PLAINTIFF'S EXHIBIT
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National Electrical Code — 1962

NFPA No. 70

This 1962 *Edition* of the National Electrical Code (NFPA No. 70) was adopted by the National Fire Protection Association at its *Annual Meeting*, May 21-25, 1962. It replaces all previous editions. The Code was adopted as an American Standard on July 24, 1962, following procedures established by the American Standards Association (UDC 614.825).

The principal changes in this 1962 Code as compared with the 1959 Edition are indicated by vertical marginal rules on the affected pages.

Consistent with the established *Rules of Procedure* (*see* Page 70-522), the proposed amendments to the 1959 Code were published by the National Fire Protection Association *in July*, 1961, for review and comment by all those interested. Subsequently, the various Code-Making Panels finalized their recommendations. Their reports were processed through the Correlating Committee of the National Electrical Code Committee preparatory to the formal presentation of the revisions in the "1962 NFPA Advance Reports." This publication was circulated to all members of the National Electrical Code Committee, to other interested NFPA *members*, and offered to the public through technical releases in the interested trade papers. The action of the NFPA Annual Meeting as to adoption of the preprinted recommendations and subsequent submittals by the Committee are recorded in the "Proceedings" of that Meeting, published by the Association.

This Code is purely advisory as far as the NFPA is *concerned but* is offered for use in law and for legal regulatory purposes in the interest of life and property protection (*see copyright statement*, page 70-2).

History

The National Electrical Code was originally drawn in 1897 as the result of the united efforts of various insurance, electrical, architectural and allied interests. This original Code was prepared by the National *Conference on Standard* Electrical Rules, composed of delegates from various interested national associations.

The National Conference was disbanded in 1911. Since then the National Fire Protection Association has been sponsor. The texts for editions up to 1917 were prepared by the NFPA Electrical Committee. In 1949 the NFPA Electrical Section was organized and the National Electrical Code Committee was created to supersede the Electrical Committee. Currently, *proposed revisions* are prepared by Code-Making Panels of the National Electrical Code Committee, under the direction of the Correlating Committee (*see* listings of personnel, pages 70-3 to 70-5).

This 1962 Edition of the National Electrical *Code replaces* all other previous editions, supplements, and printings dated 1897, 1899, 1901, 1902, 1904, 1905, 1907, 1909, 1911, 1913, 1915, 1918,

SC-ELEC-03601

300-21. Prevention of Spread of Fire. Electrical installations shall be so made that the possible spread of fire through fire-stopped partitions, hollow spaces, fire walls or fire partitions, vertical shafts, ventilating or air-handling ducts is reduced to a minimum.

300-22. Wiring in Ventilating and Exhaust Ducts.

(a) Where it is necessary to run a wiring system through air handling ducts or plenum chambers, the wiring method shall be rigid conduit, electrical metallic tubing, flexible steel conduit with lead-covered conductors, Type ACL metal-clad cable with fittings suitable for the location, Type MI mineral insulated-metal sheathed cable, or Type ALS aluminum sheathed cable. The terminals of circuits of such wiring systems shall be so located that it will not be necessary to install motors or control equipment in the ducts, except for temperature and humidity control. Raceways shall not interfere with the operation of automatic fire dampers in ducts.

Exception No. 1. The above provisions shall not apply to integral fan systems specifically approved for the purpose.

Exception No. 2. It is not the intent of this section to include habitable rooms or areas of a building, the prime purpose of which is not air handling. It may, however, include false ceiling space, hollow spaces in the wall, and the like if used for air handling purposes.

Exception No. 3. In ventilating systems used solely for data processing systems the wiring method shall be rigid conduit, electrical metallic tubing, flexible steel conduit with lead-covered conductors, Type ACL metal-clad cable with fittings approved for the purpose, Type MI mineral insulated-metal sheathed cable, Type ALS aluminum sheathed cable, or flexible cords or cables specifically approved as a part of the data processing system, when such cords or cables may be used in conformance with other sections of this code.

(b) No wiring system of any type shall be installed in ducts for dust, loose stock or vapor removal.

300-23. Temporary Wiring.

(a) Suitable disconnecting switches or plug connectors shall be installed to permit the disconnection of all conductors of the temporary circuit by a single operation.

(b) No bare conductors nor earth returns shall be used for the wiring of any temporary circuit.

ARTICLE 310—CONDUCTORS FOR GENERAL WIRING

310-1. General.

(a) The purpose of this Article is to assure that conductors have mechanical strength, insulation, and current carrying capacity adequate for the particular conditions under which they are to be used.

(b) Conductors shall be insulated, except when covered or bare conductors are specifically permitted in this code.

(c) The provisions of this Article are not intended to apply to conductors which form an integral part of equipment such as motors, motor controllers, and the like, or which are provided for elsewhere in this Code.

310-2. Application and Construction.

(a) **Conductor Application.** Conductor insulations as specified in the following Table 310-2(a) may be installed for any of the wiring methods recognized in this Chapter, except as otherwise provided for in the Table or in Section 310-3, or as otherwise specified in this Code. They are suitable for 600 volts unless otherwise specified.

(b) **Conductor Construction.** Insulated conductors for use at 600 volts or less shall conform to the provisions of Table 310-2(b).

Table 310-2(a). Conductor Application

Trade Name	Type Letter	Max. Operating Temp.	Application Provisions
Rubber-Covered Fixture Wire Solid or 7 Strand	*RF-1	60 C 140 F	Fixture wiring. Limited to 300 V.
	*RF-2	60 C 140 F	Fixture wiring, and as permitted in Section 310-8.
Rubber-Covered Fixture Wire Flexible Stranding	*FF-1	60 C 140 F	Fixture wiring. Limited to 300 V.
	*FF-2	60 C 140 F	Fixture wiring, and as permitted in Section 310-8.

*Fixture wires are not intended for installation as branch-circuit conductors nor for the connection of portable or stationary appliances.

Trade Name	Type Letter	Max. Operating Temp.	Application Provisions
Heat-Resistant Rubber-Covered Fixture Wire Solid or 7-Strand	*RFH-1	75°C 167°F	Fixture wiring. Limited to 300 V.
	*RFH-2	75°C 167°F	Fixture wiring, and as permitted in Section 310-8.
Heat-Resistant Rubber-Covered Fixture Wire Flexible Stranding	*FFH-1	75°C 167°F	Fixture wiring. Limited to 300 V.
	*FFH-2	75°C 167°F	Fixture wiring, and as permitted in Section 310-8.
Thermoplastic-Covered Fixture Wire—Solid or Stranded	*TF	60°C 140°F	Fixture wiring, and as permitted in Section 310-8.
Thermoplastic-Covered Fixture Wire—Flexible Stranding	*TFF	60°C 140°F	Fixture wiring.
Cotton-Covered, Heat-Resistant, Fixture Wire	*CF	90°C 194°F	Fixture wiring. Limited to 300 V.
Asbestos-Covered Heat-Resistant, Fixture Wire	*AF	150°C 302°F	Fixture wiring. Limited to 300 V. and Indoor Dry Location.
Silicone Rubber Insulated Fixture Wire	*SF-1	200°C 392°F	Fixture wiring. Limited to 300 V.
Solid or 7 Strand	*SF-2	200°C 392°F	Fixture wiring and as permitted in Section 310-8.
Silicone Rubber Insulated Fixture Wire	*SFF-1	150°C 302°F	Fixture wiring. Limited to 300 V.
Flexible Stranding	*SFF-2	150°C 302°F	Fixture wiring and as permitted in Section 310-8.
Code Rubber	R	60°C 140°F	Dry locations.
Heat-Resistant Rubber	RH	75°C 167°F	Dry locations.

*Fixture wires are not intended for installation as branch circuit conductors nor for the connection of portable or stationary appliances.

Trade Name	Type Letter	Max. Operating Temp.	Application Provisions
Heat Resistant Rubber	RHH	90°C 194°F	Dry locations.
Moisture-Resistant Rubber	RW	60°C 140°F	Dry and wet locations. For over 2000 volts, insulation shall be ozone-resistant.
Moisture and Heat Resistant Rubber	RH-RW	60°C 140°F	Dry and wet locations. For over 2000 volts, insulation shall be ozone-resistant.
		75°C 167°F	Dry locations. For over 2000 volts, insulation shall be ozone-resistant.
Moisture and Heat Resistant Rubber	RHW	75°C 167°F	Dry and wet locations. For over 2000 volts, insulation shall be ozone-resistant.
Latex Rubber	RU	60°C 140°F	Dry locations.
Heat Resistant Latex Rubber	RUH	75°C	Dry locations.
Moisture Resistant Latex Rubber	RUW	60°C 140°F	Dry and wet locations.
Thermoplastic	T	60°C 140°F	Dry locations.
Moisture-Resistant Thermoplastic	TW	60°C 140°F	Dry and wet locations.
Moisture and Heat Resistant Thermoplastic	THW	75°C 167°F	Dry and wet location
Moisture and Heat-Resistant Thermoplastic	THWN	75°C 167°F	Dry and wet location
Thermoplastic and Asbestos	TA	90°C 194°F	Switchboard wiring only
Thermoplastic and Fibrous Outer Braid	TBS	90°C 194°F	Switchboard wiring only

Trade Name	Type Letter	Max. Operating Temp.	Application Provisions
Mineral Insulation (Metal Sheathed)	MI	85°C 185°F	Dry and wet locations with Type O termination fittings. Max. operating temperature for special applications 250°C.
Silicone-Asbestos	SA	90°C	Dry locations—max. operating temperature for special application 125°C.
Varnished Cambric	V	85°C 185°F	Dry locations only. Smaller than No. 6 by special permission.
Asbestos and Varnished Cambric	AVA	110°C 230°F	Dry locations only.
Asbestos and Varnished Cambric	AVL	110°C 230°F	Dry and wet locations.
Asbestos and Varnished Cambric	AVB	90°C 194°F	Dry locations only.
Asbestos	A	200°C 392°F	Dry locations only. In raceways, only for leads to or within apparatus. Limited to 300 V.
Asbestos	AA	200°C 392°F	Dry locations only. Open wiring. In raceways, only for leads to or within apparatus. Limited to 300 V.
Asbestos	AI	125°C 257°F	Dry locations only. In raceways, only for leads to or within apparatus. Limited to 200 V.
Asbestos	AIA	125°C 257°F	Dry locations only. Open wiring. In raceways, only for leads to or within apparatus.
Paper		85°C 185°F	For underground service conductors, or by special permission.

Table 310-2(b). Conductor Insulations

Trade Name	Type Letter	Insulation	Thickness of Insulation	Outer Covering
Code	R	Code Rubber	14–12	64 Inch
			10	64 Inch
			8–2	64 Inch
			1–0	64 Inch
			213–500	64 Inch
			501–1000	64 Inch
			1001–2000	64 Inch
			2001–5000	64 Inch
	RH, RHW	Heat-Resistant Rubber	14–12	64 Inch
			10	64 Inch
			8–2	64 Inch
			1–0	64 Inch
			213–500	64 Inch
			501–1000	64 Inch
			1001–2000	64 Inch
			2001–5000	64 Inch
Moisture-proof	T, TW	Moisture-Resistant Rubber	14–10	64 Inch
			8–2	64 Inch
			1–0	64 Inch
			213–500	64 Inch
			501–1000	64 Inch
			1001–2000	64 Inch
			2001–5000	64 Inch
Weather-proof	RH-RW, RHW	Moisture- and Heat-Resistant Rubber	14–12	64 Inch
			10	64 Inch
			8–2	64 Inch
			1–0	64 Inch
			213–500	64 Inch
			501–1000	64 Inch
			1001–2000	64 Inch
			2001–5000	64 Inch

Trade Name	Type Letter	Insulation	Thickness of Insulation	Outer Covering
Code	R	Code Rubber	14–12	64 Inch
			10	64 Inch
			8–2	64 Inch
			1–0	64 Inch
			213–500	64 Inch
			501–1000	64 Inch
			1001–2000	64 Inch
			2001–5000	64 Inch
	RH, RHW	Heat-Resistant Rubber	14–12	64 Inch
			10	64 Inch
			8–2	64 Inch
			1–0	64 Inch
			213–500	64 Inch
			501–1000	64 Inch
			1001–2000	64 Inch
			2001–5000	64 Inch
Moisture-proof	T, TW	Moisture-Resistant Rubber	14–10	64 Inch
			8–2	64 Inch
			1–0	64 Inch
			213–500	64 Inch
			501–1000	64 Inch
			1001–2000	64 Inch
			2001–5000	64 Inch
Weather-proof	RH-RW, RHW	Moisture- and Heat-Resistant Rubber	14–12	64 Inch
			10	64 Inch
			8–2	64 Inch
			1–0	64 Inch
			213–500	64 Inch
			501–1000	64 Inch
			1001–2000	64 Inch
			2001–5000	64 Inch

*Moisture-resistant, flame-retardant, non-metallic covering

*Moisture-resistant, flame-retardant, non-metallic covering

*Moisture-resistant, flame-retardant, non-metallic covering

Table 310-2(b)—Continued

Trade Name	Type Letter	Insulation	Thickness of Insulation	Outer Covering
Moisture and Heat-Resistant	RHW	Moisture and Heat Resistant Rubber	14–10 . . . . . 3 64 Inch 8–2 . . . . . 4 64 Inch 1–4 0 . . . . . 5 64 Inch 213–500 . . . . . 6 64 Inch 501–1000 . . . . . 7 64 Inch 1001–2000 . . . . . 8 64 Inch	*Moisture-resistant, flame retardant, non-metallic covering
Latex Rubber	RU	90% Unmilled, Grainless Rubber	14–10 . . . . . .18 Mils 8–2 . . . . . .25 Mils	Moisture-resistant, flame-retardant, non-metallic covering
Heat-Resistant Latex Rubber	RUH	90% Unmilled, Grainless Rubber	14–10 . . . . . .18 Mils 8–2 . . . . . .25 Mils	Moisture-resistant, flame-retardant, non-metallic covering
Moisture-Resistant Latex Rubber	RUW	90% Unmilled, Grainless Rubber	14–10 . . . . . .18 Mils 8–2 . . . . . .25 Mils	Moisture-resistant, flame-retardant, non-metallic covering
Thermoplastic	T	Flame-Retardant, Thermoplastic Compound	14–10 . . . . . 2 64 Inch 8 . . . . . 3 64 Inch 6–2 . . . . . 4 64 Inch 1–4 0 . . . . . 5 64 Inch 213–500 . . . . . 6 64 Inch 501–1000 . . . . . 7 64 Inch 1001–2000 . . . . . 8 64 Inch	None
Moisture-Resistant Thermoplastic	TW	Flame-Retardant, Moisture-Resistant Thermoplastic	14–10 . . . . 2 64 Inch 8 . . . . 3 64 Inch 6–2 . . . . 4 64 Inch 1–4 0 . . . . 5 64 Inch 213–500 . . . . 6 64 Inch 501–1000 . . . . 7 64 Inch 1001–2000 . . . . 8 64 Inch	None
Moisture and Heat-Resistant Thermoplastic	THW	Flame-Retardant, Moisture and Heat-Resistant Thermoplastic	14–10 . . . . 3 64 Inch 8–2 . . . . 4 64 Inch 1–4 0 . . . . 5 64 Inch 213–500 . . . . 6 64 Inch 501–1000 . . . . 7 64 Inch 1001–2000 . . . . 8 64 Inch	None
Moisture and Heat-Resistant Thermoplastic	THWN	Flame-Retardant, Moisture and Heat-Resistant Thermoplastic	14–12 . . . . 15 Mils 10 . . . . 20 Mils 8–6 . . . . 30 Mils 4–2 . . . . 40 Mils 1–4 0 . . . . 50 Mils 250–500 MCM . . . . 60 Mils	Nylon Jacket
Thermoplastic and Asbestos	TA	Thermoplastic and Asbestos	Thick. Asb. 14–8 . . . . 25 Mils 20 Mils 6–2 . . . . 30 Mils 25 Mils 1–4 0 . . . . 40 Mils 30 Mils	Flame-retardant, cotton braid
Thermoplastic and Asbestos Braid	TBS	Thermoplastic	14–10 . . . . 2 64 Inch 8 . . . . 3 64 Inch 6–2 . . . . 4 64 Inch 1–4 0 . . . . 5 64 Inch	Flame-retardant, non-metallic covering

* Outer covering is not required over rubber insulations which have been specifically approved for the purpose.

Table 310-2(b)—Continued

Trade Name	Type Letter	Insulation	Thickness of Insulation	Outer Covering
Mineral-Insulated Metal-Sheathed	MI	Magnesium Oxide	16–4 ..... 50 Mils 3–4/0 ..... 55 Mils	Copper
Silicone-Asbestos	SA	Silicone Rubber	14–10 ..... 3/64 Inch 8–2 ..... 4/64 Inch 1–4/0 ..... 5/64 Inch 213–500 ..... 6/64 Inch 501–1000 ..... 7/64 Inch 1001–2000 ..... 8/64 Inch	Asbestos or glass
Varnished Cambric	V	Varnished Cambric	14–8 ..... 3/64 Inch 6–2 ..... 4/64 Inch 1–4/0 ..... 5/64 Inch 213–500 ..... 6/64 Inch 501–1000 ..... 7/64 Inch 1001–2000 ..... 8/64 Inch	Non-metallic covering or lead sheath
Asbestos and Varnished Cambric	AVA and AVL	Impregnated Asbestos and Varnished Cambric	Dimen. in Mils AVA AVL 1st Asb. VC 2nd Asb. 2nd Asb. 14–8 solid only — 30 20 25 14–8 10 30 15 25 6–2 15 30 20 25 1–4/0 20 30 30 30 213–500 25 40 40 40 501–1000 30 40 40 40 1001–2000 30 50 50 50	AVA-asbestos braid or glass AVL-lead sheath
			VC Asb. 14–8 30 20 6–2 40 30 1–4/0 40 40	Flame-retardant, cotton braid switchboard wiring
Asbestos and Varnished Cambric	AVB	Impregnated Asbestos and Varnished Cambric	Asb. VC 2nd Asb. 14–8 10 30 15 6–2 15 30 20 1–4/0 20 30 30 213–500 25 40 40 501–1000 30 40 40 1001–2000 30 50 50	Flame-retardant, cotton braid
Asbestos	A	Asbestos	14 ..... 30 Mils 12–8 ..... 40 Mils	Without asbestos braid
Asbestos	AA	Asbestos	14 ..... 30 Mils 12–8 ..... 30 Mils 6–2 ..... 40 Mils 1–4/0 ..... 60 Mils	With asbestos braid or glass
Asbestos	AI	Impregnated Asbestos	14 ..... 30 Mils 12–8 ..... 40 Mils	Without asbestos braid
Asbestos	AIA	Impregnated Asbestos	Sol. Str. 14 ..... 30 Mils 30 Mils 12–8 ..... 30 Mils 40 Mils 6–2 ..... 40 Mils 50 Mils 1–4/0 ..... 50 Mils 75 Mils 213–500 ..... 90 Mils 501–1000 ..... 105 Mils	With asbestos braid or glass
Paper		Paper		Lead sheath

This [illegible] covering not including armor, except lead sheathing, of aluminum sheathed cable and of lead-sheathed or multiple-[illegible] cables [illegible] by the flame retardant. For [illegible] see Section 342. For non-metallic-sheathed cable, see Section [illegible]. For aluminum sheathed cable, see Section 350.

Table 310-2(h-1)

Thickness of Rubber Insulation for Rubber-Covered Wire and Cable, in 64ths of an Inch

Conductor Size AWG. or MCM	Classification				
	R 10 RH 10 RW 10 RHW 10	R 20 RH 20 RW 20 RHW 20	RH RW 30† RHW 30†	RH RW 40† RHW 40†	RH-RW 50† RHW 50†
14-12	4	5	..	..	..
10- 8*	4	5	7	9	10
6- 2	5	6	8	9	10
1-4/0	6	7	8	9	10
213-500	7	8	9	10	11
501-1000	8	9	9	10	11
1001-2000	9	9	10	11	12

* No. 8 AWG. is the minimum conductor size for 5000 volts operation.
† Shall be of approved ozone-resistant type for operation at voltages over 2000.

Table 310-2(h-2)

Thickness of Varnished-Cambric Insulation for Single-Conductor Cable, in 64ths of an Inch

Conductor Size AWG or MCM	For Voltages Not Exceeding				
	1000	2000	3000	4000	5000
14	4	..	..	..	..
12	4	5	..	..	..
10	4	5	6	..	..
8-2	4	5	6	7	9
1-4/0	5	6	6	7	9
213-500	6	6	7	8	10
501-1000	7	7	7	8	10
1001-2000	8	8	8	9	10

Table 310-2(h-3)

Thickness of Varnished-Cambric Insulation for Multiple-Conductor Cable, in 64ths of an Inch

Conductor Size AWG or MCM	For Voltages Not Exceeding									
	1000		2000		3000		4000		5000	
	C	B	C	B	C	B	C	B	C	B
14	4	0	..	..	..	..	..	..	..	..
12	4	0	5	0	..	..	..	..	..	..
10	4	0	5	0	5	2	..	..	..	..
8-2	4	0	5	0	5	2	6	3	6	4
1-4/0	5	0	6	0	6	2	6	3	6	4
213-500	6	0	6	0	6	2	6	3	7	4
501-1000	6	2	6	2	6	3	6	4	7	4
1001-2000	7	2	7	2	7	3	7	4	7	5

The thickness given in columns headed "C" are for the insulation on the individual conductors. Those given in the columns headed "B" are for the thickness of the overall belt of insulation.

Table 310-2(h-4)

Thickness of Asbestos and Varnished-Cambric Insulation for Single-Conductor Cable, Types AVA, AVB and AVL, in Mils

Conductor AWG or MCM	1st Wall Asbestos	Varnished Cambric					Asbestos 2nd Wall
	For Voltages Not Exceeding						
	1000-5000	1000	2000	3000	4000	5000	1000-5000
14-2	15	45	60	80	100	120	25
1-4/0	20	45	60	80	100	120	30
213-500	25	45	60	80	100	120	40
501-1000	30	45	60	80	100	120	40
1001-2000	30	55	75	95	115	140	50

Table 384-26—Spacings Between Bare Metal Parts

	Opposite Polarity When Mounted on the Same Surface	Opposite Polarity When Held Free in Air	*Live Parts to Ground
Not over 125 volts	¾ inch	½ inch	½ inch
Not over 250 volts	1¼ inch	¾ inch	½ inch
Not over 600 volts	2 inches	1 inch	1 inch

*For spacing between live parts and doors of cabinets, see subparagraph a of Section 373-11.

It should be noted that the above distances are the *minimum* allowable, and it is recommended that greater distances be provided wherever the conditions will permit.

At switches, enclosed fuses, etc., parts of the same polarity may be placed as close together as convenience in handling will allow, unless close proximity causes excessive heating.

ARTICLE 390 — PREFABRICATED BUILDINGS

390-1. Scope. The intent and purpose of the following sections is to define approved methods for the wiring of prefabricated building sections, panels, or units designed for later erection or assembly as integral parts of buildings whether wired in the process of manufacture or at the site of erection or assembly.

390-2. Wiring Methods. Only wiring methods recognized in this Code shall be used.

390-3. Code Provisions to Apply. The provisions of this Code shall apply for the type of wiring method used and the type of construction employed.

Chapter 4. Equipment for General Use

ARTICLE 400—FLEXIBLE CORDS

A. General and Types

400-1. General. Flexible cords shall be suitable for the conditions of use and location.

400-2. Types. Cords of the several types shall conform to the descriptions of Table 400-11. Types of flexible cords other than those listed in Table 400-11 and other uses for types listed in the Table, shall be the subject of special investigations and shall not be used before being approved.

B. Use and Installation

400-3. Use. Flexible cord may be used only for (1) pendants; (2) wiring of fixtures; (3) connection of portable lamps or appliances; (4) elevator cables; (5) wiring of cranes and hoists; (6) for the connection of stationary equipment to facilitate their interchange; or (7) to prevent the transmission of noise or vibration.

400-4. Prohibited Uses. Flexible cord shall not be used (1) as a substitute for the fixed wiring of a structure; (2) where run through holes in walls, ceilings, or floors; (3) where run through doorways, windows, or similar openings; (4) where attached to building surfaces; or (5) where concealed behind building walls, ceilings, or floors.

400-5. Splices. Flexible cord shall be used only in continuous lengths without splice or tap.

400-6. Cords in Show-Windows and Show-Cases. Flexible cord used in show-windows and show-cases shall be of Type S, SO, SJ, SJO, ST, SJT, or AFS, except for the wiring of chain supported fixtures, and for supplying current to portable lamps and other merchandise for exhibition purposes.

400-7. Minimum Size. Flexible cords shall not be smaller than No. 18, except that tinsel cords, or cords having equivalent characteristics, of smaller size may be approved for use with specific appliances.

400-8 Insulation—Over 300 Volts. Where the voltage between any two conductors exceeds 300, but does not exceed

600, flexible cord of No. 10 and smaller shall have rubber or thermoplastic insulation on the individual conductors at least 3/64 inch in thickness, unless type S, SO or ST cord is used.

400-9. Overcurrent Protection and Current-Carrying Capacities of Flexible Cords.

(a) Overcurrent Protection. Flexible cords not smaller than No. 18, and tinsel cords, or cords having equivalent characteristics, of smaller size approved for use with specific appliances, shall be considered as protected against overcurrent by the overcurrent devices described in Section 240-5 and 240-7. Cords shall be not smaller than required in Table 400-9(b) for the rated current of the connected equipment.

Table 400-9(b). Current-Carrying Capacity of Flexible Cord in Amperes

Table 400-9(b) gives the allowable current-carrying capacities for not more than three current-carrying conductors in a cord. If the number of current-carrying conductors in a cord is from four to six the allowable current-carrying capacity of each conductor shall be reduced to 80 per cent of the values in the Table.

(Based on Room Temperature of 30°C (86°F). See Section 400-9 and Table 400-11.)

Size AWG	Rubber Types TP, TS Thermoplastic Types TP1, TSP	Rubber Types PO, C, PD, E, PW, K, I, E0 Thermoplastic Type E1	Rubber Types S, SO, SRD, SE, SJO, SV, SP Thermoplastic Types S1, SRD1, SJ1, SVT, SP1	Types AFS, AFSJ, JG, HPD, HSJ, HS, HPN	Types AVPO, AVPD	Cotton Types CFC* CFPO* CFPD* Asbestos Types AFC* AFPO* AFPD*
27**	0.5	..	..	..	..	..
18	...	5	7	10	17	6
17	...	..	..	12	..	..
16	...	7	10	15	22	8
15	...	..	..	17	..	..
14	...	15	15	20	28	17
12	...	20	20	30	36	23
10	...	25	25	35	47	28
8	...	35	35	..	..	..
6	...	45	45	..	..	..
4	...	60	60	..	..	..
2	...	80	..	..	..	..

*The ac types are used either for exposed work or in fixtures where they are exposed to high temperatures and ampacity ratings are adjusted accordingly.
**Tinsel cord.

Note to Table 400-9(b)

Ultimate Insulation Temperature. In no case shall conductors be associated together in such a way with respect to the kind of circuit, the wiring method employed, or the number of conductors, that the limiting temperature of the conductors will be exceeded.

400-10. Pull at Joints and Terminals. Flexible cords shall be so connected to devices and to fittings that tension will not be transmitted to joints or terminal screws. This shall be accomplished by a knot in the cord, winding with tape, by a special fitting designed for that purpose, or by other approved means which will prevent a pull on the cord from being directly transmitted to joints or terminal screws.

Notes to Table 400-11

1. Except for Types AFPO, CFPO, PO-1, PO-2, PO, SP-1, SP-2, SPT-1, SPT-2, TP, TPT, and AVPO, individual conductors are twisted together.

2. Type PO-1 is for use only with portable lamps, portable radio receiving appliances, portable clocks and similar appliances which are not liable to be moved frequently and where appearance is a consideration.

3. Types TP, TPT, TS, and TST are suitable for use in lengths not exceeding eight feet when attached directly, or by means of a special type of plug, to a portable appliance rated at 50 watts or less and of such nature that extreme flexibility of the cord is essential.

4. Type K is suitable for use on theatre stages.

5. Rubber filled or varnished cambric tapes may be substituted for the inner braids.

6. Types S, SO, and SJ are suitable for use on theatre stages, in garages and elsewhere, where flexible cords are permitted by this Code.

7. Tracking cable for operating control and signal circuit may have one or more nonmetallic fillers or may have a supporting fillers of strand of steel wire having a cross section not less than that of No. 14 copper wire. Cable exceeding 100 feet in length shall have a total copper cross section of not less than that of No. 14 copper wire, except in location subject to rope-like moisture or corrosive vapors or gases. Where steel supporting fillers are used, they shall run straight through the center of the cable or cradle and shall not be cabled with the copper strand of any conductor.

Type E and E0 Cable may incorporate in the construction 2 No. 18 Gauge Conductors formed as a pair, and covered with suitable metallic bonded for-blaze for telephone circuit. The insulation of the conductor may be rubber or thermoplastic of thickness specified for S or J, and E0 Cable. The bond shall have its own protective covering. This component may be incorporated in any layer of the cable or cradle, and shall not run straight through the center.

8. A third conductor in these cables is for grounding purposes only.

9. The individual conductors of all cord except those of heat-resistant cord (Types AFC, AFPO, AFPD, AFC, SJSE, AVPO, AVPD, CFC, CFPO and CFPD) shall have a rubber or thermoplastic insulation, except that the grounding conductor where used, shall be in accordance with Paragraph 400-14(b). A rubber compound shall be used except for heater cord (Types HC, HPD and HSJ) and for bell wires in Types P-1, P-2, PW-1, PW-2 and PW.

Table 400-11. Flexible Cord.

(See Section 400-2)

Trade Name	Type Letter	Size AWG	No. of Conductors	Insulation	Braid on Each Conductor	Outer Covering	Use		
Parallel Tinsel Cord	TP See Note 3	27	2	Rubber	None	Rubber	Attached to an Appliance	Damp Places	Not Hard Usage
	TPT See Note 3	27	2	Thermo-plastic	None	Thermo-plastic	Attached to an Appliance	Damp Places	Not Hard Usage
Jacketed Tinsel Cord	TS See Note 3	27	2 or 3	Rubber	None	Rubber	Attached to an Appliance	Damp Places	Not Hard Usage
	TST See Note 3	27	2 or 3	Thermo-plastic	None	Thermo-plastic	Attached to an Appliance	Damp Places	Not Hard Usage
Asbestos-Covered Heat-Resistant Cord	AFC	18–10	2 or 3	Impregnated Asbestos	Cotton or Rayon	None	Pendant	Dry Places	Not Hard Usage
	AFPO		2		None	Cotton, Rayon or Saturated Asbestos			
	AFPT		2 or 3						
Cotton-Covered Heat-Resistant Cord	CFC	18–10	2 or 3	Impregnated Cotton	Cotton or Rayon	None	Pendant	Dry Places	Not Hard Usage
	CFPO		2		None	Cotton or Rayon			
	CFPD		2 or 3						

See Notes

	PO [illegible]	18					See Note 2		
[illegible]	PO [illegible]	18–16	2	Rubber	Cotton	Cotton or Rayon	Pendant or Portable	Dry Places	Not Hard Usage
	PO	18–10							
All Rubber [illegible]	SP [illegible]	18					Pendant or Portable	Damp Places	Not Hard Usage
	SP [illegible] See Note 3	18–16	2	Rubber	None	Rubber			
	SP [illegible] See Note 3	18–12		Rubber	None	Rubber	Refrigerators or Room Air Conditioners	Damp Places	Not Hard Usage
All Plastic [illegible]	SPT [illegible]	18	2	Thermo-plastic	None	Thermoplastic	Pendant or Portable	Damp Places	Not Hard Usage
	SPT [illegible] See Note 3	18–16							
All Plastic Portable Cord	SPT See Note 3	18–12	2	Thermo-plastic	None	Thermoplastic	Refrigerators or Room Air Conditioners	Damp Places	Not Hard Usage
[illegible]	[illegible]	18–12	2 or more	Rubber	Cotton	None	Pendant or Port.	Dry Places	NotHard Usage
[illegible]	[illegible]	18–12	2 or more	Rubber	Cotton	Cotton or Rayon	Pendant or Port.	Dry Places	NotHard Usage

See Notes

Trade Name	Type Letter	Size AWG	No. of Conductors	Insulation	Braid on Each Conductor	Outer Covering	Use		
Reinforced Cord	P-1	18	2 or more	Rubber	Cotton	Cotton over Rubber Filler	Pendant or Portable	Dry Places	Not Hard Usage
	P-2	18-16							
	P	18-10							Hard Usage
Moisture-Proof Reinforced Cord	PW-1	18	2 or more	Rubber	Cotton	Cotton, Moisture-Resistant Finish over Rubber Filler	Pendant or Portable	Damp Places	Not Hard Usage
	PW-2	18-16							
	PW	18-10							Hard Usage
Braided Heavy Duty Cord	K See Note 4	18-10	2 or more	Rubber	Cotton	Two Cotton, Moisture-Resistant Finish See Note 5	Pendant or Portable	Damp Places	Hard Usage
Vacuum Cleaner Cord	SV	18	2	Rubber	None	Rubber	Pendant or Portable	Damp Places	Not Hard Usage
	SVT See Note 8			Thermoplastic		Thermoplastic			
Junior Hard Service Cord	SJ	18-16	2, 3, or 4	Rubber	None	Rubber	Pendant or Portable	Damp Places	Hard Usage
	SJO					Oil Resistant Compound			
	SJT			Thermoplastic or Rubber		Thermoplastic			

See Note

Hard Service Cord	S See Note	18-10	2 or more	Rubber	None	Rubber	Pendant or Portable	Damp Places	Extra Hard Usage
	SO					Oil Resist. Compound			
	ST			Thermoplastic or Rubber		Thermoplastic			
Asbestos Cord	ASJ	18-16	2 or 3	Impregnated Asbestos	None	Rubber	Portable	Dry Places	Portable Heaters
	AFS	18-0000							
Heater Cord	HO	18-12	2 or 3	Rubber & Asbestos	Cotton	None	Portable	Dry Places	Portable Heaters
	HPD				None	Cotton or Rayon			
Heater Cord	HS	18-12	2 or 3	Rubber & Asbestos	None	Cotton and Rubber	Portable	Damp Places	Portable Heaters
Heater Cord	HS	18-12	2 or 3	Rubber and Asbestos	None	Cotton and Rubber or Neoprene	Portable	Damp Places	Portable Heaters
Oil-Resistant Heater Cord	HSN	18-12	2	Neoprene	None	Neoprene	Portable	Damp Places	Portable Heaters
Heater Cord	HPD	18-12	2	Asbestos & Rub. Comb.	None	Asbestos, Flame-Ret. Moisture Resistant	Pendant or Portable	Damp Places	Not Hard Usage
	HPD		3						

Trade Name	Type Letter	Size AWG	No. of Conductors	Insulation	Braid on Each Conductor	Outer Covering	Use		
Range, Dryer Cable	SRD	10-4	3 or 4	Rubber	None	Rubber or Neoprene	Portable	Damp Places	Ranges, Dryers
	SRDT	10-4	3 or 4	Thermoplastic	None	Thermoplastic	Portable	Damp Places	Ranges, Dryers
Elevator Cable	E See Note 7	18-14	2 or more	Rubber	Cotton	Three Cotton, Outer one Flame-Retardant & Moisture-Resist. See Note 5	Elevator Lighting and Control	Non-Hazardous Locations	
	EO See Note 7					One Cotton and a Neoprene Jacket See Note 5		Hazardous Locations	
	ET See Note 7	18-14		Thermoplastic	Rayon	Three cotton, Outer one Flame-Retardant & Moisture-Resistant. See Note 5		Non-Hazardous Locations	

See Notes

for cords having insulation on the individual conductors *integral with the jacket.*

400-14. Grounding Conductor Identification. A conductor intended to be used *as a grounding conductor* shall have a continuous identifying marker readily distinguishing it from the other conductor or conductors. Conductors having a green covering shall *not be used for other than grounding* purposes. The identifying marker shall consist of one of the following:

(a) Colored Braid. A braid finished to show a green color.

(b) Colored Insulation or Covering. For cords having no braids on the individual conductors a green insulation or a green covering on one conductor.

400-15. Insulation Thickness. The nominal thickness of rubber or thermoplastic conductor insulation in Types TS, TST, PO-1, P-1, PW-1, SV, and SVT shall be not less than 1/64 inch. The nominal thickness of rubber insulation in Types HC, HPD, HSJ, and HS shall be not less than 1/64 inch for the Nos. 18-16 AWG sizes, and not less than 2/64 inch for the Nos. 14-12 AWG sizes. The nominal thickness of the thermoplastic insulation in Type ET elevator cable shall be not less than 20 mils for the No. 18 and No. 16 AWG size and not less than 1/32 inch for the No. 14 AWG size. The nominal thickness of the rubber insulation in Types E and EO elevator cables shall be not less than 20 mils for the No. 18 and 16 AWG sizes and not less than 2/64 inch for the No. 14 AWG size for ratings not exceeding 300 volts. The nominal thickness of latex-rubber insulation, when employed, in Types SJ, SJO, S and SO shall be not less than 15 mils for the Nos. 18-16 AWG sizes and not less than 18 mils for the No. 14 AWG and larger sizes. The nominal thickness of conductor insulation in Types PO, P, PW, SP-2, SPT-2, *HPN, SRD,* and *SRDT* shall be not less than 3/64 inch. The nominal thickness of thermoplastic insulation in Type SPT-3 shall be not less than 4/64 inch for sizes 18-16 and 5/64 inch for No. 14 and 6/64 inch for No. 12 AWG. For other types, the minimum nominal thickness of rubber or thermoplastic conductor insulation shall be as follows: size AWG 27, and 18 to 16—2/64 inch; 14 to 10—3/64 inch; 8—4/64 inch.

400-16. Attached to Receptacle Plugs. Where a flexible cord is provided with a *grounding conductor* and equipped with an attachment plug, the plug shall comply with Paragraphs 250-59(a and b).

ARTICLE 402—FIXTURE WIRES

402-1. Use. Fixture wires are designed for installation in lighting fixtures and in similar equipment where enclosed or protected and not subject to bending or twisting in use. Also, they are used for connecting lighting fixtures to the conductors of the circuit that supplies the fixtures.

For application in lighting fixtures, see Article 410.

Fixture wires are not intended for installation as branch circuit conductors or for the connection of portable or stationary appliances.

402-2. Minimum Size. Fixture wires shall not be smaller than No. 18.

402-3. *Insulation.*

(a) The rubber insulations include those made from natural and synthetic rubber, neoprene and other vulcanized materials.

Thermoplastic insulation may stiffen at temperatures below minus 10°C. (14°F.) and care should be used in its installation at such temperatures. *It may be deformed when subject to pressure; care should* be taken in its installation, as for example, at bushings, or points of support. See Section 373-6(b).

(b) No conductor shall be used under such conditions that its temperature, even when carrying current, will exceed the temperature specified in Table 310-2(a) for the type of insulation involved.

Table 402-1. Allowable Current-Carrying Capacity of Fixture Wire

(Based on Room Temperature of 30°C., 86°F.)

Size AWG	Fixture Wire	
	Rubber Types: RF-1, RF-2, FF-1, FF-2, RFH-1, RFH-2, FFH-1, FFH-2	Thermoplastic Types TF, TFF; Cotton Type CF*; Asbestos Type AF*; Silicone Rubber Types: SF-1*, SF-2*, SFF-1*, SFF-2*
18	5	6
16	7	8
14	[illegible]	17

*These types are used [illegible] where they are exposed to high temperatures and [illegible] accordingly.

Ultimate Insulation Temperature. In no case shall conductors be associated together in such a way with respect to the kind of circuit, the wiring method employed, or the number of conductors, that the limiting temperature of the conductors will be exceeded.

402-5. Overcurrent Protection. See Section 240-5, Exception No. 3

Table 402-6. Fixture Wire

Trade Name	Type Letter	Insulation	Thickness of Insulation	Outer Covering
Rubber-Covered Fixture Wire Solid or 7-Strand	RF-1	Code Rubber	18.....1/64 Inch	Non-metallic covering
	RF-2	Code Rubber	18–16.....2/64 Inch	Non-metallic covering
		Latex Rubber	18–16.....18 Mils	
Rubber-Covered Fixture Wire Flexible Stranding	FF-1	Code Rubber	18.....1/64 Inch	Non-metallic covering
	FF-2	Code Rubber	18–16.....2/64 Inch	Non-metallic covering
		Latex Rubber	18–16.....18 Mils	
Heat Resistant Rubber-Covered Fixture Wire Solid or 7-Strand	RFH-1	Heat-Resistant Rubber	18.....1/64 Inch	Non-metallic covering
	RFH-2	Heat-Resistant Rubber	18–16.....2/64 Inch	Non-metallic covering
		Heat-Resistant Latex Rubber	18–16.....18 Mils	
Heat Resistant Rubber-Covered Fixture Wire Flexible Stranding	FFH-1	Heat-Resistant Rubber	18.....1/64 Inch	Non-metallic covering
	FFH-2	Heat-Resistant Rubber	18–16.....2/64 Inch	Non-metallic covering
		Heat-Resistant Latex Rubber	18–16.....18 Mils	
Thermoplastic-Covered Fixture Wire—Solid or Stranded	TF	Thermoplastic	18–16.....2/64 Inch	None

Continued on next page

Table 402-6 (Continued)

Trade Name	Type Letter	Insulation	Thickness of Insulation	Outer Covering
Thermoplastic-Covered Fixture Wire—Flexible Stranding	TFF	Thermoplastic	18–16.....2/64 Inch	None
Cotton-Covered Heat-Resistant Fixture Wire	CF	Impregnated Cotton	18–14.....2/64 Inch	None
Asbestos-Covered Heat-Resistant Fixture Wire	AF	Impregnated Asbestos	18–14.....2/64 Inch	None
Silicone Insulated Fixture Wire Solid or 7-Strand	SF-1	Silicone Rubber	18.....1/64 Inch	Non Metallic Covering
	SF-2	Silicone Rubber	18–14.....1/32 Inch	Non Metallic Covering
Silicone Insulated Fixture Wire Flexible Stranding	SFF-1	Silicone Rubber	18.....1/64 Inch	Non Metallic Covering
	SFF-2	Silicone Rubber	18–14.....1/32 Inch	Non Metallic Covering