



Table of Contents

Overview of Low-Voltage and Power-Limited Systems 1

- Article 411 Low-Voltage Lighting Systems1
- Article 504 Intrinsically Safe Systems.....1
- Article 640 Sound Systems1
- Article 720 Circuits Operating at Less than 50V2
- Article 725 Remote-Control, Signaling, and Power-Limited Circuits2
- Article 727 Instrumentation Tray Cable4
- Article 760 Fire Alarm Signaling Systems.....4
- Article 770 Optical Fiber Cables and Raceways5
- Article 780 Closed-Loop Power Distribution5
- Article 800 Communications Circuits.....5
- Article 810 Radio and Television Equipment.....6
- Article 820 Community Antenna Television Systems7
- Article 830 Network-Powered Broadband Communications Systems7

NEC Article 90 Introduction..... 9

- 90.1 Purpose9
- 90.2 Scope.....9
- 90.3 Code Arrangement9
- 90.4 Enforcement.....10
- 90.7 Examination of Equipment for Product Safety.....11

NEC Article 100 Definitions..... 12

NEC Article 110 General Installation Requirements..... 14

- 110.2 Approval of Equipment.....14
- 110.3 Use of Equipment14
- 110.11 Deteriorating Agent14
- 110.12 Mechanical Execution of Work.....14
- 110.14 Electrical Connections.....15
- 110.21 Manufacturer’s Markings.....15
- 110.26 Spaces about Electrical Equipment15
- 110.27 Guarding of Live Parts.....16

Intruduction to Grounding 18

- Understanding the Basics of Electrical Systems18
- Understanding Electrical Shock Hazard19
- What Determines the Severity of Electric Shock?20
- Clearing a Ground Fault.....21
- Why Grounding is Often Difficult to Understand21

NEC Grounding Requirements 24

- Article 411 Low-Voltage Lighting of Less than 30V24
- Article 504 Intrinsically Safe Systems.....24
- Article 640 Sound Systems24
- Article 720 Circuits of Less than 50V24
- Article 725 Class 1, 2, and 3 Circuits24
- Article 760 Fire Alarm Signaling Systems.....24
- Article 800 Communication Circuits.....24
 - 800.33 Cable Grounding.....25
 - 800.40 Cable and Primary Protector Grounding25
- Article 810 Radio and Television Equipment.....27
 - 810.15 Grounding.....27
 - 810.20 Antenna Discharge Unit27
 - 810.21 Grounding Conductors – Receiving Stations28
- Article 820 Community Antenna Television and Radio Distribution Systems29
 - 820.33 Grounding Cable.....29
 - 820.40 Cable Grounding.....29

Micellaneous NEC Requirements 33

- Abandoned Cables.....33
- Burial Depth.....33
- Cable Marking.....34
- Class 2 and 3 cables [Table 725.71]34
- Power-Limited Fire Alarm Cable [Table 760.71(l)]34
- Optical Fiber Cable [Table 770.50]34
- Communications Cable [800.50]34
- Coaxial Cable [Table 820.50]34
- Cable Tray34
- Enclosures35
- Environmental Air Space35
- Identification36
- Information Technology Rooms36

Manhole Installations	36	725.52 Wiring Methods on Load Side of the Class 2 or Class 3 Power Source.....	55
Plenum Rated Cables	36	725.54 Installation of Class 2 and Class 3 Circuit Conductors ...	55
Plenum Rated Raceways.....	36	725.55 Separation from Other Systems.....	56
Protection from Physical Damage.....	36	725.56 Conductors of Different Circuits in Same Cable, Enclosure or Raceway.....	56
Raceway - Not Required.....	37	725.57 Class 2 or Class 3 Cables Exposed to Lightning.....	57
Raceway - Required	37	725.58 Support	58
Support	37	725.61 Applications of Class 2 and Class 3 Cables.....	58
Support to Raceway	38	725.71 Listing and Marking of Class 2 and Class 3 Cables	59
Separation from Lightning Protection Conductors.....	38	Article 725 – Practice Questions.....	61
Separation from Power Conductors	39	Article 727 Instrumentation Tray Cable: Type ITC.....	62
Separation from Other Low-Voltage or Power-Limited Circuits.....	39	727.1 Scope	62
Class 2 or 3 Circuits with Communications Circuits.....	40	727.2 Definition	62
Separation from Raceways or Cables	40	727.3 Other Articles.....	62
Service Mast.....	40	727.4 Uses Permitted.....	62
Spread of Fire or Products of Combustion [300.21]	41	727.5 Uses Not Permitted	62
Underground Installations	41	727.6 Construction.....	62
NEC Chapter 7 NEC Special Conditions.....	42	727.7 Marking	62
Article 720 Circuits and Equipment Operating at Less than 50V	43	727.8 Ampacity	63
720.1 Scope	43	727.9 Overcurrent Protection.....	63
720.2 Other Articles	43	727.10 Bends	63
720.4 Wiring Methods.....	43	Article 727 – Practice Questions.....	64
720.8 Overcurrent Protection.....	43	Article 760 Fire Alarm Systems.....	65
720.10 Grounding.....	43	760.1 Scope	65
Article 720 – Practice Questions.....	44	760.2 Definitions	65
Article 725 Class 1, Class 2 and Class 3 Remote-Control, Signaling and Power-Limited Circuits.....	45	760.3 Other Articles.....	66
725.1 Scope	45	760.5 Access to Electrical Equipment Behind Panels Designed to Allow Access.....	67
725.2 Definitions	45	760.6 Mechanical Execution of Work.....	67
725.3 Other Articles.....	47	760.7 Fire Alarm Circuit Cables Exposed to Lightning	68
725.5 Access to Electrical Equipment Behind Panels Designed to Allow Access.....	51	760.9 Fire Alarm Circuit and Equipment Grounding	68
725.6 Mechanical Execution of Work.....	51	760.10 Fire Alarm Circuit Identification	68
725.8 Safety-Control Equipment.....	51	760.15 Fire Alarm Circuit Requirements.....	68
725.9 Grounding.....	52	760.21 NPLFA Circuit Power Source Requirements	68
725.15 Class 1, Class 2 and Class 3 Circuit Requirements.....	52	760.23 NPLFA Circuit Overcurrent Protection.....	68
725.21 Class 1 Circuit Classifications and Power Source Requirements.....	52	760.24 NPLFA Circuit Overcurrent Device Location.....	69
725.23 Class 1 Circuit Overcurrent Protection.....	53	760.25 NPLFA Circuit Wiring Methods	69
725.24 Class 1 Circuit Overcurrent Device Location	53	760.26 Conductors of Different Circuits in Same Cable, Enclosure or Raceway.....	69
725.25 Class 1 Circuit Wiring Methods.....	53	760.27 NPLFA Circuit Conductors	69
725.26 Conductors of Different Circuits in Same Cable, Enclosure or Raceway	53	760.28 Number of Conductors in a Raceway	69
725.27 Class 1 Circuit Conductors.....	54	760.41 Power Sources for PLFA Circuits	70
725.28 Number of Conductors in a Raceway	54	760.42 Equipment Marking.....	70
725.41 Power Sources for Class 2 and Class 3 Circuits	54	760.52 Wiring Methods and Materials on Load Side of the PLFA Power Source	70
725.42 Equipment Marking.....	55	760.54 Installation of Conductors and Equipment.....	71
725.51 Wiring Methods on Supply Side of Class 2 or Class 3 Power Source.....	55	760.55 Separation from Other Circuit Conductors.....	71
		760.56 Conductors of Different PLFA Circuits, Class 2, Class 3 and Communications Circuits in Same Cable, Enclosure or Raceway.....	71

760.57 Support.....	71	Article 810 Radio and Television Equipment.....	97
760.61 Applications of Listed PLFA Cables.....	72	810.1 Scope.....	97
760.71 Listing and Marking of PLFA Cables and Insulated Continuous Line-Type Fire Detectors.....	72	810.3 Other Articles.....	97
Article 760 – Practice Questions.....	74	810.4 Community Television Antenna.....	98
Article 770 Optical Fiber Cables and Raceways.....	75	810.12 Support of Lead-in Cables.....	98
770.1 Scope.....	75	810.13 Avoidance of Contacts with Conductors of Other Systems.....	98
770.2 Definitions.....	75	810.15 Grounding.....	98
770.3 Locations and Other Articles.....	75	810.18 Clearances.....	99
770.4 Optical Fiber Cables.....	76	810.20 Antenna Discharge Unit.....	99
770.5 Types.....	76	810.21 Grounding Conductors — Receiving Stations.....	100
770.6 Raceways for Optical Fiber Cables.....	77	Article 810 – Practice Questions.....	102
770.7 Access to Electrical Equipment Behind Panels Designed to Allow Access.....	77	Article 820 Community Antenna Television and Radio Distribution Systems.....	103
770.8 Mechanical Execution of Work.....	77	820.1 Scope.....	103
770.50 Listing and Marking.....	78	820.2 Definitions.....	103
770.51 Listing Requirements for Optical Fiber Cables and Raceways.....	78	820.3 Locations and Other Articles.....	103
770.52 Installation of Optical Fibers and Electrical Conductors...79		820.4 Energy Limitations.....	104
770.53 Applications of Listed Optical Fiber Cables and Raceways.....	80	820.5 Access to Electrical Equipment Behind Panels Designed to Allow Access.....	104
Article 770 – Practice Questions.....	82	820.6 Mechanical Execution of Work.....	104
Chapter 8 Communications Systems.....	83	820.10 Outside Cables.....	105
Article 800 Communication Circuits.....	84	820.33 Grounding Cable.....	105
800.1 Scope.....	84	820.40 Cable Grounding.....	105
800.2 Definitions.....	85	820.50 Listing and Markings.....	108
800.4 Equipment.....	85	820.51 Additional Listing Requirements.....	108
800.5 Access to Electrical Equipment Behind Panels Designed to Allow Access.....	85	820.52 Installation of Cables and Equipment.....	109
800.6 Mechanical Execution of Work.....	85	820.53 Applications of Listed CATV Cables.....	110
800.8 Hazardous (Classified) Locations.....	86	Article 820 – Practice Questions.....	112
800.13 Lightning Conductors.....	86	Article 830 Network-Powered Broadband Communications Systems.....	113
800.33 Cable Grounding.....	86	830.1 Scope.....	113
800.40 Cable and Primary Protector Grounding.....	87		
800.48 Raceways for Communications Circuits.....	89		
800.50 Listing and Markings.....	89		
800.51 Listing for Communications Cables and Raceways.....	90		
800.52 Installation of Communications Wires, Cables and Equipment.....	91		
800.53 Applications of Listed Communications Cables and Raceways.....	93		
Article 800 – Practice Questions.....	96		