Table 3-3.9.1
Hazard Risk Category Classification

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Table 3-3.9.1 Hazard Risk Category Classification

Task (Assumes Equipment Is Energized, and Work Is Done Within The Flash Protection Boundary)	Hazard / Risk Category	V-Rated Gloves	V-Rated Tools
Panelboards rated 240 V and below – Notes 1 and 3	-	-	-
Circuit breaker (CB) or fused switch operation with covers on	0	N	N
CB or fused switch operation with covers off	0	N	N
Work on energized parts, including voltage testing	1	Y	Y
Remove/install CBs or fused switches	1	Y	Y
Removal of bolted covers (to expose bare, energized parts)	1	N	N
Opening hinged covers (to expose bare, energized parts)	0	N	N

Notes:

1. 25 kA short circuit current available, 0.03 second (2 cycle) fault clearing time.

3. For <10 kA short circuit available, the Hazard / Risk Category required may be reduced by one Number.

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Table 3-3.9.1 Hazard Risk Category Classification (Continued)

Task (Assumes Equipment Is Energized, and Work Is Done Within The Flash Protection Boundary)	Hazard / Risk Category	V-Rated Gloves	V-Rated Tools
Panelboards or Switchboards rated >240 V and up to 600 V (with molded case or insulated case circuit breakers) — Notes 1 and 3	–	–	–
CB or fused switch operation with covers on	0	N	N
CB or fused switch operation with covers off	1	N	N
Work on energized parts, including voltage testing	2*	Y	Y

Notes:

1. 25 kA short circuit current available, 0.03 second (2 cycle) fault clearing time.

3. For <10 kA short circuit available, the Hazard / Risk Category required may be reduced by one Number.

2* Means that a double-layer switching hood and hearing protection are required for this task in addition to the other Hazard / Risk Category 2 requirements of Table 3-3.9.2 of Part II

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Table 3-3.9.1 Hazard Risk Category Classification (Continued)

Task (Assumes Equipment Is Energized, and Work Is Done Within The Flash Protection Boundary)	Hazard / Risk Category	V-Rated Gloves	V-Rated Tools
600 V Class Motor Control Centers (MCCs) – Notes 2 (except as indicated) and 3	_	_	_
CB or fused switch or starter operation with enclosure doors closed	0	N	N
Reading a panel meter while operating a meter switch	0	N	N
CB or fused switch or starter operation with enclosure doors open	1	N	N
Work on energized parts, including voltage testing	2*	Y	Y
Work on control circuits with energized parts 120 V or below, exposed	0	Y	Y

Notes:

2. 65 kA short circuit current available, 0.03 second (2 cycle) fault clearing time.

2* Means that a double-layer switching hood and hearing protection are required for this task in addition to the other Hazard / Risk Category 2 requirements of Table 3-3.9.2 of Part II

3. For <10 kA short circuit available, the Hazard / Risk Category required may be reduced by one Number.

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Table 3-3.9.1 Hazard Risk Category Classification (Continued)

Task (Assumes Equipment Is Energized, and Work Is Done Within The Flash Protection Boundary)	Hazard / Risk Category	V-Rated Gloves	V-Rated Tools
600 V Class Motor Control Centers (MCCs) – Notes 2 (except as indicated) and 3	_	_	_
Work on control circuits with energized parts >120V exposed	2*	Y	Y
Insertion or removal of individual starter “buckets” from MCC — Note 4	3	Y	N
Application of safety grounds, after voltage test	2*	Y	N
Removal of bolted covers (to expose bare, energized parts)	2*	N	N
Opening hinged covers (to expose bare, energized parts)	1	N	N

Notes:

2. 65 kA short circuit current available, 0.03 second (2 cycle) fault clearing time.

2* Means that a double-layer switching hood and hearing protection are required for this task in addition to the other Hazard / Risk Category 2 requirements of Table 3-3.9.2 of Part II

3. For <10 kA short circuit available, the Hazard / Risk Category required may be reduced by one Number.

4. 65 kA short circuit current available, 0.33 second (20 cycle) fault clearing time.

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Table 3-3.9.1 Hazard Risk Category Classification (Continued)

Task (Assumes Equipment Is Energized, and Work Is Done Within The Flash Protection Boundary)	Hazard / Risk Category	V-Rated Gloves	V-Rated Tools
600 V Class Switchgear (with power circuit breakers or fused switches) — Notes 5 and 6	–	–	–
CB or fused switch operation with enclosure doors closed	0	N	N
Reading a panel meter while operating a meter switch	0	N	N
CB or fused switch operation with enclosure doors open	1	N	N
Work on energized parts, including voltage testing	2*	Y	Y
Work on control circuits with energized parts 120 V or below, exposed	0	Y	Y

Notes:

2* Means that a double-layer switching hood and hearing protection are required for this task in addition to the other Hazard / Risk Category 2 requirements of Table 3-3.9.2 of Part II

5. 65 kA short circuit current available, up to 1.0 second (60 cycle) fault clearing time.

6. For <25 kA short circuit current available, the Hazard / Risk Category required may be reduced by one Number.

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Table 3-3.9.1 Hazard Risk Category Classification (Continued)

Task (Assumes Equipment Is Energized, and Work Is Done Within The Flash Protection Boundary)	Hazard / Risk Category	V-Rated Gloves	V-Rated Tools
600 V Class Switchgear (with power circuit breakers or fused switches) — Notes 5 and 6	–	–	–
Work on control circuits with energized parts >120 V exposed	2*	Y	Y
Insertion or removal (racking) of CBs from cubicles, doors open	3	N	N
Insertion or removal (racking) of CBs from cubicles, doors closed	2	N	N
Application of safety grounds, after voltage test	2*	Y	N
Removal of bolted covers (to expose bare, energized parts)	3	N	N
Opening hinged covers (to expose bare, energized parts)	2	N	N

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Table 3-3.9.1 Hazard Risk Category Classification (Continued)

Task (Assumes Equipment Is Energized, and Work Is Done Within The Flash Protection Boundary)	Hazard / Risk Category	V-Rated Gloves	V-Rated Tools
Other 600 V Class (277 V through 600 V, nominal) Equipment — Note 3	–	–	–
Lighting or small power transformers (600 V, maximum)	–	–	–
Removal of bolted covers (to expose bare, energized parts)	2*	N	N
Opening hinged covers (to expose bare, energized parts)	1	N	N
Work on energized parts, including voltage testing	2*	Y	Y
Application of safety grounds, after voltage test	2*	Y	N
Revenue meters (kW-hour, at primary voltage and current)	–	–	–

Notes:

2* Means that a double-layer switching hood and hearing protection are required for this task in addition to the other Hazard / Risk Category 2 requirements of Table 3-3.9.2 of Part II

3. For <10 kA short circuit available, the Hazard / Risk Category required may be reduced by one Number.

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Table 3-3.9.1 Hazard Risk Category Classification (Continued)

Task (Assumes Equipment Is Energized, and Work Is Done Within The Flash Protection Boundary)	Hazard / Risk Category	V-Rated Gloves	V-Rated Tools
Other 600 V Class (277 V through 600 V, nominal) Equipment — Note 3	–	–	–
Insertion or removal	2*	Y	N
Cable trough or tray cover removal or installation	1	N	N
Miscellaneous equipment cover removal or installation	1	N	N
Work on energized parts, including voltage testing	2*	Y	Y
Application of safety grounds, after voltage test	2*	Y	N

Notes:

2* Means that a double-layer switching hood and hearing protection are required for this task in addition to the other Hazard / Risk Category 2 requirements of Table 3-3.9.2 of Part II

3. For <10 kA short circuit available, the Hazard / Risk Category required may be reduced by one Number.

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Table 3-3.9.1 Hazard Risk Category Classification (Continued)

Task (Assumes Equipment Is Energized, and Work Is Done Within The Flash Protection Boundary)	Hazard / Risk Category	V-Rated Gloves	V-Rated Tools
NEMA E2 (fused contactor) Motor Starters, 2.3 kV through 7.2 kV	_	_	_
Contactor operation with enclosure doors closed	0	N	N
Reading a panel meter while operating a meter switch	0	N	N
Contactor operation with enclosure doors open	2*	N	N
Work on energized parts, including voltage testing	3	Y	Y
Work on control circuits with energized parts 120 V or below, exposed	0	Y	Y
Work on control circuits with energized parts >120 V, exposed	3	Y	Y
Insertion or removal (racking) of starters from cubicles, doors open	3	N	N

Notes:

2* Means that a double-layer switching hood and hearing protection are required for this task in addition to the other Hazard / Risk Category 2 requirements of Table 3-3.9.2 of Part II

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Table 3-3.9.1 Hazard Risk Category Classification (Continued)

Task (Assumes Equipment Is Energized, and Work Is Done Within The Flash Protection Boundary)	Hazard / Risk Category	V-Rated Gloves	V-Rated Tools
NEMA E2 (fused contactor) Motor Starters, 2.3 kV through 7.2 kV	_	_	_
Insertion or removal (racking) of starters from cubicles, doors closed	2	N	N
Application of safety grounds, after voltage test	3	Y	N
Removal of bolted covers (to expose bare, energized parts)	4	N	N
Opening hinged covers (to expose bare, energized parts)	3	N	N

Notes:

2* Means that a double-layer switching hood and hearing protection are required for this task in addition to the other Hazard / Risk Category 2 requirements of Table 3-3.9.2 of Part II

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Table 3-3.9.1 Hazard Risk Category Classification (Continued)

Task (Assumes Equipment Is Energized, and Work Is Done Within The Flash Protection Boundary)	Hazard / Risk Category	V-Rated Gloves	V-Rated Tools
Metal Clad Switchgear, 1 kV and above	_	_	_
CB or fused switch operation with enclosure doors closed	2	N	N
Reading a panel meter while operating a meter switch	0	N	N
CB or fused switch operation with enclosure doors open	4	N	N
Work on energized parts, including voltage testing	4	Y	Y
Work on control circuits with energized parts 120 V or below, exposed	2	Y	Y
Work on control circuits with energized parts >120 V, exposed	4	Y	Y
Insertion or removal (racking) of CBs from cubicles, doors open	4	N	N

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Table 3-3.9.1 Hazard Risk Category Classification (Continued)

Task (Assumes Equipment Is Energized, and Work Is Done Within The Flash Protection Boundary)	Hazard / Risk Category	V-Rated Gloves	V-Rated Tools
Metal Clad Switchgear, 1 kV and above	_	_	_
Insertion or removal (racking) of CBs from cubicles, doors closed	2	N	N
Application of safety grounds, after voltage test	4	Y	N
Removal of bolted covers (to expose bare, energized parts)	4	N	N
Opening hinged covers (to expose bare, energized parts)	3	N	N
Opening voltage transformer or control power transformer compartments	4	N	N

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Table 3-3.9.1 Hazard Risk Category Classification (Continued)

Task (Assumes Equipment Is Energized, and Work Is Done Within The Flash Protection Boundary)	Hazard / Risk Category	V-Rated Gloves	V-Rated Tools
Other Equipment 1 kV and above	_	_	_
Metal clad load interrupter switches, fused or unfused	_	_	_
Switch operation, doors closed	2	N	N
Work on energized parts, including voltage testing	4	Y	Y
Removal of bolted covers (to expose bare, energized parts)	4	N	N
Opening hinged covers (to expose bare, energized parts)	3	N	N
Outdoor disconnect switch operation (hookstick operated)	3	Y	Y
Outdoor disconnect switch operation (gang-operated, from grade)	2	N	N

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Table 3-3.9.1 Hazard Risk Category Classification (Continued)

Task (Assumes Equipment Is Energized, and Work Is Done Within The Flash Protection Boundary)	Hazard / Risk Category	V-Rated Gloves	V-Rated Tools
Other Equipment 1 kV and above	_	_	_
Insulated cable examination, in manhole or other confined space	4	Y	N
Insulated cable examination, in open area	2	Y	N

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Table 3-3.9.1 Hazard Risk Category Classification (Continued)

Legend:

V-rated Gloves are gloves rated and tested for the maximum line-to-line voltage upon which work will be done.

V-rated Tools are tools rated and tested for the maximum line-to-line voltage upon which work will be done.

2* means that a double-layer switching hood and hearing protection are required for this task in addition to
the other Hazard/Risk Category 2 requirements of Table 3-3.9.2 of Part II.

Y = yes (required)

N = no (not required)

Notes:

1. 25 kA short circuit current available, 0.03 second (2 cycle) fault clearing time.
2. 65 kA short circuit current available, 0.03 second (2 cycle) fault clearing time.
3. For < 10 kA short circuit current available, the Hazard/Risk Category required may be reduced by one
Number.
4. 65 kA short circuit current available, 0.33 second (20 cycle) fault clearing time.
5. 65 kA short circuit current available, up to 1.0 second (60 cycle) fault clearing time.
6. For < 25 kA short circuit current available, the Hazard/Risk Category required may be reduced by one
Number.

Table 3-3.9.2
Protective Clothing and Personal Protective Equipment (PPE) Matrix

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Table 3-3.9.2 Protective Clothing and Personal Protective Equipment (PPE) Matrix

Protective Clothing & Equipment	**Protective Systems for Hazard/Risk Category**					
Hazard/Risk Category Number	**-1** (Note 3)	**0**	**1**	**2**	**3**	**4**
Untreated Natural Fiber	-	-	-	-	-	-
a. T-shirt (short-sleeve)	X			X	X	X
b. Shirt (long-sleeve)		X				
c. Pants (long)	X	X	X (Note 4)	X (Note 6)	X	X
FR Clothing (Note 1)	-	-	-	-	-	-
a. Long-sleeve shirt			X	X	X (Note 9)	X
b. Pants			X (Note 4)	X (Note 6)	X (Note 9)	X
c. Coverall			X (Note 5)	X (Note 7)	X (Note 9)	X (Note 5)
d. Jacket, parka, or rainwear			AN	AN	AN	AN

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Table 3-3.9.2 Protective Clothing and Personal Protective Equipment (PPE) Matrix

Protective Clothing & Equipment	**Protective Systems for Hazard/Risk Category**					
Hazard/Risk Category Number	**-1** (Note 3)	**0**	**1**	**2**	**3**	**4**
FR Protective Equipment	-	-	-	-	-	-
a. Flash suit jacket (2-layer)						X
b. Flash suit pants (2-layer)						X
Head protection	-	-	-	-	-	-
a. Hard hat			X	X	X	X
b. FR hard hat liner					X	X
Eye protection	-	-	-	-	-	-
a. Safety glasses	X	X	X	AL	AL	AL
b. Safety goggles				AL	AL	AL
Face protection double-layer switching hood				AR (Note 8)	X	X
Hearing protection (ear canal inserts)				AR (Note 8)	X	X
Leather gloves (Note 2)			AN	X	X	X
Leather work shoes			AN	X	X	X

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Table 3-3.9.2 Protective Clothing and Personal Protective Equipment (PPE) Matrix

Legend:
AN = As needed
AL = Select one in group
AR = As required
X = Minimum required

Notes:
1. See Table 3-3.9.3. (ATPV is the Arc Thermal Performance Exposure Value for a garment in cal/cm^2 .)
2. If voltage-rated gloves are required, the leather protectors worn external to the rubber gloves satisfy this requirement.
3. Class –1 is only defined if determined by Notes 3 or 6 of Table 3-3.9.1 of Part II.
4. Regular weight (minimum 12 oz/yd^2 fabric weight), untreated, denim cotton blue jeans are acceptable in lieu of FR pants. The FR pants used for Hazard/Risk Category 1 shall have a minimum ATPV of 5.
5. Alternate is to use FR coveralls (minimum ATPV of 5) instead of FR shirt and FR pants.
6. If the FR pants have a minimum ATPV of 8, long pants of untreated natural fiber are not required beneath the FR pants.
7. Alternate is to use FR coveralls (minimum ATPV of 5) over untreated natural fiber pants and T-shirt.
8. A double-layer switching hood and hearing protection are required for the tasks designated 2* in Table 3-3.9.1 of Part II.
9. Alternate is to use two sets of FR coveralls (each with a minimum ATPV of 5) over untreated natural fiber clothing, instead of FR coveralls over FR shirt and FR pants over untreated natural fiber clothing.

Table 3-3.9.3
Protective Clothing Characteristics

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Table 3-3.9.3 Protective Clothing Characteristics

Typical Protective Clothing Systems			
Hazard / Risk Category	**Clothing Description (Number of clothing layers is given in parentheses)**	**Total Weight oz/yd^2**	**Minimum Arc Thermal Performance Exposure Value (ATPV)* or Break-open Threshold Energy (E_{BT})* Rating of PPE cal/cm^2**
0	Untreated cotton (1)	4.5 – 7	N/A
1	FR shirt and FR pants (1)	4.5 – 8	5
2	Cotton underwear plus FR shirt and FR pants (2)	9 – 12	8
3	Cotton underwear plus FR shirt and FR pants plus FR coverall (3)	16 – 20	25
4	Cotton underwear plus FR shirt and FR pants plus double layer switching coat and pants (4)	24 – 30	40

***ATPV is defined in the ASTM P S58 standard arc test method for flame resistant (FR) fabrics as the incident energy that would just cause the onset of a second degree burn (1.2 cal/cm^2). E_{BT} is reported according to ASTM P S58 and is defined as the highest incident energy which did not cause FR fabric breakopen and did not exceed the second-degree burn criteria. E_{BT} is reported when ATPV cannot be measured due to FR fabric breakopen.**

Figure A-1-2.4
Limits of Approach

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Table 2-1.3.4 Approach Boundaries to Live Parts for Shock Protection.
(All dimensions are distance from live part to employee.)

(1)	(2)	(3)	(4)	(5)
	Limited Approach Boundary[1]		**Restricted Approach Boundary[1]**	
Nominal System Voltage Range, Phase to Phase	**Exposed Movable Conductor**	**Exposed Fixed Circuit Part**	**Includes Inadvertent Movement Adder**	**Prohibited Approach Boundary[1]**
0 to 50	Not specified	Not specified	Not specified	Not specified
51 to 300	10 ft 0 in.	3 ft 6 in.	Avoid contact	Avoid contact
301 to 750	10 ft 0 in.	3 ft 6 in.	1 ft 0 in.	0 ft 1 in.
751 to 15 kV	10 ft 0 in.	5 ft 0 in.	2 ft 2 in	0 ft 7 in.
15.1 kV to 36 kV	10 ft 0 in.	6 ft 0 in.	2 ft 7 in.	0 ft 10 in
36.1 kV to 46 kV	10 ft 0 in.	8 ft 0 in.	2 ft 9 in.	1 ft 5 in.
46.1 kV to 72.5 kV	10 ft 0 in.	8 ft 0 in.	3 ft 3 in.	2 ft 1 in.
72.6 kV to 121 kV	10 ft 0 in.	8 ft 0 in.	3 ft 2 in.	2 ft 8 in.
138 kV to 145 kV	11 ft 0 in.	10 ft 0 in.	3 ft 7 in.	3 ft 1 in.
161 kV to 169 kV	11 ft 0 in.	11 ft 8 in	4 ft 0 in.	3 ft 6 in.

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Table 2-1.3.4 Approach Boundaries to Live Parts for Shock Protection.
(All dimensions are distance from live part to employee.)

(1)	(2)	(3)	(4)	(5)
	Limited Approach Boundary[1]		**Restricted Approach Boundary[1]**	
Nominal System Voltage Range, Phase to Phase	**Exposed Movable Conductor**	**Exposed Fixed Circuit Part**	**Includes Inadvertent Movement Adder**	**Prohibited Approach Boundary[1]**
230 kV to 242 kV	13 ft 0 in	13 ft 0 in	5 ft 3 in.	4 ft 9 in.
345 kV to 362 kV	15 ft 4 in.	15 ft 4 in.	8 ft 6 in.	8 ft 0 in.
500 kV to 550 kV	19 ft 0 in.	19 ft 0 in.	11 ft 3 in.	10 ft 9 in.
765 kV to 800 kV	23 ft 9 in	23 ft 9 in	14 ft 11 in.	14 ft 5 in

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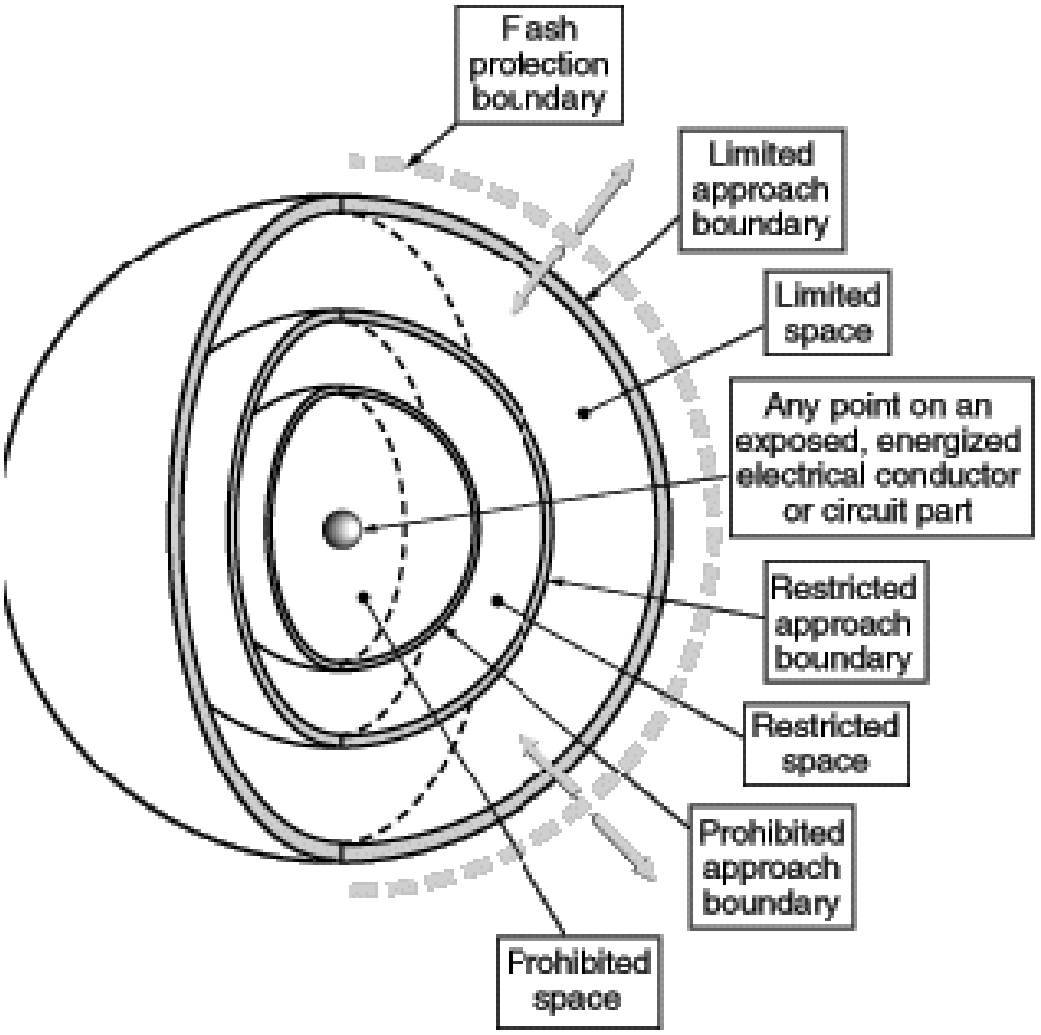
Figure A-1-2.4 Limits of Approach