600 A 15, 25, and 35 kV class Cleer™ grounding elbow

General

Eaton provides a visible ground on its Cooper Power™ series 600 A, 15, 25, and 35 kV Cleer™ loadbreak connector system with its Cooper Power series Cleer grounding elbow. This tool is designed to be installed directly on the 600 A loadbreak interfaces after the circuit is verified to be de-energized. A Cleer grounding elbow installed on the loadbreak bushing interfaces on each end of the cable will isolate and ground the cable. The grounding elbow has a 16 kA through fault and fault closure rating for 15 kV systems.

Construction

The grounding elbow is molded with high quality yellow EPDM rubber and features a copper top connector and tin plated probe complete with an arc follower tip.

Each unit comes standard with a 6 foot, 2/0 or 4/0 600 volt yellow or clear insulated grounding cable. Assemblies with different cable lengths and clamps installed are available.

All grounding elbow sets supplied with a factory installed ferrule and clamp conform to the latest requirements of ASTM F855. When grounding elbow is ordered without clamp, it does not meet ASTM F855. It is the user's responsibility to install an approved ferrule and clamp. For all kits not conforming to the latest ASTM F855 Edition, the cable will be terminated with a blunt cable end. Grounding kits including Cleer protective caps and parking stands are also available.

Installation

Determine whether circuit is de-energized. Attach the ground cable to system ground. Using a clampstick, install the grounding elbow directly to the 600 A Cleer loadbreak bushing interface. Refer to *Service Information S600-103-1, 600 A, 15, 25, and 35 kV Class Cleer™ Grounding Elbow Installation Instructions*.

Production tests

Tests are conducted in accordance with Eaton requirements.

- Physical Inspection
- Periodic Dissection
- Periodic Fluoroscopic Analysis

Voltage Ratings are in accordance with IEEE Std 386™-2006 standard.

Ordering information

Standard kit contains:

- Ground elbow installed on six feet yellow 2/0 or 4/0 cable
- Silicone lubricant
- Installation instruction
- Clamps and ferrules installed (optional)
- Kitted in an individual carton

Kits are also available to include Cleer parking stand and protective caps kitted in a canvas bag. See page 6 for details.

Table 1. Current Ratings and Characteristics

Description	kV Class	Amperes without bailing	Amperes with CLEERBAIL assembly
Fault Closure	15	16 kA rms symmetrical at 8.3kV for 0.17s	16 kA rms symmetrical at 8.3kV for 0.17s
	25	10 kA rms symmetrical at 15.2kV for 0.17s	10 kA rms symmetrical at 15.2kV for 0.17s
	35	10 kA rms symmetrical at 21.1kV for 0.17s	10 kA rms symmetrical at 21.1kV for 0.17s
Short Time	15	16 kA rms symmetrical at 8.3kV for 0.17s	25 kA rms symmetrical at 8.3kV for 0.17s
	25	10 kA rms symmetrical at 15.2kV for 0.17s	25 kA rms symmetrical at 15.2kV for 0.17s
	35	10 kA rms symmetrical at 21.1kV for 0.17s	25 kA rms symmetrical at 21.1kV for 0.17s

Current ratings and characteristics are in accordance with applicable IEEE Std 386™ -2006 standard requirements.

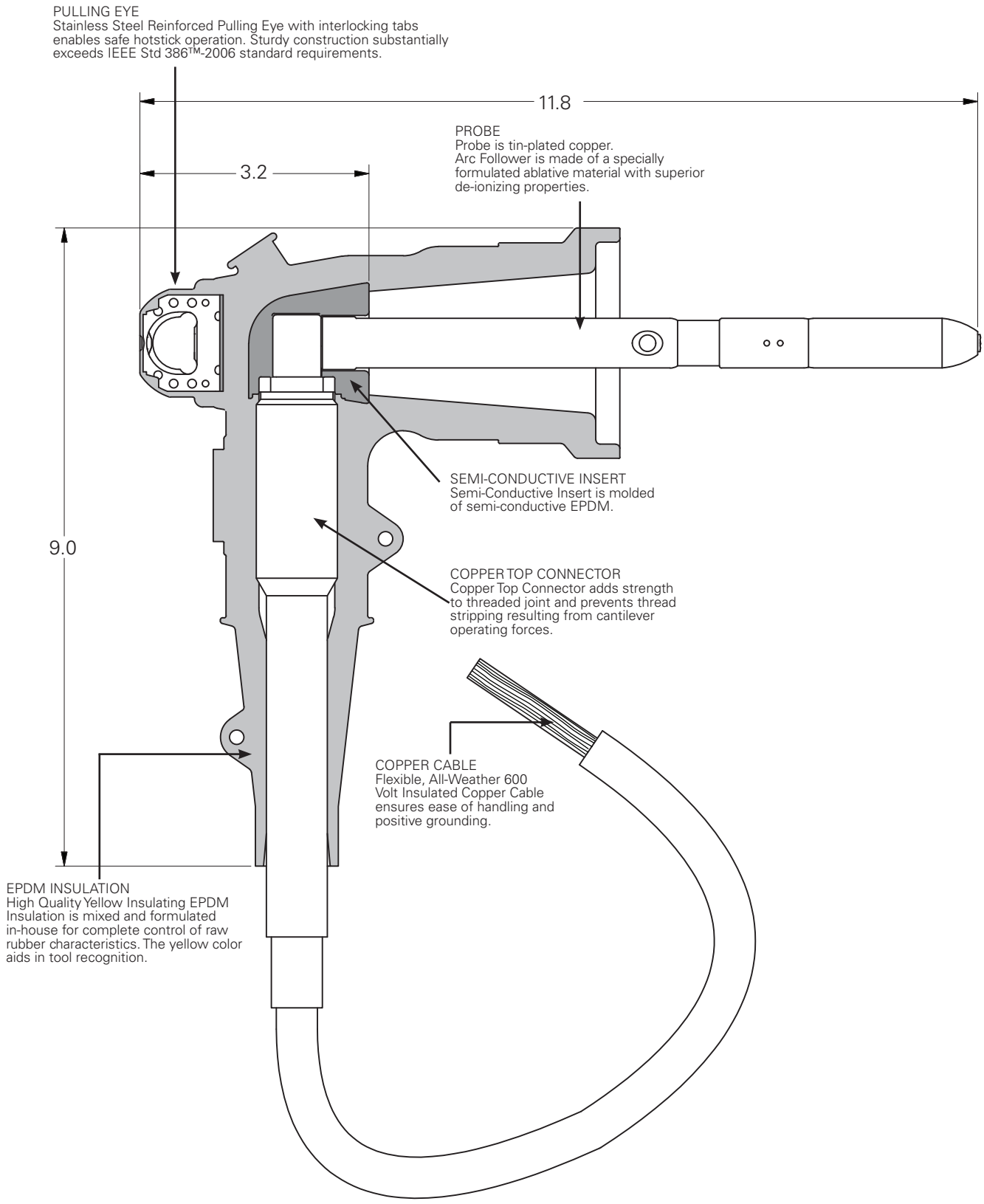

Figure 1. GE600 15, 25, and 35 kV grounding elbow.

Grounding clamps available

C-Type grounding clamps

Eaton offers a wide variety of grounding clamps in various styles and sizes for different applications. Because of the of diversity of products, users are assured of being able to select the exact clamp for the application. Cleer grounding elbows can be supplied assembled to your requirements.

Design features

Three general design considerations offer maximum application versatility:

- **Aluminum or bronze construction** – for the best conductivity regardless of conductor material
- **A variety of sizes to fit any job**
- **Sized for the job** – small clamps, ASTM rating 4, ultimate 47,000 A for 15 cycles; medium clamps, ASTM rating 5, ultimate 60,000 A for 15 cycles; large clamps, ASTM rating 6, ultimate 70,000 A for 15 cycles.
- **Resists burring and stripping** – brass **eye screws have Acme threads.**
- **Superior strain relief** – via stainless steel cable clamps.
- **Economical maintenance** – replaceable serrated jaw inserts save time and money.
- **Better conductivity and corrosion resistance** – brass jaw seats are plated when used in aluminum clamps.
- **Mounting flexibility** – threaded ferrule holes available for 1/2″-13 or 5/8″-11 threaded ferrules.
- **Identification ease** – wire range and catalog number are clearly marked on each clamp.

Figure 2.
Cat. #133035-2AL-S6 (Aluminum), Style 15C
Cat. #133035-2BRZ-S6 (Bronze), Style 16C
Cat. #3620-2-S6 (Aluminum), Style 21C
Cat. #3620-3-S6 (Bronze), Style 22C

Figure 4.
Cat. #133034-2AL-S6 (Aluminum), Style 11C
Cat. #133034-2BRZ-S6 (Bronze), Style 12C

Figure 5.
Cat. #3688-2-S6 (Aluminum), Style 20C

Figure 6.
Cat. #3668-1-S6 (Bronze), Style 01C
Cat. #3668-100-S6 (Bronze), Style 02C
Cat. #3654-100-S6 (Aluminum), Style 04C

Figure 7.
Cat. #3669-100-S6 (Bronze), Style 07C
Cat. #3665-1-S6 (Aluminum), Style 08C
Cat. #3665-100-S6 (Aluminum), Style 09C

Flat face grounding clamps

Eaton's Cooper Power series heavy-duty flat face ground clamps attach to flat metal surfaces such as busbars, towers, metal poles or other conductive structures.

Design features:

- **Aluminum or bronze construction** – for the best conductivity regardless of conductor material.
- **A variety of sizes fit any job**
- **Jaws with either smooth or serrated surfaces**
- **Sized for the job** – small clamps, ASTM rating 4, ultimate 47,000 A for 15 cycles; medium clamps, ASTM rating 5, ultimate 60,000 A for 15 cycles; large clamps, ASTM rating 6, ultimate 70,000 A for 15 cycles.
- **Resists burring and stripping** – brass eye screws have Acme threads, a superior thread design.
- **Superior strain relief** – via stainless steel cable clamps.
- **Better conductivity and corrosion resistance** – brass jaw seats are plated when used in aluminum clamps.
- **Mounting flexibility** – threaded ferrule holes available for 1/2"-13 or 5/8"-11 threaded ferrules.
- **Identification ease** – wire range and catalog number are clearly marked on each clamp.

Figure 8.
Cat. #133036-8AL-S6 (Aluminum), Style 04F
Cat. #133036-8BRZ-S6 (Bronze), Style 05F

Figure 9.
Cat. #3659-S6 (Aluminum), Style 01F
Cat. #3673-100-S6 (Bronze), Style 03F

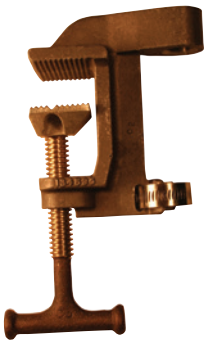

Figure 10.
Cat. #133042-8AL-S6 (Aluminum), Style 06F
Cat. #133042-8BRZ-S6 (Bronze), Style 07F

Figure 11.
Cat. #3672-100-S6 (Bronze), Style 02F

Miscellaneous clamp

Eaton's Cooper Power series includes a special locking plier clamp.

Figure 12.
Cat. #133045-S6 (Steel), Style 1LP

Table 2. Grounding Clamp Styles

Clamp Style	Material	Clamp Range	Cable Range	ASTM Rating 15 Cycle Withstand	Eye Screw Thread	Ferrule Thread Type	Figure	Catalog Number
01C	Bronze	#8 Sol. to 1" dia.	#2 to 4/0	4 (34 kA)	Fine	1/2" Thru Hole	6	3668-1-S6
02C	Bronze	#8 Sol. to 1" dia.	#2 to 4/0	4 (34 kA)	Fine	1/2-13	6	3668-100-S6
04C	Aluminum	#8 Sol. to 1" dia.	#2 to 4/0	4 (34 kA)	Fine	1/2-13	6	3654-100-S6
07C	Bronze	#8 Sol. to 2" dia.	#2 to 4/0	4 (34 kA)	Fine	1/2-13	7	3669-100-S6
08C	Aluminum	#8 Sol. to 2" dia.	#2 to 4/0	4 (34 kA)	Fine	1/2" Thru Hole	7	3655-1-S6
09C	Aluminum	#8 Sol. to 2" dia.	#2 to 4/0	4 (34 kA)	Fine	1/2-13	7	3655-100-S6
21C	Bronze	#8 Sol. to 1-3/8" dia.	#2 to 4/0	4 (34 kA)	Fine	1/2-13	3	3620-2-S6
22C	Bronze	#8 Sol. to 1" dia.	#2 to 4/0	4 (34 kA)	Fine	1/2-13	3	3620-3-S6
15C	Aluminum	#8 Sol. to 1" dia.	#2 to 250 MCM	5 (43 kA)	Acme	1/2-13	2	133035-2AL-S6
16C	Bronze	#8 Sol. to 1" dia.	#2 to 250 MCM	5 (43 kA)	Acme	1/2-13	2	133035-2BRZ-S6
20C	Aluminum	#6 Sol. to 5" dia.	#2 to 4/0	5 (43 kA)	Acme	1/2-13	5	3688-2-S6
11C	Aluminum	#8 Sol. to 2" dia.	#2 to 250 MCM	6 (54 kA)	Acme	1/2-13	4	133034-2AL-S6
12C	Bronze	#8 Sol. to 2" dia.	#2 to 250 MCM	6 (54 kA)	Acme	1/2-13	4	133034-2BRZ-S6
01F	Aluminum	#8 Sol. to 1-1/2" dia.	# 2 to 4/0	4 (34 kA)	Fine	1/2-13	9	3659-S6
02F	Bronze	#8 Sol. to 1-1/2" dia.	# 2 to 4/0	4 (34 kA)	Fine	1/2-13	11	3672-100-S6
03F	Aluminum	#8 Sol. to 1-1/2" dia.	# 2 to 4/0	4 (34 kA)	Fine	1/2-13	9	3673-100-S6
04F	Aluminum	#8 Sol. to 2" dia.	# 2 to 250 MCM	4 (34 kA)	Acme	5/8-11	8	133036-8AL-S6
05F	Bronze	#8 Sol. to 2" dia.	# 2 to 250 MCM	4 (34 kA)	Acme	5/8-11	8	133036-8BRZ-S6
06F	Aluminum	#8 Sol. to 2" dia.	# 2 to 250 MCM	4 (34 kA)	Acme	5/8-11	10	133042-8AL-S6
07F	Bronze	#8 Sol. to 2" dia.	# 2 to 250 MCM	4 (34 kA)	Acme	5/8-11	10	133042-8BRZ-S6
1LP	Steel	.25" to 1.25" dia.	1/0 to 2/0	N/A	N/A	Bolted	12	133045-S6

* Electrical ratings are RMS, symmetrical.

TABLE 3. Grounding Elbow Ordering Information

Digits	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	G	**E**	**6**	**0**	**0**											

Digits 1-5	
GE600	Grounding Elbow 600 A

Digit 6 Conductor Size	
2	2/0 cable
4	4/0 cable

Digits 8 and 9 Cable Length	
06	6 feet
08	8 feet
10	10 feet

Digits 10-12 Clamp

From Table 2 determine the clamp for the cable end. Fill in digits 10 - 12 using the Clamp Style numbers shown in the first column of Table 2. **Note: If no clamp is required, use "000".**

Digits 15-16 Kit Voltage Class	
15	15 kV
25	25 kV
35	35 kV

Note: If kit not specified in digits 13 and 14, leave blank.

Digit 7 Cable Insulation Color	
Y	Yellow
C	Clear

Digits 13-14	
K1	Single phase kit
K3	Three phase kit
—	Only grounding elbow

3 Phase Kit Contents	
3	Elbows
3	Standoff Bushing (Parking Stand Mount)
6	Protective Caps
1	Carry Bag
1-5 oz.	Tube of Lubricant
1	Installation Instructions

Single Kit Contents	
1	Elbow
1	Standoff Bushing (Parking Stand Mount)
2	Protective Caps
1	Carry Bag
1-5 oz.	Tube of Lubricant
1	Installation Instructions

Example: Catalog number for grounding elbow with 6' of yellow 4/0 cable and 133035-2AL clamp is **GE6004Y0615C**

Standoff bushing

Eaton's Cooper Power series 600 A, 15 and 25 kV Class Cleer loadbreak standoff bushing meets the applicable requirements of IEEE Std 386™-2006 standard - Separable Insulated Connector Systems and provides double interfaces for temporarily parking the Cleer loadbreak connector in sectionalizing cabinets and in underground vaults. The standoff bushing is designed to be installed in the parking stand of the sectionalizing cabinet or in a parking stand mounted in a vault.

Figure 13. 600 A, 15, 25 and 35 kv Cleer Loadbreak Standoff Bushing – PS600CLEERDM.

CLEERBAIL and CLEERCHAIN

Cleer bail and chain system allow for increased through fault ratings on Cleer systems. The Cleer bail increases through fault ratings to 40 kA when used on a Cleer C connector and 25 kA when used on a Cleer grounding elbow on a Cleer bracketed system. The CLEERBAIL and CLEERCHAIN can be used together to increase through fault ratings from 16 kA to 25 kA on a 35 kV 600 A T-body assembly with Cleer bushing insert and grounding elbow.

Figure 15. CLEERCHAIN and CLEERBAIL

Protective cap

The 600 A Cleer loadbreak protective cap is an accessory device designed to electrically insulate and mechanically seal the 600 A Cleer loadbreak bushing interfaces. It is available in 15, 25 and 35 kV voltage classes. Part numbers are LPC615, LPC625 and LPC635 respectively.

Eaton incorporates its Cooper Power series field proven POSI-BREAK™ technology, providing a layer of insulation over the conductive internal insert and an insulative sleeve on the base of the probe. This results in increased strike distance greatly reducing the possibility of partial vacuum flashovers and providing superior switching performance and reliability.

The protective cap is fully shielded and submersible and meets the applicable requirements of IEEE Std 386™ -2006 standard. Refer to Installation Instruction Sheet, MN650020EN for details.

Figure 14. 600 A, 25 kV Cleer Loadbreak Connector Protective Cap – LPC625.

Figure 16. CLEERBAIL and CLEERHAIN installation

Additional information

Refer to the following reference literature for application recommendations:

CA650010EN, 600 A, 15 kV Class Cleer Loadbreak Connector System

CA650011EN, 600 A, 25 kV Class Cleer Loadbreak Connector System

CA650012EN, 600 A, 28 kV Class Cleer Loadbreak Connector System

CA901002EN, 600 A, 15, 25, and 28 kV Class Cleer SecTER™ Cabinet

MN650019EN, 600 A 15, 25, and 28 kV Class Cleer Loadbreak Connector System Installation Instructions

MN650020EN, 600 A 15, 25, and 28 kV Class Cleer Loadbreak Connector Insulated Protective Cap Installation Instructions

MN650021EN, 600 A 15 and 25 kV Class Cleer Loadbreak Standoff Bushing Installation Instructions

MN650056EN, 600 A, 15, 25 and 35 kV Class Cleer Grounding Elbow Installation Instructions

CP1120, 600 A 15 kV Class Cleer Loadbreak Separable Connector System Certified Test Report

CP1204, 600 A 25 kV Class Cleer Loadbreak Separable Connector System Certified Test Report

CP1205, 600 A 28 kV Class Cleer Loadbreak Separable Connector System Certified Test Report

PA650002EN, The Cleer Solution for Distribution Systems

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