

UL 1574

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Track Lighting Systems

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UL Standard for Safety for Track Lighting Systems, UL 1574

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Summary of Topics

The new Third edition of ANSI/UL 1574, reflects updated requirements for Mono-, Duo-, or Multi-Point Canopies, a new exception for Single-Ended Compact Fluorescent Type Lamps, addition of a Maximum Temperature Rise for the luminaire assembly enclosure, and other editorial corrections.

The new and revised requirements are substantially in accordance with UL's Bulletin(s) on this subject dated December 12, 2003 and May 4, 2004. The bulletin(s) is now obsolete and may be discarded.

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UL 1574

Standard for Track Lighting Systems

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September 7, 2004

The most recent designation of ANSI/UL 1574 as an American National Standard (ANSI) occurred on August 30, 2004.

This ANSI/UL Standard for Safety, which consists of the Third edition is under continuous maintenance, whereby each revision is ANSI approved upon publication. Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Written comments are to be sent to UL-RTP Standard Department, 12 Laboratory Dr., P.O. Box 13995, Research Triangle Park, NC, 27709-3995.

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

Revisions of this Standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest set of revised requirements.

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INTRODUCTION

1 Scope

1.1 These requirements cover track lighting systems intended for permanent connection to sources of supply in commercial or residential ordinary locations in accordance with the National Electrical Code, NFPA 70. The track lighting systems covered by this standard are rated:

- a) 300 volts or less;
- b) 150 volts or less to ground; and
- c) 50 amperes or less.

1.2 Lighting track is intended to be permanently installed and permanently connected to a branch circuit not exceeding 277 volts, nominal to ground, and 50 amperes.

1.3 These requirements cover:

- a) Track networks consisting of track and connectors;
- b) Mono-, duo-, and multi-point canopies;
- c) Incandescent, fluorescent, and high intensity discharge (HID) luminaire assemblies intended to be electrically connected to and physically supported by the track in track networks and canopies;
- d) Mounting means for the track; and
- e) Accessories.

1.4 These requirements do not cover:

- a) Busways intended for lighting, receptacles, or other general-purpose adaptors covered by the Standard for Busways, UL 857, and intended for use in accordance with Article 364 of the National Electrical Code, NFPA 70; or
- b) Track lighting systems for marine use aboard a ship or boat.

1.5 Track lighting systems are not intended for use:

- a) In wet or damp locations;
- b) In installations where the track is concealed;
- c) In hazardous locations;
- d) Where subject to physical damage;
- e) Where the track is extended through walls or partitions of building structures;
- f) Where subject to corrosive vapors; or

g) In storage battery rooms.

1.6 A track lighting luminaire assembly that uses a tungsten-halogen lamp, fluorescent lamp, or high-intensity-discharge lamp shall also comply with the applicable requirements from the Standard for Luminaires, UL 1598.

2 Units of Measurement

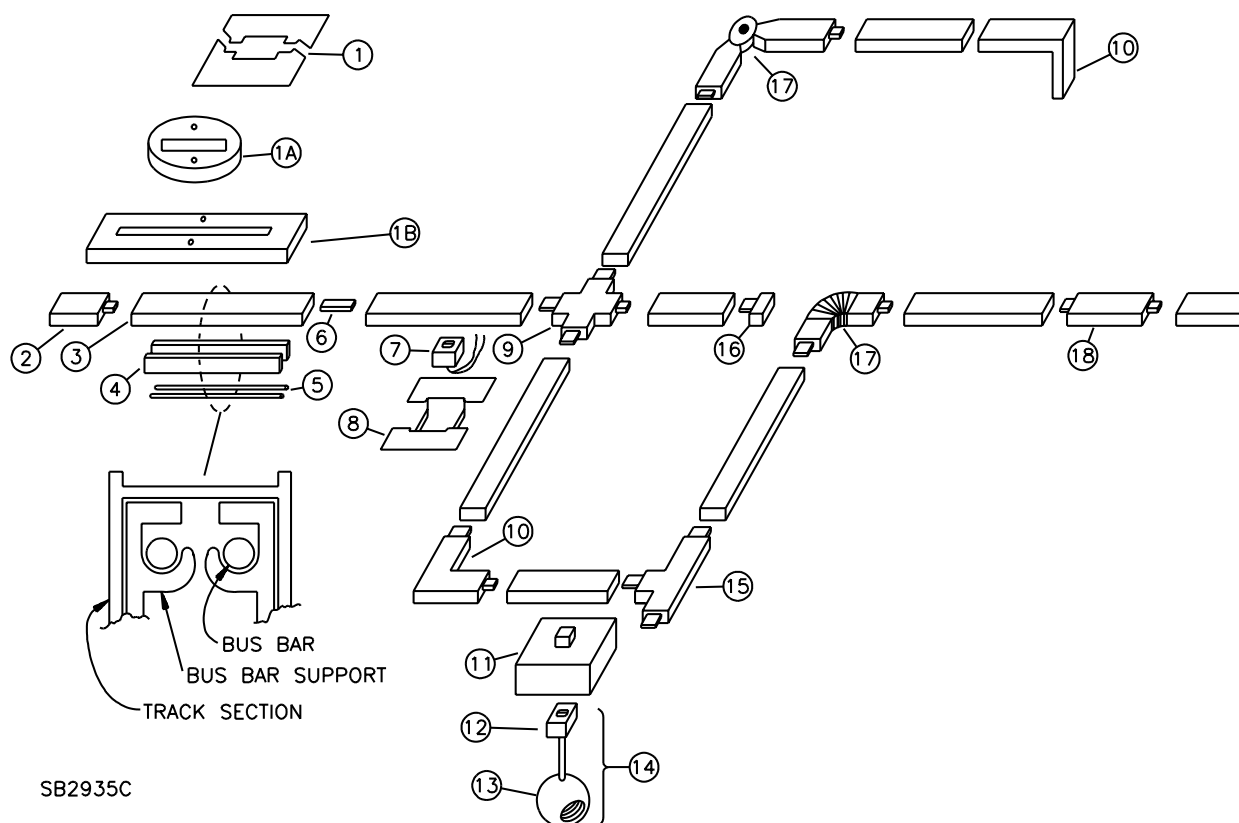
2.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

2.2 Unless indicated otherwise, all voltage and current values mentioned in this standard are root mean square (rms).

3 Glossary

3.1 For the purpose of this standard, the following definitions apply. Some terms unique to track systems are illustrated in Figure 3.1.

Figure 3.1
Electrical fittings in a typical track system



- | | | |
|---|--|--|
| 1 – Canopy (see 3.6) | 6 – Straight intercept connector (see 3.23) | 13 – Luminaire head (see 3.31) |
| 1A – Mono- or duo-point canopy (see 3.7) | 7 – Floating feed connector (see 3.21) | 14 – Luminaire assembly (see 3.30) |
| 1B – Multi-point canopy (see 3.8) | 8 – Canopy for floating feed connector (see 3.6) | 15 – T-shaped intercept connector (see 3.23) |
| 2 – End feed connector (see 3.18) | 9 – X-shaped intercept connector (see 3.23) | 16 – End cap (see 3.17) |
| 3 – Track (see 3.46) | 10 – L-shaped intercept connector (see 3.23) | 17 – Adjustable intercept connector (see 3.23) |
| 4 – Bus bar support– mounted inside track section (see 3.5) | 11 – Power pack (see 3.37) | 18 – Center feed connector (see 3.9) |
| 5 – Bus bars – mounted inside bus bar support (see 3.4) | 12 – Adaptor (see 3.3 and 3.30) | |

3.2 ACCESSORY – An attachment (such as a shutter, barn door assembly, or iris) provided by the manufacturer for connection to a luminaire assembly.

3.3 ADAPTOR – A component of a luminaire assembly intended to mate with a track and provide mechanical securement and electrical connection.

3.4 BUS BAR – A conductor electrically connected to the source of supply and physically located inside a track (conductors in connectors are considered internal wiring). The bus bar provides power supply connection for luminaire assemblies along the length of the track.

3.5 BUS BAR SUPPORT – An insert, usually made of a polymeric material, that runs the length of a section of track and serves to support the bus bars and to isolate them while providing an opening that makes electrical contact between the bus bars and an adaptor possible.

3.6 CANOPY – A cover, either provided integral with or separate from a feed connector, that is intended to cover the outlet box by securing to the outlet box feed connector or directly to the ceiling.

3.7 CANOPY, MONO- OR DUO-POINT – A canopy which mounts directly over an outlet box and is provided with a section of track that can accept one or two luminaire assemblies at a time. A mono- or duo-point canopy is constructed such that additional lengths of track cannot be mechanically or electrically connected to the canopy.

3.8 CANOPY, MULTI-POINT – A canopy which mounts directly over an outlet box and is provided with a section of track that can accept more than one luminaire assembly at a time. A multi-point canopy is constructed such that additional lengths of track cannot be mechanically or electrically connected to the canopy.

3.9 CENTER FEED CONNECTOR – An intercept connector provided with means for connection between two sections of track and to a source of supply.

3.10 CLASS 2 CIRCUIT – A low-voltage circuit supplied by:

- a) A transformer that complies with Class 2 requirements in the Standard for Class 2 and Class 3 Transformers, UL 1585; or
- b) A power supply that complies with the Class 2 requirements in the Standard for Class 2 Power Units, UL 1310.

3.11 COMPONENT – An electrical device such as a lampholder, current-interrupting device, fuse wire, or transformer.

3.12 CONNECTOR – A generic term used to refer to an electrical fitting that connects:

- a) Track sections to each other (intercept connectors); and
- b) A track system to a power supply (feed-type intercept connectors).

3.13 CURRENT-INTERRUPTING DEVICE – A component (such as a switch or breaker) intended to stop the flow of current in a track network or luminaire assembly circuit.

3.14 DECORATIVE PART – A part of the luminaire, outside the enclosure, that has no safety function.

3.15 **ELECTRIC SHOCK** – A risk of electric shock is considered likely to occur at any part if the potential between the part and earth ground or any other accessible part is more than 42.4 volts peak and the continuous current flow through a 1500-ohm resistor exceeds 5 milliamperes.

3.16 **ELECTRICAL FITTING** – A generic term used to refer to each separate electrical portion of a track system. (For example: adaptors, connectors, luminaire assemblies, and track sections are electrical fittings.)

3.17 **END CAP** – A cover intended to close the open end of a track.

3.18 **END FEED CONNECTOR** – An electrical fitting intended to connect a source of supply to the end of a track. The connector is provided with a knockout or canopy for permanent connection to a source of supply.

3.19 **FEED CONNECTOR** – An electrical fitting (such as an end feed connector or a floating feed connector) intended to connect a track network to a power supply.

3.20 **FITTING** – A hook, stem, or other part of a track system intended primarily to perform a mechanical rather than an electrical function.

3.21 **FLOATING FEED CONNECTOR** – An electrical fitting intended to connect a track to a source of supply at any point along the length of the track. This is accomplished by attaching the connector to the bus bars in the same manner as an adaptor connects to the bus bars.

3.22 **HEAVY-DUTY LIGHTING TRACK** – A lighting track identified for use on circuits exceeding 20 amperes, but not greater than 50 amperes. Each lighting fitting attached to a heavy-duty lighting track has individual supplementary overcurrent protection.

3.23 **INTERCEPT CONNECTOR** – An electrical fitting intended to connect two or more sections of track together. The connector may be L-shaped, T-shaped, X-shaped, straight, or adjustable. An intercept connector that is also intended to connect a track system to the power supply is considered to be a feed connector.

3.24 **KNOCKOUT** – A precut portion of a feed connector that can be readily removed at the time of installation to provide an open hole for the attachment of a permanent wiring system.

3.25 **LAMP** – A part, commonly called a "light bulb" or "bulb" for incandescent luminaires or a "fluorescent tube" for fluorescent luminaires, intended to be inserted into a lampholder (socket) to produce light.

3.26 **LAMP CONTAINMENT BARRIER** – A barrier that consists of the top, sides, and bottom that enclose the lamp compartment. The barrier may consist of a metal housing, a polymeric enclosure, a glass diffuser or lens, a metal screen, or the like.

3.27 **LAMP-SUPPORTED LAMPHOLDER** – A lampholder that, when connected as intended, is supported by the lamp, which is in turn supported by the luminaire assembly. Lamp-supported lampholders are usually constructed to accept lamps with prong connectors.

3.28 **LIVE PART** – A conductive part without basic insulation, where a risk of electric shock exists. The neutral conductor is considered to be a live part.

3.29 **LOW-VOLTAGE CIRCUIT** – A circuit that operates at 30 volts or less and that is electrically isolated from the primary of a transformer.

- 3.30 LUMINAIRE ASSEMBLY – An assembly consisting of a luminaire head and an adaptor.
- 3.31 LUMINAIRE HEAD – An assembly that includes a lamp enclosure or lamp compartment and any components and parts necessary for connecting the lamp compartment to the adaptor.
- 3.32 MOUNTING MEANS – Hardware (such as screws or clips) provided for mechanically securing a track to a mounting surface.
- 3.33 OPEN HOLE – An aperture in an enclosure that is not covered or filled by another part.
- 3.34 OPENING – An aperture in an enclosure that is covered or filled by a plug or knockout and that has the potential of becoming an open hole.
- 3.35 PACKAGING OF TRACK – A single section of track individually wrapped or multiple sections of track packaged together.
- 3.36 PENDANT-TYPE TRACK – A ceiling-mounted track system in which the track sections and connectors are suspended from the ceiling by a metal stem, metal chain, or metal cable.
- 3.37 POWER PACK – Generally a separate unit connected between the track and the adaptor of the luminaire assembly. It is provided with a switching power supply, linear power supply, or isolating transformer to supply power to a track lighting luminaire.
- 3.38 RECESSED CHANNEL – A metal channel intended to be recessed into a wall or ceiling with a means provided for securing a track lighting system within it. The channel may be integral with the track.
- 3.39 RECESSED LUMINAIRE ASSEMBLY – A luminaire assembly intended for installation in a recessed channel such that all or part of the luminaire head is recessed into a wall or ceiling. A luminaire assembly, where only the stem and/or adapter is recessed when installed, is not considered a recessed luminaire assembly.
- 3.40 RECESSED TRACK – A track intended to be installed in a recessed channel such that all or part of the track is behind the mounting surface.
- 3.41 STRAIN RELIEF DEVICE – A knot, bushing, or the equivalent intended to prevent strain from being transmitted to a wire or cord at a termination point.
- 3.42 SURFACE-MOUNTED TRACK – A non-recessed track.
- 3.43 TERMINAL, PRESSURE-WIRE – A terminal where one or more conductors are clamped under a pressure plate or saddle by one or more screws or nuts.
- 3.44 TERMINAL, PUSH-IN – A terminal where the stripped end of a conductor is pushed into the terminal and the clamping pressure is maintained by a spring mechanism, without the use of screws.
- 3.45 TERMINAL, WIRE-BINDING SCREW – A terminal in which a single conductor is clamped directly under the head of the screw when it is tightened. The single conductor is either bent around the screw in a 3/4 loop or is otherwise retained by interference fit.

3.46 **TRACK** – An enclosure that houses the bus bars and that houses or is integral with the bus bar support. Track is usually made of extruded material that usually resembles an "H" in cross section, with two vertical members connected by a horizontal member. The bus bar support and bus bars are factory-mounted in the lower half of the "H" and the connection of luminaire assemblies is accomplished through the open bottom.

3.47 **TRACK NETWORK** – An electrical distribution system consisting of track and connectors.

3.48 **TRACK SYSTEM** – A complete assembly that includes a track network, mounting hardware, and one or more luminaire assemblies.

4 Components

4.1 Except as indicated in 4.2, a component of a product covered by this standard shall comply with the requirements for that component. See Appendix A for a list of standards covering components generally used in the products covered by this standard.

4.2 A component is not required to comply with a specific requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

4.3 A component shall be used in accordance with its rating established for the intended conditions of use.

4.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

5 Undated References

5.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

CONSTRUCTION – TRACK SYSTEMS

6 Assembly

6.1 The electrical portion of each electrical fitting shall be completely assembled and wired prior to being shipped from the factory.

Exception: An "X" or "T" shaped intercept connector complying with 33.2 and 81.1 need not be prewired prior to being shipped from the factory.

6.2 Adaptors shall be of such construction as to preclude the user from making electrical connections.

Exception: A pendant adaptor intended for cord or chain suspended luminaires may have provision for making electrical connections if the adaptor complies with Section 52, Pendant Luminaire Adapter.

7 Packaging

7.1 If a feed connector is intended to be used with a separable canopy, the canopy shall be included in the same package as the feed connector or marked as specified in 82.4 with a marking that is visible during installation or mounting of the track.

8 Enclosures

8.1 When a track system is installed as intended, all splices, wires, components, and leads or terminals for connection of supply wires shall be enclosed in accordance with 8.2 for a track network and 40.1 for a luminaire assembly.

8.2 An enclosure for a track network as specified in 8.1 shall be constructed of:

- a) Metal; or
- b) A polymeric material that complies with the requirements in 8.5.

8.3 A canopy shall be made of metal at least 0.016 inch (0.4 mm) thick or of a polymeric material that complies with the requirements in 8.5.

8.4 The minimum wall thickness of a pendant mounted metal stem shall be:

- a) 0.025 inch (0.64 mm) without threads or with pressed (rolled) threads; and
- b) 0.040 inch (1.02 mm) with die-cut threads.

8.5 A polymeric material used as an enclosure for a track network shall comply with:

- a) The requirements in Table 8.1;
- b) The requirement in 8.6;
- c) The Normal Temperature Test, Section 54;
- d) The Polymeric Enclosure Impact Test, Section 61; and
- e) The Mold Stress Relief Distortion Test, Section 57.

Exception No. 1: A small part as described in 8.7 that is not used for direct support of a live part need not comply with the requirements in (a) – (e).

Exception No. 2: A polymeric material that is not rated for or does not comply with the hot wire ignition or high current arc resistance to ignition requirements in Table 8.1 may be determined to be acceptable if the part fabricated with the polymeric material is tested in accordance with, and found to comply with, the applicable tests for stationary equipment described in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C.

Table 8.1
Network polymeric material requirements

Applications	Minimum flammability class ^a	Properties			
		Resistance to ignition		Electrical	
		Minimum hot wire (HWI) ^b	Minimum high current (HAI) ^b	Minimum dielectric breakdown strength ^b	Comparative tracking index (CTI) ^b
		Maximum performance level category	Maximum performance level category	Minimum volts	Maximum performance level category
Enclosure ^c	V-0	–	3	–	–
Enclosure – indirect support of live parts ^d	V-0	–	3	–	–
Enclosure – direct support of live parts ^e	V-0	4	3	5000	5
	V-0	4	3	5000	5
Bus bar support	V-1	3	2	5000	5

^a The flammability classification is to be determined by the tests described in the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94.

^b Tests are to be conducted in accordance with the Standard for Polymeric Materials – Short Term Property Evaluations, UL 746A.

^c An enclosure of an electrical fitting that is not used for direct or indirect support of live parts (such as cover) and where there are no uninsulated live parts enclosed.

^d An enclosure in direct contact with insulated live parts or where uninsulated live parts are enclosed and spaced greater than 1/32 inch (0.8 mm) from enclosure.

^e An enclosure in direct contact with or within 1/32 inch (0.8 mm) of uninsulated live parts.

8.6 A polymeric material used in the construction of a part shall have a temperature rating consistent with the temperature measured on the part during the temperature test.

Exception: A polymeric material used for a small part as defined in 8.7 need not have a temperature rating if the small part is not used for the direct or indirect support of a live part or if the small part is not used as electrical insulation.

8.7 A small part is one that:

- Has a volume not exceeding 0.012 cubic inches (0.2 cm³);
- Has a maximum dimension not exceeding 1.2 inches (3.0 cm); and
- Cannot propagate flame from one area to another or act as a bridge between a possible source of ignition and other ignitable parts because of its location.

8.8 A knockout in an enclosure of metal or polymeric material shall comply with Section 56, Security of Knockout Test.

9 Corrosion Protection

9.1 All ferrous sheet-metal parts shall be plated, galvanized, enameled, painted, varnished, lacquered, or the equivalent.

Exception No. 1: Parts need not be provided with corrosion protection if they are intended only for decoration.

Exception No. 2: A coating need not be applied to:

- a) The cut edges of precoated stock;*
- b) Steel nuts, bolts, and screws; and*
- c) The inside surface of a pipe stem.*

Exception No. 3: A coating need not be applied to stainless steel.

Exception No. 4: Mounting hardware need not be provided with corrosion protection.

10 Joining of Enclosure Parts

10.1 The method of making a joint between metal parts and fastening arms and supports shall provide strength and rigidity and shall prevent turning that could result in movement that may be adverse to the wires after the assembly is completed.

Exception: A swivel lighting luminaire may be turned, but no more than 200 degrees in either direction (for a total of 400 degrees).

10.2 Friction between parts is not acceptable as the sole means to prevent turning. Turning shall be prevented by the use of:

- a) A star washer;
- b) A locking-type nut;
- c) A nut seated against another nut;
- d) Some other mechanical method where two parts mate by interference fit; or
- e) A suitable factory-applied adhesive.

11 Prevention of Wire Damage

11.1 A wire enclosure shall be free from burrs, fins, and other sharp edges that can contact wires.

11.2 If a conductor passes through an opening or crosses over the edge of sheet metal, it shall be:

- a) Secured away from the edges of the metal;
- b) Protected by a bushing or a grommet; or
- c) Protected by rolling the edge of the metal not less than 120 degrees.

Sleeving is not an acceptable means of preventing cutting and abrasion of wires. A bushing used to prevent cutting and abrasion shall comply with the requirements in 11.3.

Exception: The edges of sheet metal thicker than 0.042 inch (1.07 mm) need only be treated to remove burrs, fins, and sharp edges.

11.3 A bushing used to comply with 11.2 shall be securely held in place. If the bushing is constructed of insulating material, it shall be at least 3/64 inch (1.2 mm) thick. A rubber bushing is not acceptable.

Exception: A bushing less than 3/64 inch (1.2 mm) thick is acceptable if an investigation shows that the bushing provides mechanical properties equivalent to those provided by a bushing 3/64 inch (1.2 mm) thick.

12 Wire and conductors

12.1 A conductor shall be made of copper or copper alloy.

12.2 A conductor shall have insulation rated for the voltage, temperature, and condition of service to which it will be subjected under conditions of intended use.

Exception: The insulation of a conductor need not be rated for the voltage, temperature, or condition of service if connected to a Class 2 circuit.

12.3 A conductor for a luminaire assembly (including bonding and grounding conductors) shall be no smaller than 18 AWG (0.82 mm²).

Exception: Wire smaller than 18 AWG may be used if connected to a Class 2 circuit.

12.4 An insulated wire connector shall be rated for the voltage and temperature involved.

Exception: An insulated wire connector need not be rated for the voltage and temperature involved if connected to a Class 2 circuit.

12.5 If stranded internal wiring is connected to a wire-binding screw or stud terminal, the construction shall be such that no loose strands result.

13 Network Conductors

13.1 General

13.1.1 A bus bar shall be a single, solid conductor at each point where a connector or adaptor can mate with it.

13.1.2 A conductor shall be of copper or copper alloy.

13.1.3 A bus bar and all conductors in a connector (including grounding and bonding conductors) shall be sized in accordance with Table 13.1.

Exception: A bus bar or conductor need not be sized in accordance with Table 13.1 if it complies with the requirements in Section 71, Direct-Current Bus Bar or Conductor Resistance Test.

Table 13.1
Minimum bus bar and conductor cross-sectional area

Tracking rating	For a conductor with a circular cross section		For a conductor with a cross section other than circular	
	AWG	Diameter		Area
Amperes		Inch	(mm)	Inch ² (mm ²)
15 or 20	12	0.081	2.05	0.0051 3.29
30	10	0.102	2.59	0.0082 5.29
40	8	0.128	3.25	0.0130 8.39
50	6	0.184	4.67	0.0206 13.29

13.1.4 A bonding conductor shall be enclosed by the track and connectors after installation.

13.2 Pigtail leads

13.2.1 The conductor of a pigtail lead shall be made of copper and of a size (wire gage) sufficient for the rated current of the track system as indicated in Table 13.2.

Table 13.2
Minimum wire gage for track system current rating

Current rating of track system	Minimum wire gage	
Amperes	AWG	(mm ²)
15 or 20	12	3.3
30	10	5.3
40	8	8.4
50	6	13.3

14 Splices and Connections

14.1 A splice shall be:

- a) Made with solder, a wire connector, or an equivalent means;
- b) Inaccessible to contact using the probe illustrated in Figure 17.1; and
- c) Electrically and mechanically secure.

Exception: A splice is not required to be inaccessible when it is connected to a low-voltage circuit.

14.2 A soldered splice and a splice made with an uninsulated wire connector shall be covered with insulation rated for the voltage and temperature involved.

15 Current-Interrupting Devices

15.1 A current-interrupting device (such as a switch or fuse) shall be rated for the voltage and current of the circuit in which it is connected.

15.2 A current-interrupting device shall not be connected in the grounded (neutral) conductor unless the device connects and disconnects the grounded conductor and all ungrounded conductors simultaneously.

16 Switches

16.1 A switch shall have a minimum ampere rating equal to the total load current it controls multiplied by the load factor shown in Table 16.1.

Table 16.1 – Switch rating load factor

Type of load	Special use switches				General use switches
	L-rated (ac only)	T-rated (ac/dc)	Ampere rated (ac only)	Ampere rated (ac/dc)	Ampere rated (ac only)
Tungsten filament	1	1	3	3	1
Inductive	1	1	2	2	1
Receptacle	1	1	3	3	1

16.2 An adaptor whose contacts function as a switch shall comply with 16.1.

16.3 An adaptor that:

- a) Is constructed and intended to provide the switching function for a luminaire assembly; and
- b) Has a lever, knob, handle, or the like as part of the switching function

shall comply with the requirements in the Standard for General-Use Snap Switches, UL 20.

17 Accessibility of Current-Carrying Parts

17.1 A current-carrying part shall be made inaccessible to unintentional contact by persons during intended use, including relamping, by material specified in Section 8, Enclosures, for track systems and Section 40, Enclosures, for luminaire assemblies, as applicable. A component is considered inaccessible to unintentional contact if it complies with 17.2 and 17.3.

Exception No. 1: A current-carrying part need not be inaccessible if the part:

- a) Involves a voltage of less than 30 volts; and*
- b) Is connected to the secondary circuit of a transformer that is electrically isolated from the primary of the transformer.*

Exception No. 2: An enclosure provided as an integral part of a lampholder and the exposed current-carrying parts of an Edison-base lampholder that electrically contact a lamp need not be inaccessible.

Exception No. 3: A pair of end contact lampholders for double contact lamps may be accessible during relamping if:

- a) The luminaire is marked in accordance with 83.7; or*
- b) The lampholders are of the circuit-interrupting type which disconnect the ungrounded supply from the accessible live parts of the lampholder when the end of the lamp connected to the grounded supply is removed.*

Exception No. 4: Wiring need not be inaccessible if it consists of:

- a) Leads within a single 0.020 inch (0.51 mm)-thick glass fiber sleeve;*
- b) AWM Style 20288;*
- c) Flexible cord with insulation equal to or greater than Type SPT-2; or*
- d) The equivalent.*

Exception No. 5: Lampholder leads that are 2 inches (50.8 mm) or less in length and insulated in accordance with 12.2 need not be inaccessible.

Exception No. 6: An electrical device such as a transformer, ballast, or user-replaceable automatic starter provided with an integral metal enclosure need not be inaccessible.

17.2 An uninsulated live part is considered inaccessible if a probe as illustrated in Figure 17.1 cannot be made to touch any part that involves electric shock to earth ground or to another uninsulated live part when the system is completely installed as intended. No force is to be used when inserting the probe into the opening.

17.3 With respect to the requirement in 17.2, the probe may be articulated into any configuration and may be rotated or angled to any position before, during, or after inserting into the opening. The penetration may be to any depth allowed by the opening size, including minimum depth combined with maximum articulation.

Technical drawing of a mechanical part, PA100A, showing front, side, and cross-sectional views with dimensions in millimeters.

Front View (Left): Shows a stepped conical structure. Key dimensions include:

- Top radius: 3.5
- Top thickness: .05
- First step thickness: .05
- Second step thickness: .05
- Third step thickness: .05
- Fourth step thickness: .05
- Bottom step thickness: .05
- Base diameter: 50
- Overall height: 97
- Section A-A is indicated at the top.

Side View (Right): Shows the profile of the part. Key dimensions include:

- Top angle: APPROX. 30°
- Top thickness: 5.0
- First step thickness: 5.8
- Second step thickness: 30
- Third step thickness: 60
- Fourth step thickness: 90
- Fifth step thickness: 96
- Sixth step thickness: 100
- Seventh step thickness: 136
- Eighth step thickness: 154
- Ninth step thickness: 234
- Base diameter: 25.4

Top View (Bottom): Shows the circular base. Key dimensions include:

- Base diameter: 78
- Inner diameter: 25.4
- Radius: 25

ALL DIMENSIONS IN MILLIMETERS

18 Spacings

18.1 A spacing of at least 1/4 inch (6.4 mm) over surface and through air shall be maintained between field wiring terminals.

18.2 At other than field wiring terminals, a spacing of at least 1/16 inch (1.6 mm) over surface and through air for circuits involving voltages of up to 150 volts, and 1/8 inch (3.2 mm) for circuits up to 300 volts, shall be maintained between:

- a) Live parts of opposite polarity; and
- b) A live part and a dead metal part that may be grounded when a track system is installed.

Compliance of a track section with the spacing requirements shall not be dependent on the bus bar being recessed from the end of the track.

18.3 A bus bar in a track that is intended to be field cut shall have minimum 3/16 inch (4.76 mm) spacings maintained between bus bars of opposite polarity and between bus bars and grounded metal.

Exception: A track system for a branch circuit not exceeding 120 volts nominal between conductors has the option of being constructed with a minimum 1/16 inch (1.6 mm) spacing when the track system complies with Section 63, Field Track Cutting Test.

19 Polarity

19.1 Polarity shall be maintained electrically through all components of a track system intended for use on polarized supplies by mechanical means between electrical fittings.

19.2 The screw shell of an Edison-base lampholder and the grounded (neutral) conductor of a ballast shall be connected to the grounded (neutral) conductor of the luminaire assembly.

19.3 A track section shall have a designated grounded (neutral) conductor that electrically connects to an electrical fitting (such as a luminaire assembly) when the electrical fitting is connected to the track.

19.4 The mechanical means required in 19.1 for maintaining polarity of the components in a track system (for example, a keying ridge or protrusion) shall meet the requirements of the Mechanical Means of Polarity Test, Section 69.

19.5 A grounded (neutral) conductor shall have insulation that is white or gray in color where visible to the installer or, if a braid is employed, the braid shall be white or gray in color.

19.6 A field wiring terminal to which the designated grounded conductor is electrically connected shall be of metal white in color or shall be identified by means of a metal-plated coating white in color.

Exception: A terminal need not be white in color if all the supply connection terminals are marked as described in 82.3.

20 Interchangeable Fittings

20.1 An electrical fitting shall not be interchangeable with a corresponding electrical fitting with a different voltage rating.

Exception No. 1: An electrical fitting may be mechanically interchangeable with a corresponding electrical fitting if, when it is mechanically secured to the track, the electrical fitting does not electrically connect to the ungrounded conductor of a supply source.

Exception No. 2: A luminaire adaptor rated 120 volts may be insertable into a track rated 30 volts or less.

21 Bonding

21.1 Each conductive part that:

- a) Is accessible to persons, as determined by application of the accessibility probe illustrated in Figure 17.1;
- b) Is not intended to be electrically live; and
- c) Could inadvertently become energized

shall be conductively bonded to a common point that incorporates provision for grounding the track system.

21.2 For any part that is provided with enamel, paint, or a similar coating:

- a) A bonding connection means shall be provided that penetrates the surface coating; or
- b) The bonding connection points shall remain free of coating.

21.3 An inductive device (such as a transformer or ballast) shall be bonded to grounded dead metal in the track system whether or not the device is accessible.

21.4 The bonding system shall comply with the Grounding Resistance Test, Section 53.

21.5 The continuity of the bonding system shall not rely on the mechanical properties (mold stress, cold flow, and the like) of a polymeric material.

Exception: A material may be relied on if investigated and found to comply with:

- a) Section 8, Enclosures, for track networks or Section 40, Enclosures, for luminaire assemblies and accessories; and*
- b) Section 57, Mold Stress Relief Distortion Test, for thermoplastics relied on for structural integrity.*

21.6 The continuity of the bonding system shall not rely on breakaway ground tabs.

Exception: Breakaway ground tabs may be employed on an "X" or "T" shaped intercept connector marked in accordance with 81.1.

21.7 The continuity of the bonding system shall not be compromised by the loosening of parts that rely upon adjustments made without the use of a tool. When tested in accordance with 53.3.4, the adjustment of the luminaire head shall be performed in the loosest condition possible without jeopardizing the integrity of the assembly.

21.8 Each end of a bonding wire or jumper conductor shall be secured by a mechanical means such as:

- a) A screw and nut;
- b) A screw of the standard or thread-cutting type that threads into metal with at least two full threads in the metal;
- c) A rivet; or
- d) Other means determined by an investigation to be equivalent to (a), (b), or (c).

21.9 A grounding wire or jumper conductor shall be terminated by a screw, rivet, or equivalent means that does not secure another component or is not likely to be removed during replacement of any component.

22 Grounding Means

22.1 A grounding means shall consist of a pigtail lead grounding conductor, a pressure wire terminal, a wire binding screw or the equivalent. The grounding means shall be at the same location as the power supply connection means.

22.2 A pressure wire terminal intended for the field connection of an equipment grounding conductor shall comply with the requirements in 24.1 and shall be plainly identified by being marked in accordance with 82.2.

22.3 The insulation on a pigtail lead grounding conductor shall be green with or without one or more yellow stripes. A grounding wire with a braid shall have a braid of continuous green color with or without a yellow tracer.

22.4 An equipment grounding conductor shall not be terminated by a screw, rivet, or equivalent device that is:

- a) Located on a cover or other removable part; or
- b) Used as the fastening means of the cover.

22.5 With reference to 22.1, a wire binding screw intended for the field connection of an equipment grounding conductor shall have a green head that is hexagonal, slotted, or both.

23 Supply Connection Means

23.1 A track system shall be constructed so that it can be connected to a branch circuit wiring system by at least one of the following means:

- a) A canopy and mounting means for mounting over an outlet box;
- b) A knockout or hole for connection of conduit; or
- c) A tab and opening for connection of surface raceway.

23.2 A flexible cord shall not be used to connect a track lighting system to the branch circuit.

23.3 A track system shall be intended for connection to a single branch circuit or to more than one branch circuit if the grounded (neutral) conductors of the track system are not connected together. In addition, connectors and adaptors shall be constructed to prevent the combination of two separate branch circuits to complete a circuit. A branch circuit shall be:

- a) A single-phase circuit (120 volts), as illustrated in Figure 23.1;
- b) A split single-phase circuit (120/240 volts, single-phase, 3-wire with grounded neutral), as illustrated in Figure 23.2; or
- c) A polyphase circuit (208Y/120 volts, 3-phase, 4-wire), as illustrated in Figure 23.3.

Table 23.1 describes the voltage characteristics of the different branch circuit wiring systems. Connection of the track to switched inputs that are derived from a single branch circuit may be considered acceptable.

Exception: A track system may be intended for connection to a low-voltage circuit.