



## Chapter 4 Equipment for General Use

NEC 2008

### ARTICLE 400 Flexible Cords and Cables

#### I. General

**400.1 Scope.** This article covers general requirements, applications, and construction specifications for flexible cords and flexible cables.

**400.2 Other Articles.** Flexible cords and flexible cables shall comply with this article and with the applicable provisions of other articles of this Code.

**400.3 Suitability.** Flexible cords and cables and their associated fittings shall be suitable for the conditions of use and location.

**400.4 Types.** Flexible cords and flexible cables shall conform to the description in Table 400.4. Types of flexible cords and flexible cables other than those listed in the table shall be the subject of special investigation.

**Table 400.4 Flexible Cords and Cables** (See 400.4.)

Trade Name	Type Letter	Voltage	AWG or kcmil	Number of Conductors	Insulation	Nominal Insulation Thickness <sup>1</sup>			Braid on Each Conductor	Outer Covering	Use		
						AWG or kcmil	mm	mils			Pendant or portable	Dry locations	Not hard usage
Lamp cord	C	300 600	18-16 14-10	2 or more	Thermoset or thermoplastic	18-16 14-10	0.76 1.14	30 45	Cotton	None	Pendant or portable	Dry locations	Not hard usage
Elevator cable	E See Note 7. See Note 11. See Note 12.	300 or 600	20-2	2 or more	Thermoset	20-16 14-12 12-10 8-2	0.51 0.76 1.14 1.52	20 30 45 60	Cotton	Three cotton, Outer one flame-retardant & moisture-resistant. See Note 5.	Elevator lighting and control	Unclassified locations	
						20-16 14-12 12-10 8-2	0.51 0.76 1.14 1.52	20 30 45 60	Flexible nylon jacket				
Elevator cable	EO See Note 7. See Note 12.	300 or 600	20-2	2 or more	Thermoset	20-16 14-12 12-10 8-2	0.51 0.76 1.14 1.52	20 30 45 60	Cotton	Outer one Three cotton, flame-retardant & moisture-resistant. See Note 5.	Elevator lighting and control	Unclassified locations	Hazardous (classified) locations
										One cotton and a neoprene jacket. See Note 5.			
Elevator cable	ETP See Note 7. See Note 12.	300 or 600							Rayon	Thermoplastic	Hazardous (classified) locations		
	ETT See Note 7. See Note 12.	300 or 600							None	One cotton or equivalent and a thermoplastic jacket			

**Capacities for Flexible Cords and Cables.**

**Capacity Tables.** Table 400.5(A) provides the allowable ampacities, and Table 400.5(B) provides the ampacities for flexible cords and cables with not more than three current-carrying conductors. These tables shall be used in conjunction with applicable end-use product standards to determine the proper size and type. Where cords are used in ambient temperatures exceeding 30°C (86°F), temperature correction factors from Table 310.16 shall be applied to the temperature rating of the cord shall be used to determine the ampacity from Table 400.5(B). Where the number of current-carrying conductors exceeds three, the ampacity or the ampacity of each conductor shall be determined from the 3-conductor rating as shown in Table 400.5(B).

**400.5 Adjustment Factors for More Than Three Current-Carrying Conductors in a Flexible Cord or Cable**

Number of Conductors	Percent of Value in Tables 400.5(A) and 400.5(B)
4 - 6	80
7 - 9	70
10 - 20	50
21 - 30	45
31 - 40	40
41 and above	35

**Limiting Insulation Temperature.** In no case shall flexible cords and cables be associated together in such a way with respect to the kind of circuit, the wiring method used, or the number of conductors such that the limiting temperature of any conductor is exceeded.

A single conductor that carries only the unbalanced current in other conductors of the same circuit shall not be considered to meet the requirements of a current-carrying conductor.

A 4-wire circuit consisting of two phase conductors and a neutral conductor of a 4-wire, 3-phase, wye system, a common conductor carries approximately the same current as the line-to-neutral currents of the other conductors and shall be considered to be a current-carrying conductor.

In a 4-wire, 3-phase, wye circuit where more than one-third of the load consists of nonlinear loads, there are harmonic currents present in the neutral conductor and the neutral conductor shall be considered to be a current-carrying conductor.

Equipment grounding conductor shall not be considered a current-carrying conductor.

A single conductor is used for both equipment grounding and to carry unbalanced current from other conductors provided for in 250.140 for electric ranges and clothes dryers, it shall not be considered as a current-carrying conductor.

*Exception: For other loading conditions, adjustment factors shall be permitted to be calculated under 310.15(C).*

FPN: See Annex B, Table B.310.11, for adjustment factors for more than three current-carrying conductors in a raceway or cable with load diversity.

**400.6 Markings.**

**(A) Standard Markings.** Flexible cords and cables shall be marked by means of a printed tag attached to the coil reel or carton. The tag shall contain the information required in 310.11(A). Types S, SC, SCE, SCT, SE, SEO, SEOO, SJ, SJE, SJEO, SJEOO, SJO, SJT, SJTO, SJTOO, SO, SOO, ST, STO, STOO, SEW, SEOW, SEOOW, SJEW, SJEOW, SJEOOW, SJOW, SJTW, SJTOW, SJTOOW, SOW, SOOW, STW, STOW, and STOOOW flexible cords and G, G-GC, PPE, and W flexible cables shall be durably marked on the surface at intervals not exceeding 610 mm (24 in.) with the type designation, size, and number of conductors.

**(B) Optional Markings.** Flexible cords and cable types listed in Table 400.4 shall be permitted to be surface marked to indicate special characteristics of the cable materials. These markings include, but are not limited to, markings for limited smoke, sunlight resistance, and so forth.

**400.7 Uses Permitted.**

**(A) Uses.** Flexible cords and cables shall be used only for the following:

- (1) Pendants
- (2) Wiring of luminaires
- (3) Connection of portable luminaires, portable and mobile signs, or appliances
- (4) Elevator cables
- (5) Wiring of cranes and hoists
- (6) Connection of utilization equipment to facilitate frequent interchange
- (7) Prevention of the transmission of noise or vibration
- (8) Appliances where the fastening means and mechanical connections are specifically designed to permit ready removal for maintenance and repair, and the appliance is intended or identified for flexible cord connection
- (9) Connection of moving parts
- (10) Where specifically permitted elsewhere in this Code

**(B) Attachment Plugs.** Where used as permitted in 400.7(A)(3), (A)(6), and (A)(8), each flexible cord shall be equipped with an attachment plug and shall be energized from a receptacle outlet.

*Exception: As permitted in 368.56.*

**Table 400.5(A) Allowable Ampacity for Flexible Cords and Cables** [Based on Ambient Temperature of 30°C (86°F). See 400.13 and Table 400.4.]

Size (AWG)	Thermoplastic Types TPT, TST	Thermoset Types C, E, EO, PD, S, SJ, SJO, SJOW, SJO, SJOOW, SO, SOW, SOO, SOOW, SP-1, SP-2, SP-3, SRD, SV, SVO, SVOO	Types HPD, HPN, HSJ, HSJO, HSJOO
		Thermoplastic Types ET, ETLB, ETP, ETT, SE, SEW, SEO, SEOW, SEOOW, SJE, SJEW, SJEO, SJEOW, SJEOOW, SJT, SJTW, SJTO, SJTOW, SJTOO, SJTOOW, SPE-1, SPE-2, SPE-3, SPT-1, SPT-1W, SPT-2, SPT-2W, SPT-3, ST, SRDE, SRDT, STO, STOW, STOO, STOOOW, SVE, SVEO, SVT, SVTO, SVTOO	
		Column A <sup>+</sup>	Column B <sup>+</sup>
27*	0.5	—	—
20	—	5**	***
18	—	7	10
17	—	9	12
16	—	10	13
15	—	12	16
14	—	15	18
12	—	20	25
10	—	25	30
8	—	35	40
6	—	45	55
4	—	60	70
2	—	80	95

\*Tinsel cord.

\*\*Elevator cables only.

\*\*\*7 amperes for elevator cables only; 2 amperes for other types.

+The allowable currents under Column A apply to 3-conductor cords and other multiconductor cords connected to utilization equipment so that only 3 conductors are current-carrying. The allowable currents under Column B apply to 2-conductor cords and other multiconductor cords connected to utilization equipment so that only 2 conductors are current-carrying.

**400.8 Uses Not Permitted.** Unless specifically permitted in 400.7, flexible cords and cables shall not be used for the following:

- (1) As a substitute for the fixed wiring of a structure
- (2) Where run through holes in walls, structural ceilings, suspended ceilings, dropped ceilings, or floors
- (3) Where run through doorways, windows, or similar openings
- (4) Where attached to building surfaces

*Exception to (4): Flexible cord and cable shall be permitted to be attached to building surfaces in accordance with the provisions of 368.56(B)*

- (5) Where concealed by walls, floors, or ceilings or located above suspended or dropped ceilings
- (6) Where installed in raceways, except as otherwise permitted in this Code
- (7) Where subject to physical damage

**400.9 Splices.** Flexible cord shall be used only in continuous lengths without splice or tap where initially installed in applications permitted by 400.7(A). The repair of hard-service cord and junior hard-service cord (see Trade Name

column in Table 400.4) 14 AWG and larger shall be permitted if conductors are spliced in accordance with 110.14(B) and the completed splice retains the insulation, outer sheath properties, and usage characteristics of the cord being spliced.

**400.10 Pull at Joints and Terminals.** Flexible cords and cables shall be connected to devices and to fittings so that tension is not transmitted to joints or terminals.

*Exception: Listed portable single-pole devices that are intended to accommodate such tension at their terminals shall be permitted to be used with single-conductor flexible cable.*

FPN: Some methods of preventing pull on a cord from being transmitted to joints or terminals are knotting the cord, winding with tape, and fittings designed for the purpose.

**400.11 In Show Windows and Showcases.** Flexible cords used in show windows and showcases shall be Types S, SE, SEO, SEOO, SJ, SJE, SJEO, SJEOO, SJO, SJOO, SJT, SJTO, SJTOO, SO, SOO, ST, STO, STOO, SEW, SEOW, SEOOW, SJEW, SJEOW, SJEOOW, SJOW, SJOOW,