61.2 Examples of industrial control equipment are:

a) Manual and magnetic starters and controllers.

b) Thermal- and magnetic-overload relays.

c) Pushbutton stations, including selector switches and pilot lights.

d) Control-circuit switches and relays.

e) Float-, flow-, pressure-, and vacuum-operated switches.

f) Resistors and rheostats.

g) Proximity switches.

h) Time-delay relays and switches.

i) Resistors and rheostats intended for industrial heating and lighting, including those for motor-generator fields.

j) Control devices intended for industrial heating and lighting.

k) Variable-voltage autotransformers.

61.3 These devices shall also comply with the applicable requirements in the Standard for Industrial Control Equipment, UL 508.

CONSTRUCTION

62 Holes in Enclosures

62.1 An open-type auxiliary device for use in a motor-control circuit (such as a pilot light, selector switch, or pushbutton) complying with the requirements in 62.2, threaded into an enclosure, or a closure plug threaded into an opening in the enclosure for such an auxiliary device, need not be secured against removal.

62.2 An open-type auxiliary device shall close the opening into which it threads in a manner complying with the requirements in this standard when installed in accordance with the manufacturer's installation instructions. If the construction is such that the enclosure of the auxiliary device requires a hydrostatic strength test or equivalent, the auxiliary device wiring terminals or leads shall be factory sealed.

Exception: A permanently mounted device shall have provision for connection to threaded rigid metal conduit, or other wiring methods in accordance with Article 501 in the National Electric Code, ANSI/NFPA 70. This requirement does not apply to an open-type auxiliary device for use in a motor-control circuit (such as a pilot light, selector switch, or pushbutton) that:

a) Is intended to thread into an enclosure and close the opening into which it threads, and

b) Complies with the requirements in 62.2.

PERFORMANCE

63 No-Load Endurance Test

63.1 A manually-operated device provided with a metal-to-polymeric or polymeric-to-ceramic type shaft opening shall be subjected to the no-load endurance test specified in 63.2. There shall be no mechanical or visible damage to any of the parts.

63.2 The device shall be tested with shaft path surfaces having the maximum surface roughness to be provided in production. Following the test, the device shall comply with Explosion Tests, Section 21.

63.3 The device is to be operated in its intended manner. This test may be conducted manually or mechanically. The duration of the test is to be 10,000 cycles, at a rate not greater than 10 per minute. The rate of cycling is to be greater if agreeable to all concerned.

MARKINGS

64 Details

64.1 Unless the proper wiring connections are plainly evident, wiring terminals shall be marked, or the device shall be provided with a wiring diagram to indicate the connections. A device requiring the use of heater elements in the installation shall be provided with a heater table.

64.2 If a wiring diagram or heater table is necessary, each shall be secured to the device. The diagram or table may be on a paper label if it is:

a) Located within the enclosure where it is visible and legible on opening the enclosure, and

b) Protected against mechanical damage.

64.3 A magnetic motor controller enclosure shall be marked as required by 60.3, except that in place of the electrical ratings required by 60.3(c), the enclosure shall be marked to indicate the manufacturer, type, and ratings of the mechanism or mechanisms for which it is intended.

64.4 Except as noted in 64.5, the marking required by 64.3 shall be on the metal nameplate.

64.5 The information covering the mechanisms for which the enclosure is intended may be on a paper label cemented to the inside of the enclosure where it is readily visible if the nameplate bears a reference to the location of this information; for example, "For use only with mechanisms listed on inside of cover."

64.6 An open-type auxiliary device as described in 62.1, 62.2 and in the exceptions to 62.2 shall be provided with instructions indicating that the device is to be installed in a threaded opening in an enclosure, the minimum number of threads to be engaged, and the type of threads required in the enclosure. These instructions are permitted to be in the form of a pressure-sensitive label.

64.7 The marking for an open-type auxiliary device for use in a motor-control circuit (such as a pilot light, selector switch, or pushbutton) complying with the requirement in 62.2 and intended for mounting within another enclosure, may be on an adhesive-backed label or equivalent secured to the auxiliary device.

PART VI – SWITCHES

65 General

65.1 Switches shall comply with the applicable requirements of Part I – Part IV of this Standard in addition to the requirements in Part VI.

65.2 Switches shall also comply with the applicable requirements for similar switches for use in unclassified locations.

65.3 These requirements cover snap and similar switches rated 60 amperes or less at 250 volts or less; 30 amperes or less at 600 volts or less; and 2 horsepower or less at 600 volts or less.

65.4 These requirements do not cover knife, enclosed, clock-operated, or magnetically-operated switches, or industrial control equipment such as auxiliary devices and magnetic or manual motor controllers.

CONSTRUCTION

66 Enclosure Thickness

66.1 A sheet-metal diaphragm that forms part of the enclosure of an electrical component may be less than 1/32 inch (0.8 mm) thick if:

a) A barrier of acceptable insulating material at least 1/32 inch thick is secured in place between the diaphragm and any electrical component that it encloses;

b) The diaphragm is located or enclosed so that it will be protected against unintentional mechanical damage;

c) The diaphragm is formed of an acceptable inherently corrosion-resistant sheet metal not less than 0.005 inch (0.127 mm) thick;

d) The diameter of the diaphragm is not greater than 1 inch (25.4 mm); and

e) The diaphragm assembly withstands the Explosion Tests, Section 21, Hydrostatic Pressure Test, Section 22, and Diaphragm Endurance Test, Section 56.

67 Mounting of Switch Mechanism

67.1 A switch mechanism operated by rotation of an integral shaft shall be secured so that the mechanism as a whole cannot turn.

68 Spacings

68.1 Except as specified in 68.2, the spacings shall comply with the spacing requirements for general-use switches for use in ordinary locations.

68.2 The spacing through air from each terminal to the enclosure walls shall not be less than 1/4 inch (6.4 mm).

69 Insulating Barrier or Liner

69.1 Except as noted in 69.2 – 69.4, an insulating barrier or liner that is used to provide spacings shall be of material acceptable for the application and shall not be less than 0.028 inch (0.711 mm) thick.

69.2 A barrier or liner that is used in conjunction with not less than one-half the required spacing may be less than 1/32 inch (0.80 mm) but shall not be less than 0.013 inch (0.330 mm) thick, if the barrier or liner is:

a) Of acceptable insulating material;

b) Resistant to moisture;

c) Of acceptable mechanical strength if exposed or otherwise likely to be subjected to mechanical damage;

d) Securely held in place; and

e) Located so that it will not be affected adversely by operation of the equipment in service – particularly arcing.

69.3 An insulating barrier or liner used as the sole separation between live parts and grounded parts or between live parts of opposite polarity, shall be of material acceptable for the mounting of uninsulated live parts and not less than 0.013 inch (0.330 mm) thick. Otherwise, a barrier shall be used in conjunction with at least a 1/32 inch (0.80 mm) air spacing.

69.4 An insulating material having a thickness less than that specified in 69.1 – 69.3 may be used if, upon investigation, it is found to be acceptable for the application and is equivalent to materials of the thickness contemplated in 69.1 – 69.3.

RATINGS

70 General

70.1 Other than noted in 70.2 and 70.4, a switch shall be rated in volts and amperes.

70.2 A switch may be rated in volts and horsepower with or without a current rating.

70.3 Except as noted in 70.4, the voltage rating shall be one or an appropriate combination of the voltage ratings specified in Table 70.1.

70.4 A switch not intended for general use may have a voltage rating other than specified in Table 70.1 in conjunction with an ampere, horsepower [not more than 2 horsepower (1.49 kW output)], or other acceptable load rating.

Table 70.1
Voltage ratings

AC Voltage ratings	DC Voltage ratings
120 or 125	125
240 or 250	250

Table 70.1 Continued on Next Page

Table 70.1 Continued

AC Voltage ratings	DC Voltage ratings
277	600
480	
600	

70.5 A switch may carry an additional "T" rating at 125 volts if the switch complies with the test requirements for a switch intended for the control of tungsten-filament lamps operating on direct current.

70.6 A switch may carry an additional "L" rating at 120 or 125 volts alternating current, if the switch complies with the test requirements for a switch intended for the control of tungsten-filament lamps operating on alternating current.

70.7 For two- and three-circuit switches (including fan-motor and double-throw switches), the ampere rating applies to the maximum current carried under any combination of circuits.

70.8 The horsepower rating of a switch intended for general use shall be 1/10, 1/8, 1/6, 1/4, 1/3, 1/2, 3/4, 1, 1-1/2, or 2 horsepower (0.07, 0.09, 0.12, 0.19, 0.25, 0.37, 0.56, 0.7, 1.1, or 1.49 kW output) or an appropriate combination of such values at different voltages.

70.9 The marked horsepower rating of a switch at any single voltage indicates that the switch is acceptable for that horsepower rating or less at that voltage only. If a switch is to be acceptable for any horsepower rating at another voltage, that horsepower and voltage rating is also to appear on the switch.

MARKING

71 Details

71.1 Each switch shall be marked with a metal nameplate indicating the following in addition to the requirements in Section 60, Details:

a) Electrical ratings (see also 70.9).

b) A cautionary statement: "CAUTION – To Reduce The Risk of Ignition Of Hazardous Atmospheres, Disconnect The Device From The Supply Circuit Before Opening. Keep Assembly Tightly Closed When In Operation ," or equivalent wording.

71.2 If a wiring diagram is necessary, it shall be secured to the switch. The diagram may be a paper label if it is located within the enclosure where it is visible and legible on opening the enclosure and it is protected from mechanical damage.

71.3 An alternating-current/direct-current switch provided with No. 6 (3.5 mm major diameter) wire-binding terminal screws having leads less than 0.296 inch (7.52 mm) in diameter shall be marked, where readily visible during installation, 12 AWG max or the equivalent.

71.4 A switch investigated for the control of tungsten-filament lamps on direct as well as alternating current shall be identified as such by means of the letter "T", which shall be a part of the marked electrical ratings and located to indicate that it applies only to the rating of 125 volts.

71.5 A switch investigated for the control of tungsten-filament lamps on alternating-current circuits only shall be identified as such by means of the letter " L ", which shall be a part of the marked electrical ratings and located to indicate that it applies only to the rating for 120 or 250 volts alternating current.

71.6 A switch that is acceptable for use on alternating-current circuits only shall be identified as such by means of the letters "AC" or an acceptable frequency marking (for example, 60 hertz) or a phase marking, which shall be a part of the electrical ratings.

71.7 In accordance with the Exceptions to 14.1.1.3 instructions to install a fitting providing a smooth, rounded inlet hole shall be provided if a conduit opening is not:

a) Provided with a conduit stop;

b) Well-rounded; or

c) Threaded as specified in Table 14.2.

PART VII – CIRCUIT BREAKERS

72 General

72.1 Circuit breakers shall comply with the applicable requirements of Part I – Part IV of this Standard in addition to the requirements in Part VII.

72.2 These requirements cover circuit breakers specifically designed to provide service-entrance, meter-service, or branch-circuit protection for installation and use in hazardous (classified) locations, Class I, Division 1, Groups A, B, C, and D, and Class II, Division 1, Groups E, F, and G, in accordance with the National Electrical Code, ANSI/NFPA 70.

72.3 These requirements also cover explosionproof electrical equipment for installation and use in Class I, Zone 1, Groups IIA, IIB, and IIC hazardous (classified) locations.

72.4 These requirements also cover explosionproof electrical equipment for installation and use in Class I, Zone 1, Groups IIA, IIB, IIB plus Hydrogen, and IIC hazardous (classified) locations.

72.5 For the purpose of these requirements, the term circuit breaker covers the electrical mechanism together with an enclosure and the term circuit-breaker mechanism covers the electrical mechanisms only.

CONSTRUCTION

73 General

73.1 These requirements cover both circuit breakers and circuit-breaker enclosures other than as indicated in 75.23.

73.2 Circuit breakers for use in hazardous locations shall also comply with the applicable requirements in the Standard for Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures, UL 489.

74 Wiring Space

74.1 The space within the enclosure of a circuit breaker shall be sufficient to provide ample room for the necessary wires and cables.

74.2 The terminal currents and conductor sizes are specified in Table 74.1.

Table 74.1
Terminal current and conductor size

Terminal current in amperes[a]	Copper conductor			Aluminum or copper-clad aluminum conductor		
	Paralleled	Size[d]		Paralleled	Size[d]	
		60°C (140°F)	75°C (167°F)		60°C (142°F)	75°C (167°F)
15 or less	–	14 AWG[d]	14 AWG	–	12 AWG	12 AWG
20	–	12	12	–	10	10
25	–	10	10	–	10	10
30	–	10	10	–	8	8
40	–	8	8	–	6	8
50	–	6	6	–	4	6
60	–	4	6	–	3	4
70	–	4	4	–	2	3
80	–	3	4	–	1	2
90	–	2	3	–	1/0[c]	2
100	–	1	3	–	1/0[c]	1
110	–	1[b]	2	–		1/0
125	–	1/0	1	–		2/0
150	–		1/0	–		3/0
175	–		2/0	–		4/0
200	–		3/0	–		250 kcmil
225	–		4/0	–		300
250	–		250 kcmil	–		350
275	–		300	–		500
300	–		350	–		500
325	–		400	2		4/0 AWG
350	–		500	2		4/0
400	2		3/0 AWG	2		250 kcmil
450	2		4/0	2		300
500	2		250 kcmil	2		350
550	2		300	2		500
600	2		350	2		500
700	2		500	3		350
800	3		300	3		400
1000	3		400	4 or 3		350 or 600
1200	4 or 3		350 or 600	4		500
1400	4		500	5		500
1600	5		400 or	5		600
	4		600			
2000	6		400 or	6		600
	5		600			
2500	8		400,	8		600,
	7		500, or	7		750, or
	6		600	9		500
3000	9		400,	10		500,
	8		500, or	9		600, or
	7		600	8		750

Table 74.1 Continued on Next Page

Table 74.1 Continued

Terminal current in amperes[a]	Copper conductor			Aluminum or copper-clad aluminum conductor		
	Paralleled	Size[d]		Paralleled	Size[d]	
		60°C (140°F)	75°C (167°F)		60°C (142°F)	75°C (167°F)
4000	12		400,	13		500,
	11		500, or	12		600, or
	10		600	11		750

[a] For a terminal current other than specified, the next higher rating is to be used – for example, if rated 35 amperes, enter at 40 amperes.

[b] No. 1 Type RH, RHH, RHW, THW, THWN, or XHHW copper conductor may be used if the circuit breaker is so marked. See 75.16.

[c] No. 1 Type RH, RHH, RHW, THW, THWN, or XHHW aluminum conductor may be used if the circuit breaker is so marked. See 75.16.

[d] SI equivalents in mm^2 for AWG and kcmil wire are determined by the following formula:

mm^2= (CircularMils/1973.525)

74.3 With reference to the requirement in 74.1, the number of wires for which wiring space is to be provided is twice the number of circuit-breaker poles – the maximum number of wires involved when the wires enter the enclosure at the end opposite the end at which are located the terminals to which they will be connected. If a solid neutral terminal is supplied, wiring space for such wires will also be required. The provision of barriers to prevent the running of wires end-to-end is acceptable in lieu of the wiring space otherwise required provided that the barriers are riveted, welded, or otherwise secured in place to make their removal difficult.

74.4 If conduit openings are provided in a side wiring space, the width of such a space shall be adequate to accommodate (with respect to bending) the maximum size of wire for the application. For 8 AWG (8.4 mm^2) or larger wire sizes, reference may be made to Table 74.3 and Table 74.4.

Exception: Side wiring spaces of less width may be provided if conduit openings of sufficient size are properly located elsewhere, and if they can be used conveniently when the circuit breaker is wired as intended.

74.5 The clear wiring space at any point, independent of all projections, obstructions, or interference from moving parts of the operating mechanism, shall not be less in width nor in depth than the values specified in Table 74.2.

Table 74.2
Wiring space

Maximum size of wire or cable involved AWG or kcmil (mm^2)		Minimum width and depth of wiring space inches (mm)		Minimum areas required for multiple wires based on factor of 2.5									
				Two Wires		Three Wires		Four Wires		Five Wires		Six Wires	
				$Inch^2$	mm^2	$Inch^2$	mm^2	$Inch^2$	mm^2	$Inch^2$	mm^2	$Inch^2$	mm^2
12 AWG	3.3	3/8	9.5	0.14	90	0.21	135	0.28	181	0.35	226	0.42	271
10	5.3	3/8	9.5	0.23	148	0.34	219	0.46	297	0.57	368	0.68	439
8[a]	8.4	1/2	12.7	0.43	277	0.64	413	0.85	548	1.07	690	1.28	826
6	13.3	5/8	15.9	0.62	400	0.93	600	1.24	800	1.55	1000	1.86	1200
4	21.2	3/4	19.1	0.80	516	1.20	774	1.60	1032	2.00	1290	2.40	1548

Table 74.2 Continued on Next Page

Table 74.2 Continued

Maximum size of wire or cable involved AWG or kcmil (mm²)		Minimum width and depth of wiring space inches (mm)		Minimum areas required for multiple wires based on factor of 2.5									
				Two Wires		Three Wires		Four Wires		Five Wires		Six Wires	
				Inch²	mm²	Inch²	mm²	Inch²	mm²	Inch²	mm²	Inch²	mm²
3	26.7	3/4	19.1	0.91	587	1.36	877	1.82	1174	2.27	1465	2.72	1755
2	33.6	7/8	22.2	1.03	665	1.55	1000	2.06	1329	2.58	1665	3.10	2000
1	42.4	1	25.4	1.36	877	2.04	1316	2.72	1755	3.40	2194	4.08	2632
1/0	53.5	1	25.4	1.55	1000	2.33	1503	3.10	2000	3.88	2503	4.66	3006
2/0	67.4	1	25.4	1.79	1155	2.68	1729	3.58	2310	4.47	2884	5.36	3458
3/0	85.0	1-1/8	28.6	2.08	1342	3.11	2006	4.16	2684	5.19	3348	6.22	4013
4/0	107.2	1-1/4	31.8	2.42	1561	3.63	2342	4.84	3123	6.05	3903	7.26	4684
250 kcmil	127.0	1-3/8	34.9	2.96	1910	4.44	2865	5.92	3819	7.40	4774	8.88	5729
300	152.0	1-1/2	38.1	3.42	2206	5.13	3310	6.84	4413	8.55	5516	10.26	6619
350	177.0	1-1/2	38.1	3.81	2458	5.72	3690	7.62	4916	9.53	6148	11.44	7381
400	203.0	1-5/8	41.3	4.18	2967	6.27	4045	8.36	5394	10.45	6742	12.54	8090
500	253.0	1-3/4	44.5	4.92	3174	7.38	4761	9.84	6348	12.30	7935	14.76	9523
600	304.0	1-7/8	47.6	5.97	3852	8.96	5781	11.94	7703	14.93	9632	17.92	11561
700	354.0	2	50.8	6.68	4310	10.02	6465	13.36	8619	16.70	10774	20.04	12929
750	380.0	2	50.8	7.04	4542	10.56	6813	14.08	9084	17.60	11355	21.12	13626
800	406.0	2-1/8	54.0	7.39	4768	11.09	7155	14.78	9535	18.48	11923	22.18	14310
900	456.0	2-1/4	57.2	8.09	5219	12.13	7826	16.18	10439	20.22	13045	24.26	15652
1000	506.0	2-1/4	57.2	8.77	5658	13.15	8484	17.54	11316	21.92	14142	26.30	16968
1250	633.0	2-1/2	63.5	11.03	7116	16.55	10677	22.06	14232	27.58	17794	33.10	21355
1500	760.0	2-3/4	69.9	12.74	8219	19.11	12329	25.48	16439	31.85	20548	38.22	24658
1750	886.0	2-7/8	73.0	14.45	9323	21.67	13981	28.90	18645	36.12	23303	43.34	27961
2000	1012.0	3-1/8	79.4	16.04	10348	24.06	15523	32.08	20697	40.10	25871	48.12	31045

[a] 8 AWG is the minimum size of wire to be considered if the device is marked "Suitable for Use As Service Equipment."

Table 74.3
Minimum width of gutter and wire-bending space in inches (mm)

Size of wire		Wires per terminal (pole)									
AWG or kcmil	(mm²)	1		2		3		4		5	
14 – 10	(2.1 – 5.3)	Not specified		–		–		–		–	
8 – 6	(8.4 – 13.3)	1-1/2	(38.1)	–		–		–		–	
4 – 3	(21.1 – 26.7)	2	(50.8)	–		–		–		–	
2	(33.6)	2-1/2	(63.5)	–		–		–		–	
1	(42.4)	3	(76.2)	–		–		–		–	
1/0 – 2/0	(53.5 – 67.4)	3-1/2	(88.9)	5	(127)	7	(178)	–		–	
3/0 – 4/0	(85.0 – 107)	4	(102)	6	(152)	8	(203)	–		–	
250	(127)	4-1/2	(114)	6	(152)	8	(203)	10	(254)	–	

Table 74.3 Continued on Next Page

Table 74.3 Continued

Size of wire		Wires per terminal (pole)									
AWG or kcmil	(mm^2)	1		2		3		4		5	
300 – 350	(152 – 177)	5	(127)	8	(203)	10	(254)	12	(305)	–	
400 – 500	(203 – 253)	6	(152)	8	(203)	10	(254)	12	(305)	14	(356)
600 – 700	(304 – 355)	8	(203)	10	(254)	12	(305)	14	(356)	16	(406)
750 – 900	(380 – 456)	8	(203)	12	(305)	14	(356)	16	(406)	18	(457)
1000 – 1250	(507 – 633)	10	(254)	–		–		–		–	
1500 – 2000	(760 – 1010)	12	(305)	–		–		–		–	

Notes –

1) The table includes only those multiple-conductor combinations that are likely to be used. Combinations not mentioned may be given further consideration.

2) For circuit breakers rated 125 amperes or less, and marked to indicate use of both 60°C and 75°C wire, the wire bending space is based on the use of 60°C (140°F) insulated wire.

Table 74.4
Minimum wire-bending space at terminals in inches

Wire size		Wires per Terminal (Pole)[a]							
AWG or kcmil	(mm^2)	1		2		3		4 or More	
14 – 10	(2.1 – 5.3)	Not Specified		–		–		–	
8	(8.4)	1-1/2		–		–		–	
6	(13.3)	2		–		–		–	
4	(21.2)	3		–		–		–	
3	(26.7)	3		–		–		–	
2	(33.6)	3-1/2		–		–		–	
1	(42.4)	4-1/2		–		–		–	
1/0	(53.5)	5-1/2		5-1/2		7		–	
2/0	(67.4)	6		6		7-1/2		–	
3/0	(85.0)	6-1/2	(1/2)	6-1/2	(1/2)	8		–	
4/0	(107)	7	(1)	7-1/2	(1-1/2)	8-1/2	(1/2)	–	
250	(127)	8-1/2	(2)	8-1/2	(2)	9	(1)	10	
300	(152)	10	(3)	10	(2)	11	(1)	12	
350	(177)	12	(3)	12	(3)	13	(3)	14	(2)
400	(203)	13	(3)	13	(3)	14	(3)	15	(3)
500	(253)	14	(3)	14	(3)	15	(3)	16	(3)
600	(304)	15	(3)	16	(3)	18	(3)	19	(3)
700	(355)	16	(3)	18	(3)	20	(3)	22	(3)

Table 74.4 Continued on Next Page

Table 74.4 Continued

Wire size		Wires per Terminal (Pole)[a]							
AWG or kcmil	(mm^2)	1		2		3		4 or More	
750	(380)	17	(3)	19	(3)	22	(3)	24	(3)
800	(405)	18		20		22		24	
900	(456)	19		22		24		24	
1000	(507)	20		–		–		–	
1250	(633)	22		–		–		–	
1500	(760)	24		–		–		–	
1750	(887)	24		–		–		–	
2000	(1013)	24		–		–		–	

[a] Wire bending space shall be permitted to be reduced by the number of inches shown in parentheses under the following conditions:

1. Only removable wire connectors receiving one wire each are used, (there may be more than one removable wire connector per terminal).

2. The removable wire connectors can be removed from their intended location without disturbing structural or electrical parts other than a cover, and can be reinstalled with the conductor in place.

For SI units one inch = 25.4 mm

74.6 The clear wiring space, independent of all projections, obstructions, or interference from moving parts of the operating mechanism, shall be fully adequate for the wiring of the circuit breaker, and shall not be less in total area than 250 percent of the total cross-sectional area of the maximum number of wires that may be used in such space.

74.7 Minimum values for some of the more common multiple-wire conditions are specified in Table 74.2.

74.8 To determine whether a wiring space complies with the requirements in 74.6, consideration is to be given to the actual size of the wires that will be used in the space; but it is to be assumed that wires smaller than 12 AWG (3.3 mm^2) will not be used. In computing the actual area of a wiring space, consideration is to be given to all the available space that may be used properly for the placement of wires.

74.9 The wire-bending space at the line and load terminals shall be as specified in Table 74.4 for the conductor size that corresponds with the maximum ampere rating of the circuit breaker.

74.10 The wire-bending space from a connector to any barrier or other obstruction that is part of a circuit-breaker enclosure shall be as specified in Table 74.3.

74.11 If a wire is restricted by barriers or other means from being bent in a 90-degree or S bend from the terminal to any usable location in the wall of the enclosure, the distance is to be measured from the end of the barrier or other obstruction to the wall of the enclosure.

74.12 The distance mentioned in 74.9 and 74.10 is to be measured in a straight line from the edge of the wire terminal closest to the wall in a direction perpendicular to the box wall or barrier. The wire terminal shall be turned so that the axis of the wire opening in the connector is as close to perpendicular to the wall of the enclosure as it can assume without defeating any reliable means provided to prevent its turning, such as a boss, shoulder, walls of a recess, multiple bolts securing the connector, or the like. A barrier, shoulder, or the like, is to be disregarded when the measurement is being made if it does not reduce the radius to which the wire must be bent. If a terminal is provided with one or more connectors for the