



BIRNS Underwater Power Cable Assemblies

BIRNS power cable assemblies ("power cords") transmit electrical power to BIRNS lighting products. Most power cords comprise electrical cable, an underwater connector, a "locking sleeve" (retention device), and a plug.

We make power cords to order so you can get any length. Standard cords are available in unbroken lengths up to 1,000 feet (300 m); longer unbroken lengths are available on special order.

Electrical Cable

We use three multistrand copper-core electrical cables with our lighting systems: Aquaprene, Super-Vutron, and Polyurethane. They are color-coded, and used for different applications.

Aquaprene, color-coded black, rated to 90°C and 600 volts, is jacketed with neoprene (polychloroprene) and insulated with styrene rubber (STR). Aquaprene has good resistance to most general environmental and chemical conditions (including abrasion, oil, and grease), and has found wide acceptance. It is our standard cable, and is compatible with all three connector types. It experiences "mild to moderate" radiation damage at 2×10^6 R (2×10^4 Gy), and "moderate to severe" damage at 5×10^6 R (5×10^4 Gy); CERN does not recommend it for use above 10^8 R (10^6 Gy). Conductors are made of soft drawn annealed bare stranded copper wires.

- BIRNS Aquaprene 52A-006 16AWG/3-conductor cable has a nominal diameter of Ø.390" (Ø9.9mm) and weighs approximately 0.110 lb/ft (0.165 Kg/m). Each conductor consists of 26 x #30 strands.
- BIRNS Aquaprene 52A-009 14AWG/3-conductor cable has a nominal diameter of Ø.540" (Ø13.7mm) and weighs approximately 0.184 lb/ft (0.276 Kg/m). Each conductor consists of 41 x #30 strands.
- BIRNS Aquaprene 52A-012 12AWG/3-conductor cable has a nominal diameter of Ø.610" (Ø15.5mm) and weighs approximately 0.244 lb/ft (0.366 Kg/m). Each conductor consists of 65 x #30 strands.

Super-Vutron, color-coded yellow, is jacketed with chlorosulfonated polyethylene (CSPE) and insulated with ethylene propylene diene monomer (EPDM). This cable is often used in the nuclear industry, as its insulation is more radiation-tolerant and its jacket is easier to decontaminate. Super-Vutron is compatible with all three connector types. It experiences "mild to moderate" radiation damage at 8×10^5 R (8×10^3 Gy), and "moderate to severe" damage at 4×10^6 R (4×10^4 Gy); CERN does not recommend it for use above 10^8 R (10^6 Gy).



- BIRNS Super-Vutron 52A-013 16AWG/3-conductor cable has a nominal diameter of $\text{\O}0.395$ " ($\text{\O}10\text{mm}$) and weighs approximately 0.100 lb/ft (0.150 Kg/m). Each conductor consists of 65 x #34 strands.
- BIRNS Super-Vutron 52A-033 14AWG/3-conductor cable has a nominal diameter of $\text{\O}0.525$ " ($\text{\O}13.3\text{mm}$) and weighs approximately 0.165 lb/ft (0.248 Kg/m). Each conductor consists of 41 x #30 strands.
- BIRNS Super-Vutron 52A-023 12AWG/3-conductor cable has a nominal diameter of $\text{\O}0.610$ " ($\text{\O}15\text{mm}$) and weighs approximately 0.250 lb/ft (0.375 Kg/m). Each conductor consists of 65 x #30 strands.

Polyurethane, color-coded blue, is jacketed with polyurethane and insulated with cross-linked polyethylene (XLPE). This is excellent cable for use in the nuclear environment, as it is extremely radiation-tolerant and "clean", and its slick surface is very easy to decontaminate. Polyurethane is compatible with the MSG-3-CP connector. It experiences "mild to moderate" radiation damage at 8×10^6 R (8×10^4 Gy), and "moderate to severe" damage at 4×10^7 R (4×10^5 Gy); CERN does not recommend it for use above 10^9 R (10^7 Gy).

Underwater Electrical Connector

Most BIRNS lighting products use one of three connectors: CEF3S; CEF2S; and MSG-3-CP. These are mutually-incompatible, to preclude possible cross-connection.

CEF3S is a flexible female "Rubber Molded" neoprene connector. It has three electrical conductors, is standard for our 120V and 240V lights that draw $<15\text{A}$, and utilizes either the 63A-003 stainless locking sleeve or the 63A-001 Delrin locking sleeve.

CEF2S is identical to the CEF3S, but has only two conductors (to preclude introduction of 120V into a low-voltage product). It is standard for our low-voltage ($<48\text{V}$) lights that draw $<15\text{A}$, and usually utilizes the 63A-003 locking sleeve.

MSG-3-CP is a "Metal-Shelled" connector. It has three electrical conductors, is mechanically indexed, and is molded of Glass-Reinforced Epoxy (GRE) with a Brass 360 coupling ring. [Nuclear versions use a 304 SS ring.] This connector is standard for our 120V and 240V lights that draw $>15\text{A}$, and/or for products that withstand extraordinary abuse.



Locking Sleeve

63A-001 is male, cylindrical, 51mm (2") long, and made of black Delrin (Acetal resin). It is used with our lights with Type I "armored" connectors, including the Snooper (Models 5567 and 5564), Snooperwide (5441), Refueling Light (5721 and 5725), Kelvin (5801, with Type I armored lamps), and Joule (5583 and 5586). The 63A-001 is generally preferred by the Marine Industry.

63A-003 is female, hexagonal, and is made of AISI Type 316 stainless steel. It is used with our lights with Type II "extended" connectors, including the XT120 (5651), Snooperette (5660), Tubelight (5710), Refueling Light (5723 and 5727), Kelvin (5801, with Type II extended lamps), and Joule (5584 and 5587). The 63A-003 is generally preferred by the Nuclear Industry. A plastic version (63A-004) is available for non-nuclear work.

Plug

We install plugs onto power cables longer than 20 feet, for customers in the USA and Canada. We use only heavy-duty plugs which conform to NEMA standards. Unless specified otherwise, we use 125-volt plugs. (240-volt plugs are available on special order.)

There are two plug styles: Straight and Locking (or "Twist-Lock"). The table below shows the NEMA configuration and the BIRNS plug part number.

Plug Styles	15A	20A	30A
Straight Blade:	NEMA 5-15P	NEMA 5-20P	NEMA 5-30P
	BIRNS 18C-001 plug	BIRNS 18C-003 plug	BIRNS 18C-017 plug
Locking ("Twist-Lock"):	NEMA L5-15P	NEMA L5-20P	NEMA L5-30P
	BIRNS 18C-002 plug	BIRNS 18C-007 plug	BIRNS 18C-011 plug