to a temperature of 20° C, should not exceed 6.6 nF per 100 m (328 ft) for category 3 cable and should not exceed5.6 nF per 100 m (328 ft) for category 4 and category 5 cables. The measurements are performed in accordance with ASTM D 4566. Mutual capacitance value is provided for engineering design purposes only and is not a requirement for conformance testing.

- ANSI/TIAEIA-568-A 1995 CLAUSE 10.2.4.3

The capacitance unbalance to ground at 1 kHz of any pair, measured in accordance with ASTM D 4566 and 10.2.4.9, shall not exceed 330 pF per 100 m (328 ft) at or corrected to a temperature of 20° C

- ANSI/TIAEIA-568-A 1995 CLAUSE 10.2.4.4

Table 12-2 Connecting Hardware Transmission parameter variation

Parameter	Level A	Level B	Level C	Test method
dc resistance	0.3 Ohms	0.2 Ohms	0.1 Ohms	ASTM D 4566 (ref B1.7)
Resistance unbalance	15 mOhms	10 mOhms	5 mOhms	ASTM D 4566 (ref B1.7)
Attenuation (1-16 MHz)	0.4 dB	0.3 dB	0.2 dB	
NEXT ratio (1-16 MHz)	20 mV/V	10 mV/V	5 mV/V	

Note: in the above table, Level A became Category 3 requirement, and Level C became Category 4 requirement, with the publication of TSB 36 and TSB 40

- EIA/TIA 568 1991. 12.2.6.2 Table 12-2.

The dc resistance between the input and output connections of the connecting hardware (not including the cable stub, if any used for 100 Ohm cabling shall not exceed 0.3 Ohms when tested in accordance with ASTM D 4566.

- ANSI/TIAEIA-568-A 1995 CLAUSE 10.4.4.4

Note: the above requirement superceded table 12-2 of EIA/TIA 568 1991 and the resistance unbalance requirements were deleted as well as the tighter requirements of 0.2 and 0.1 Ohms dc resistance.

Resistance of conductors per ASTM B-3

Solid Conductors:

D.C. resistance of 24 AWG conductor at 20° C, 25.7 Ohms per 1000 ft.
D.C. resistance of 26 AWG conductor at 20° C, 41.0 Ohms per 1000 ft.

Stranded Conductors:

26 AWG, 7/34, 38.8 Ohms per 1000 ft at 20° C after insulation.
24 AWG, 7/32, 24.0 Ohms per 1000 ft at 20° C after insulation.

- Brand-Rex Wire and Cable Engineering Guide 1978

Temperature coefficient of resistance.
$Rt = Ro[1+\alpha(T-To)]$ where:

Rt = Resistance as measured at temperature T.
Ro = Resistance at reference temperature to.
α = Temperature coefficient of resistance at To.
T = temperature at which measurement is made.
To = Reference temperature.
α = 0.00393 per degree C at 20° C.

- Brand-Rex Wire and Cable Engineering Guide 1978

Current carrying capacity of conductor in free air. (Temperature of conductor carrying indicated current)
Ambient temperature = 30° C

Temp of copper	80° C	90° C	105° C
Size (AWG)	Amps	Amps	Amps
26	4	5	5
24	6	7	7
22	8	9	10

- Brand-Rex Wire and Cable Engineering Guide 1978

NEC current carrying capacity of conductors:

Table 10 gives recommended current ratings for copper and some aluminum based on a 45 C (40 C for wires smaller than 22 AWG) conductor temperature rise due to load current.
Table 10 may be used for the following temperature conditions.

Maximum Allowable Conductor Temperature ° C	maximum Ambient Temperature Around Wire ° C	Typical Conductor and Insulation
105	60	Bare or tinned copper or Aluminum: PVC insulation

A 60 C ambient temperature around the wiring (20 C internal temperature rise from 40 C (104 F) ambient around the equipment) is typical of some electronic equipment. If higher ambient temperatures, high power, or compact designs with electron tubes or magnetic core components are a factor, the temperature in the wiring space should be specifically determined.

“Wiring confined” ratings are based on 15 or more wires in a bundle, with the sum of all the actual load currents of the bundled wires not exceeding 20% of the permitted “Wiring confined” sum total carrying capacity of the bundled wires. These ratings approximate 60% of the free air ratings (with some variations due to rounding). They should be used for wire in harnesses, cable, conduit, and general chassis conditions. Bundles of fewer than 15 wires may have the allowable sum of the load currents increased as the bundle approaches the single-wire condition.

Table 10 Recommended Current ratings (continuous duty) for Electronic Equipment and Chassis wiring.
(abbreviated)

Wire Size	Copper Wire	
AWG	Wiring in free air	Wiring Confined
28	1.4	0.83
26	2.2	1.3
24	3.5	2.1
22	7.0	5.0

- Based on USA Standards Institute, USA Standard C1, Prepared by the National Fire Protection Association, NFPA No. 70.