UL Solutions

Low voltage DC microgrids and DER systems

Mapping UL Solutions Standards in direct current applications

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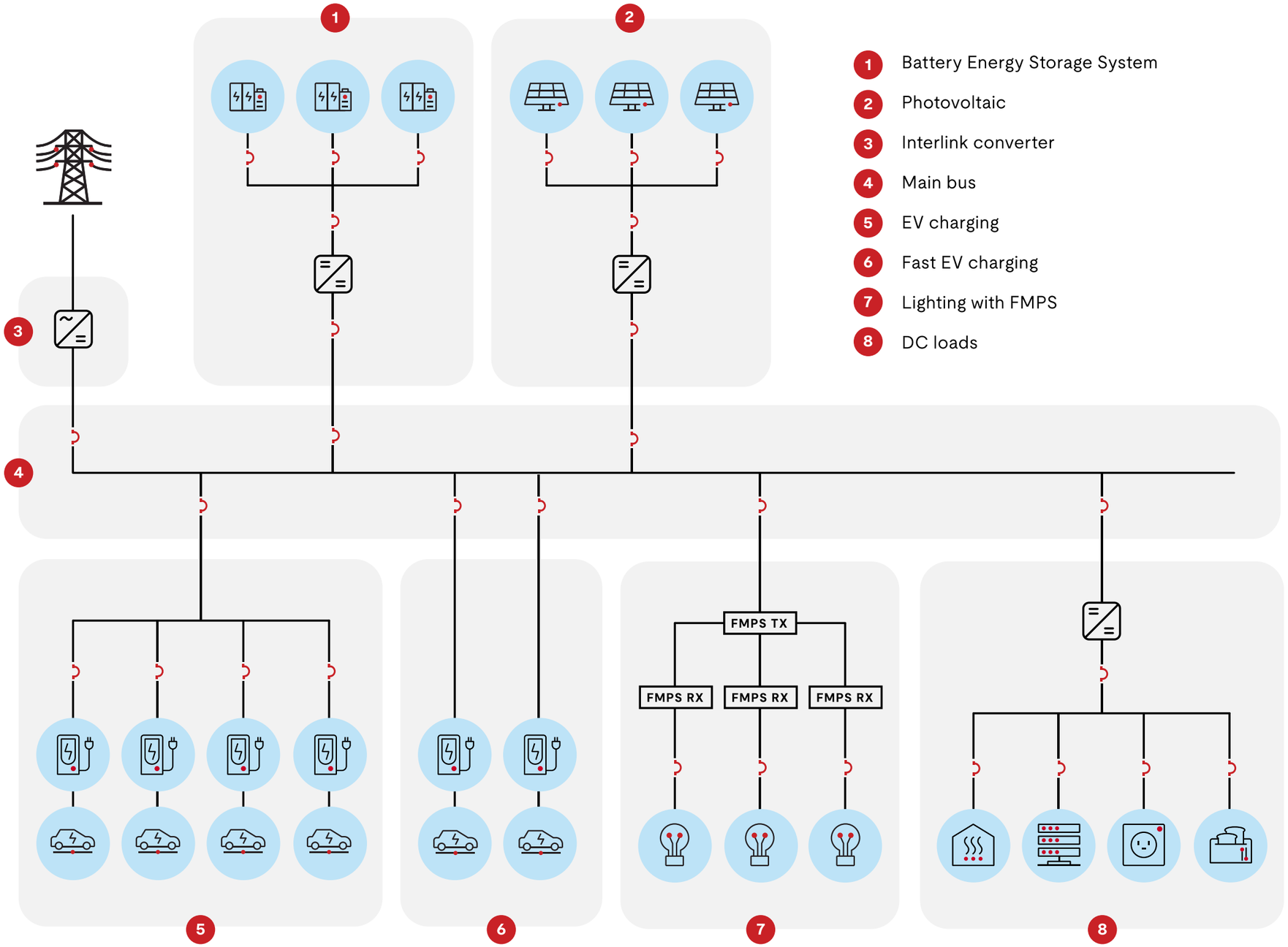
Low Voltage DC microgrid and DER system

Single Line Diagram

Direct current (DC) DER Systems (DC microgrids) are revolutionizing energy management by enhancing efficiency and sustainability. They reduce energy losses typically associated with the conversion of alternating current (AC) to DC and integrate seamlessly with renewable sources like solar and wind. Their ability to function independently from the main grid enhances power supply reliability and stability, making them ideal for critical infrastructure, commercial and industrial (C&I) applications and remote locations. Choosing the right standard is crucial to unlocking the full potential and supporting the safety of DC power systems.

Contact us to learn more

The single line diagram is for representative purpose only.



1. Battery Energy Storage System
2. Photovoltaic
3. Interlink converter
4. Main bus
5. EV charging
6. Fast EV charging
7. Lighting with FMPS
8. DC loads

1 Battery Energy Storage System

Key points

- Bidirectional by nature → Source and load
- High fault current on battery side
- Ground fault protection

NEC requirements

- Article 517.30
  Health Care Facilities Microgrids
- Article 700.12
  Emergency System Microgrids
- Article 701
  Legally Required Standby Systems
- Article 702
  Optional Standby Systems
- Article 705
  Part II Microgrids
- Article 706 | 2023
  Energy Storage Systems
- Article 710 | 2023
  Stand-alone systems

Relative standard	Revision	Scope	Limits	Additional information
BESS solution				
UL 9540	2023	Energy Storage Systems and Equipment	Up to 1,000 Vac/up to 1,500 Vdc	
UL 9540A	2019	Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems	NEC and NESC	
Battery overcurrent protection				
UL 489 Sup. SC	2019	Molded-Case Circuit Breakers and Molded-Case Switches for use with Battery Power Supplies		The Supplement SC in UL 489 was UL 489F in the past
UL 489I	2022	Solid State and Hybrid Circuit Breaker	Up to 1,000 Vac/up to 1,500 Vdc	Outline of Investigation
UL 248-21	CSDC 05-2023	Fuses for the Protection of Batteries and Battery Systems		
DC combiner				
UL 1741	2024	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources	Compliance with NEC	Certified as Interconnection System Equipment
Battery switch disconnector				
UL 98	2023	Enclosed and Dead-Front Switches	Up to 1,000 Vac or Vdc	If the switch disconnector is needed

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The standards indicated are for generic reference purpose only and updated to April 2025.

1 Battery Energy Storage System

Relative standard	Revision	Scope	Limits	Additional information
Output overcurrent protective device				
UL 1066	2022	Low-Voltage AC and DC Power Circuit Breakers	Up to 1,000 Vac/up to 1,500 Vdc	Standard for ACB
UL 489	2019	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures	Up to 1,000 Vac/up to 1,500 Vdc	Standard for MCB, MCCB
UL 489I	2022	Solid State and Hybrid Circuit Breaker	Up to 1,000 Vac/up to 1,500 Vdc	Outline of Investigation
UL 248-1, -2, -3, -4, -5, -6, -8, -9, -10, -12, -15, -17	-1: 6th Edition dated 10/24/2022 -2: 2nd Edition dated 8/1/2000 -3: 2nd Edition dated 8/1/2000 -8: 3rd Edition dated 5/13/2011 -10: 2nd Edition dated 8/1/2000 -17: Outline 5th Edition dated 9/13/2018	-1 Low voltage fuses general requirements, -2 Class C fuses, -3 Class CA and CB fuses, -8 Class J fuses, -10 Class L fuses, -17 Class CF fuses	Up to 600 Vdc	
Switch disconnector				
UL 98	2023	Enclosed and Dead-Front Switches	Up to 1,000 Vac or Vdc	If the switch disconnector is needed
Converter				
UL 1741	2024	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources	Compliance with NEC LV requirements up to 1,000 Vac and 1,500 Vdc and MV requirements over 1,000 Vac and 1,500 Vdc apply UL 1741	For utility-interactive equipment, must be used in conjunction with IEEE 1547
IEEE 1547	2018	Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces	Assume 60 Hz nominal grid frequency	
IEEE 1547.1	2020	EEE Standard Conformance Test Procedures for Equipment Interconnecting Distributed Energy Resources with Electric Power Systems and Associated Interfaces		
UL 62109-1	2023	Safety of Power Converters for Use in Photovoltaic Power Systems	Up to 1,000 Vac, non PV 1,500 Vdc, PV 2,000 Vdc	
CRD 62109-2	18-Jul-14	Power converters for use in photovoltaic power systems		Inverter requirements including reference to UL1741 for grid tied applications

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2 Photovoltaic

Key points

- Low fault current on PV side
- PV arc-fault
- Ground fault
- Source backfeed protection

NEC requirements

- Article 690 | 2023
  Solar Photovoltaic (PV) Systems
- Up to 1,000 Vac/up to 1.500 Vdc
- PV system DC circuits shall not exceed 1,000 V within or originating from arrays located on or attached to buildings and PV system DC circuits inside buildings
- PV system DC circuits shall not exceed 600 V on or in one- and two-family dwellings

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Relative standard	Revision	Scope	Limits	Additional information
PV panels				
UL 61730-1	2022	Photovoltaic (PV) Module Safety Qualification	Up to 1,500 Vdc	
PV combiner, rapid shutdown				
UL 1741	2024	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources	Compliance with NEC	Certified as Interconnection System Equipment
Switchgear				
UL 1558	5th Edition 2016	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear		
Busway				
UL 857	2024	LV Busway	Up to 1,000 Vac or Vdc	USA only – Previous version was 600 V max
PV overcurrent protective device				
UL 489B	2021	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures for Use with Photovoltaic (PV) Systems	Up to 1,500 Vdc	
UL 489I	2022	Solid State and Hybrid Circuit Breaker	Up to 1,000 Vac/up to 1,500 Vdc	Outline of Investigation
UL 248-19	2020	Photovoltaic Fuses	Up to 1,500 Vdc	
PV switch disconnector				
UL 98B	2015	Enclosed and Dead-front Switches for Use in Photovoltaic Systems	Up to 1,500 Vdc	Outline of Investigation
UL 508I	2017	Outline of Investigation for Disconnect Switches Intended for Use in Photovoltaic Systems	Up to 1,500 Vdc	Outline of Investigation
DC/DC converter				
UL 1741	2024	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources	Compliance with NEC	For utility-interactive equipment, must be used in conjunction with IEEE 1547

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2 Photovoltaic

Relative standard	Revision	Scope	Limits	Additional information
Output overcurrent protective device				
UL 1066	2022	Low-Voltage AC and DC Power Circuit Breakers	Up to 1,000 Vac/up to 1,500 Vdc	Standard for ACB
UL 489	2019	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures	Up to 1,000 Vac/up to 1,500Vdc	Standard for MCB, MCCB
UL 489I	2022	Solid State and Hybrid Circuit Breaker	Up to 1,000 Vac/up to 1,500 Vdc	Outline of Investigation
UL 248-1, -2, -3, -4, -5, -6, -8, -9, -10, -12, -15, -17	-1: 6th Edition dated 10/24/2022 -2: 2nd Edition dated 8/1/2000 -3: 2nd Edition dated 8/1/2000 -8: 3rd Edition dated 5/13/2011 -10: 2nd Edition dated 8/1/2000 -17: Outline 5th Edition dated 9/13/2018	-1 Low voltage fuses general requirements, -2 Class C fuses, -3 Class CA and CB fuses, -8 Class J fuses, -10 Class L fuses, -17 Class CF fuses	Up to 600 Vdc	
Power control systems				
UL 3141	2017	Outline of Investigation for Power Control Systems	Compliance with NEC 2023 750.30	If the converter includes power control system functionalities
Switch disconnector				
UL 98	2023	Enclosed and Dead-Front Switches	Up to 1,000 Vac or Vdc	If disconnection is needed, may be fuse protected
PV DC arc-fault circuit protection				
UL 1600B	2018		Compliance with NEC	
PV hazard control				
UL 3741	2020	PV hazard control	Compliance with NEC	

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3 Interlink converter

Key points

- Isolated or non-isolated converter
- Grounding configuration
- Bidirectionnity requirements
- High or limited fault current depending on converter topology
- Ground faults
- Arc fault protection
- Power control systems

NEC requirements

- Article 495 | 2023
- Article 705 | 2023
  Interconnected electric power production sources
- Article 710 | 2023
  Stand-alone systems

Relative standard	Revision	Scope	Limits	Additional information
Connect the AC grid to the DC main bus				
UL 1741	2024	Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources	Compliance with NEC LV requirements up to 1,000 Vac and 1,500 Vdc and MV requirements over 1,000 Vac and 1,500 Vdc apply UL 1741	For utility-interactive equipment, must be used in conjunction with IEEE 1547
IEEE 1547	2018	Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces	Assume 60 Hz nominal grid frequency	
IEEE 1547.1	2020	EEE Standard Conformance Test Procedures for Equipment Interconnecting Distributed Energy Resources with Electric Power Systems and Associated Interfaces		
UL 62109-1	2023	Safety of Power Converters for Use in Photovoltaic Power Systems	Up to 1,000 Vac, non PV 1,500 Vdc, PV 2,000 Vdc	
CRD 62109-2	July 18, 2014	Power Converters for Use in Photovoltaic Power Systems		Inverter requirements including reference to UL 1741 for grid tied applications. UL 62109-2 requirements are contained in the UL 62109-1 CRD
UL 3141	2017	Outline of Investigation for Power Control Systems	Compliance with NEC 2023 750.30	If the converter includes power control system functionalities

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4 DC main bus

Key points

- Centralized distribution → Panelboard/switchboard
- Decentralized distribution → Busway type

NEC requirements

- Article 705 | 2023
  Interconnected electric power production sources
- Chapter 2 | 2023
  Wiring and protection

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Relative standard	Revision	Scope	Limits	Additional information
Panelboard				
UL 67	2024	LV Panelboard	Up to 1,000 Vac or Vdc	
Switchboard				
UL 891	2019	LV Switchboard	Up to 1,000 Vac or Vdc	
Switchgear				
UL 1558	5th Edition 2016	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear		If the bus is connected to switchgear
IEEE C37.20.1	2015	Metal-Enclosed, Low-Voltage Switchgear (which contains either stationary or drawout, manually or electronically operated low-voltage AC or DC power circuit breakers)		If the bus is connected to switchgear; IEEE C37.20.1 is not used directly for certification, but referenced by UL 1558, which is the document used for certification
Busway				
UL 857	2024	LV Busway	Up to 1,000 Vac or Vdc	
Overcurrent protective device				
UL 1066	2022	Low-Voltage AC and DC Power Circuit Breakers	Up to 1,000 Vac/up to 1,500 Vdc	Standard for ACB
UL 489	2019	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures	Up to 1,000 Vac/up to 1,500 Vdc	Standard for MCB, MCCB
UL 4891I	2022	Solid State and Hybrid Circuit Breaker	Up to 1,000 Vac/up to 1,500 Vdc	Outline of Investigation
UL 248-1, -2, -3, -4, -5, -6, -8, -9, -10, -12, -15, -17	-1: 6th Edition dated 10/24/2022 -2: 2nd Edition dated 8/1/2000 -3: 2nd Edition dated 8/1/2000 -8: 3rd Edition dated 5/13/2011 -10: 2nd Edition dated 8/1/2000 -17: Outline 5th Edition dated 9/13/2018	-1 Low voltage fuses general requirements, -2 Class C fuses, -3 Class CA and CB fuses, -8 Class J fuses, -10 Class L fuses, -17 Class CF fuses	Up to 600 Vdc	
Switch disconnector				
UL 98	2023	Enclosed and Dead-Front Switches	Up to 1,000 Vac or Vdc	If the switch disconnector is needed

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5 EV charging

Key points

- EV charger is a DC/DC converter
- Output DC voltage could be higher/ lower than bus voltage

NEC requirements

- Article 625 | 2023
  Electric Vehicle Power Transfer System
- Up to 1,000 Vac or Vdc max at input EV charger; output not specified

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Relative standard	Revision	Scope	Limits	Additional information
Panelboard				
UL 67	2024	LV Panelboard	Up to 1,000 Vac or Vdc	
Switchboard				
UL 891	2019	LV Switchboard	Up to 1,000 Vac or Vdc	
Busway				
UL 857	2024	LV Busway	Up to 1,000 Vac or Vdc	
Overcurrent protective device				
UL 489	2019	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures	Up to 1.000 Vac/up to 1,500 Vdc; 1,500 Vdc max output	Standard for MCB, MCCB
UL 489I	2022	Solid State and Hybrid Circuit Breaker	Up to 1,000 Vac/up to 1,500 Vdc; 1,500 Vdc max output	Outline of Investigation
UL 248-1, -2, -3, -4, -5, -6, -8, -9, -10, -12, -15, -17	-1: 6th Edition dated 10/24/2022 -2: 2nd Edition dated 8/1/2000 -3: 2nd Edition dated 8/1/2000 -8: 3rd Edition dated 5/13/2011 -10: 2nd Edition dated 8/1/2000 -17: Outline 5th Edition dated 9/13/2018	-1 Low voltage fuses general requirements, -2 Class C fuses, -3 Class CA and CB fuses, -8 Class J fuses, -10 Class L fuses, -17 Class CF fuses	Up to 600 Vdc	
Switch disconnector				
UL 98	2023	Enclosed and Dead-Front Switches	Up to 1,000 Vac or Vdc	If disconnect is needed; may be fuse protected
EV charger				
UL 2202	2022	DC Charging Equipment for Electric Vehicles	Up to 1,000 Vac/up to 1,500 Vdc; 1500 Vdc max output	
UL 9741	2023	Electric Vehicle Power Export Equipment (EVPE)	Up to 1,000 Vac/up to 1,500 Vdc; 1,500 Vdc max output	Extend UL 2202 with the ability to export power
EV charger cable				
UL 2263	2022	Electric Vehicle Cable	Up to 1000 Vac or Vdc	
EV vehicle plug				
UL 2251	2022	Plugs, Receptacles and Couplers for Electric Vehicles	1,000 Vac — 1,500 Vdc — 800 A max	

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6 Fast EV charging

Relative standard	Revision	Scope	Limits	Additional information
EV charger				
UL 2202	2022	DC Charging Equipment for Electric Vehicles	1,000 Vac — 1,500 Vdc input 1500 Vdc max output	In some applications, it does not cover megawatt charging systems
UL 9741	2023	Electric Vehicle Power Export Equipment (EVPE)	Up to 1,000 Vac/up to 1,500 Vdc	
UL 2750	2023	Wireless Power Transfer Equipment for Electric Vehicles	Up to 1,000 Vac input	
EV charger cable				
UL 2278	2025	Megawatt Charging Configured Electric Vehicle Couplers	1,500 Vdc — 3,000 A	

Key points

- Output DC voltage usually → 1,000 Vdc

NEC requirements

- Article 625 | 2023
  Electric Vehicle Power Transfer System
- Up to 1,000 Vac or Vdc, max at input
  EV charger; output not specified

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7 Fault Managed Power Systems (FMPS)

Key points

- FMPS are not dedication to DC or lighting applications
- FMPS are mentioned in this document as an example for LED DC distribution

NEC requirements

- Article 722 | 2023
  Class 4 cables under the NEC requirements
- Not less than #24 AWG, rated not less than 450 VDC, not less than 60 C per 722.179 (A) (16)
- Article 726 | 2023
  Class 4 Fault-Managed Power Systems
- 450 V peak or DC

Relative standard	Revision	Scope	Limits	Additional information
FMPS				
UL 1400-1	2022	Fault-Managed Power Systems		Outline of Investigation
Cat 4 cables for FMPS				
UL 1400-2	2023	Outline of Investigation for Cables in Fault-Managed Power Systems	Class 4 cables up to 450 V peak	
Panelboard				
UL 67	2024	LV Panelboard	Up to 1,000 Vac or Vdc	
Protection				
UL 489	2019	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures	Up to 1,000 Vac/up to 1,500 Vdc	Standard for MCB, MCCB
UL 489I	2022	Solid State and Hybrid Circuit Breaker	Up to 1,000 Vac/up to 1,500 Vdc	Outline of Investigation
UL 248-1, -2, -3, -4, -5, -6, -8, -9, -10, -12, -15, -17	-1: 6th Edition dated 10/24/2022 -2: 2nd Edition dated 8/1/2000 -3: 2nd Edition dated 8/1/2000 -8: 3rd Edition dated 5/13/2011 -10: 2nd Edition dated 8/1/2000 -17: Outline 5th Edition dated 9/13/2018	-1 Low voltage fuses general requirements, -2 Class C fuses, -3 Class CA and CB fuses, -8 Class J fuses, -10 Class L fuses, -17 Class CF fuses	Up to 600 Vdc	

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8 DC loads

Relative standard	Revision	Scope	Limits	Additional information
Converter				
UL 1741	2024	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources	Compliance with NEC LV requirements up to 1,000 Vac and 1,500 Vdc and MV requirements over 1,000 Vac and 1,500 Vdc apply UL 1741	
Converter and PV ground fault protection				
UL 62109	Proposal dated 2/22/2019	Safety of Power Converters for Use in Photovoltaic Power Systems	Up to 1,000 Vac, non PV 1,500 Vdc, PV 2,000 Vdc	
Overcurrent protection device				
UL 1066	2022	Low-Voltage AC and DC Power Circuit Breakers	Up to 1,000 Vac/up to 1,500 Vdc	Standard for ACB
UL 489	2019	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures	Up to 1,000 Vac/up to 1,500 Vdc	Standard for MCB, MCCB
UL 489I	2022	Solid State and Hybrid Circuit Breaker	Up to 1,000 Vac/up to 1,500 Vdc	Outline of Investigation
UL 248-1, -2, -3, -4, -5, -6, -8, -9, -10, -12, -15, -17	-1: 6th Edition dated 10/24/2022 -2: 2nd Edition dated 8/1/2000 -3: 2nd Edition dated 8/1/2000 -8: 3rd Edition dated 5/13/2011 -10: 2nd Edition dated 8/1/2000 -17: Outline 5th Edition dated 9/13/2018	-1 Low voltage fuses general requirements, -2 Class C fuses, -3 Class CA and CB fuses, -8 Class J fuses, -10 Class L fuses, -17 Class CF fuses	Up to 600 Vdc	

Key points

- DC loads given as example
- There could be a converter in front of the load

NEC requirements

- Chapter 2 | 2023
  Wiring and Protection
- Up to 1,000 Vac/up to 1,500 Vdc

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Circuit protection device: Circuit breaker and fuses

Relative standard	Revision	Scope	Limits	Additional information
Fuse				
UL 248-1	2022	General Requirement	Fuses rated 1,000 V or less, AC and/or DC, with interrupting ratings up to 300 kA	
UL 248-2	2024	Class C Fuses	Fuses rated 1,200 A or less and 600 Vac; DC ratings are optional	
UL 248-3	2024	Class CA and CB Fuses	Fuses rated 60 A or less and 600 Vac; DC ratings are optional	
UL 248-4	2024	Class CC Fuses	Fuses rated 30 A or less and 600 Vac; DC ratings are optional	
UL 248-5	2024	Class G Fuses	Fuses rated 20 A or less, 600 Vac; 21-60 A, 480 Vac; DC ratings are optional	
UL 248-6	2024	Class H Non-Renewable Fuses	Fuses rated 600 A or less and either 250 or 600 Vac; DC ratings are optional	
UL 248-7	2024	Class H Renewable Fuses	Fuses rated 600 A or less and either 250 or 600 Vac; DC ratings are optional	
UL 248-8	2020	Class J Fuses	Fuses rated 600 A or less and 600 Vac; DC ratings are optional	
UL 248-9	2020	Class K Fuses	Fuses rated 600 A or less and either 250 or 600 Vac; DC ratings are optional	
UL 248-10	2020	Class L Fuses	Fuses rated 100-6,000 A and 600 Vac; DC ratings are optional	
UL 248-11	2020	Plug Fuses	Fuses rated 30 A or less and 125 Vac; DC ratings are optional	
UL 248-12	2022	Class R Fuses	Fuses rated 600 A or less and either 250 or 600 Vac; DC ratings are optional	
UL 248-13	2022	Semiconductor Fuses	Intended to be read together with the Standard for Low-Voltage Fuses — Part 1; fuses rated 2,000 Vac or less; DC ratings are optional	Not for branch protection application
UL 248-14	2020	Supplemental Fuses	Fuses rated 60 A or less; intended only for supplementary overcurrent protection where branch circuit or equivalent applications are not involved; DC ratings are optional	
UL 248-15	2022	Class T Fuses	Fuses rated 1,200 A or less and 300 or 600 Vac; DC ratings are optional	
UL 248-16	2023	Test Limiters	Test limiters calibrated to specific limits of peak let-through current and clearing I2t at 250, 300, 480 or 600 Vac	
UL 248-17	2018	Class CF Fuses	Outline of Investigation (OOI); fuses rated 400 A or less and 600 Vac; DC ratings are optional	
UL 248-18	2022	Class CD Fuses	Fuses rated 31-60 A and 600 Vac	

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The standards indicated are for generic reference purpose only and updated to April 2025.

Relative standard	Revision	Scope	Limits	Additional information
Fuse				
UL 248-19	2020	Photovoltaic Fuses	Fuses for photovoltaic (PV) systems rated up to 1,500 Vdc. Fuses for photovoltaic (PV) systems are intended to be used for the protection of photovoltaic strings or arrays and their associated wiring to provide protection against overloads or short circuits. These types of fuses are not intended to protect downstream inverter components, such as capacitors against the discharge of such capacitors back into the arrays.	PV application only
UL 248-20	2019	Electric Vehicle (EV) Fuses	OOI applies to fuses intended for use as overcurrent protection in an electric vehicle power circuit where branch circuit overcurrent protection in accordance with the National Electric Code (NFPA 70) is not required. Compliance with the following is acceptable for use as a component of an end product: fuses rated 1,000 V or less, AC and/or 1,500V or less DC, with interrupting ratings up to 50k.	Inside EV only
UL 248-21	CSDC May 2023	Fuses for the Protection of Batteries and Battery Systems		Battery protection application only
Curcuit Breaker				
UL 489I	2019	Molded-Case Circuit Breakers and Switches for Use with Photovoltaic (PV) Systems	Up to 1,000 Vac and 1,500 Vdc — 6,000 A or less	
UL 489A	2023	Circuit Breakers for Use in Communications Equipment	Single-pole or multi-pole DC rated circuit breakers intended for use as branch circuit overcurrent and short-circuit protection in communications equipment; up to 600 Vdc	
UL 489B	2021	Molded-Case Circuit Breakers (MCCB) and Switches for Use with Photovoltaic (PV) Systems	MCCB for PV applications up to 1,500 Vdc	PV application
UL 489D	2022	US Naval Commercial-Off-The-Shelf (COTS) Designated Molded-Case Circuit Breakers, Molded-Case Switches and Accessories for Use on Non Nuclear Naval Combatant Ships	Up to 250 Vdc	Naval application
UL 489 Sup SC	2019	Molded-Case Circuit Breakers and Switches for Use with Battery Power Supplies	Up to 1,500 Vdc	Battery protection application
UL 489I	2022	Solid State and Hybrid Circuit Breaker	1,000 Vac — 1,500 Vdc	Outline of Investigation
UL 1066	2022	Power Circuit Breakers up to 1000 V AC and 1500 V DC	Up to 1,000 Vac and 1,500 Vdc	
UL 1077	2021	Supplementary Protectors for Use in Electrical Equipment	600 V max	Not for branch protection application

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Other related standards

Relative standard	Revision	Scope	Limits	Additional information
DC DER System				
UL 3001D		These requirements cover DC Distributed Energy Resource Systems (DC DER Systems)		
Power Meter				
UL 2735	2014	Standard for Electric Utility Meters	Up to 600 V	
Energy Management Equipment				
UL 916	2022	Cover energy management equipment and associated sensing devices	Up to 600 V	
Surge Protection				
UL 1449	2022	Cover enclosed and open-type Surge Protective Devices (SPDs)	Up to 1,000 Vac/up to 1,500 Vdc	DC rating for PV application only
Arc Fault Circuit Interrupters				
UL 1699	2023	Cover arc-fault circuit-interrupters (AFCIs) of the branch/feeder, outlet circuit, portable, and cord type intended for use in dwelling units	Up to 20 A and 30 A 120 Vac 60 Hz	No DC rating
Photovoltaic (PV) DC Arc-Fault Circuit Protection				
UL 1699B	2024	Cover DC photovoltaic arc-fault circuit protection devices intended for use in solar photovoltaic electrical energy systems	Up to 1,500 Vdc/NEC 690	DC rating for PV application only
Source Interconnection Switches				
UL 1008B	2023	Source interconnection switches intended for interconnection of sources and/or loads in a Distributed Energy Resource System (DERS)	Up to 1,000 Vac/up to 1,500 Vdc	Outline of Investigation

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