

# **THE MULTIPLE CHALLENGES OF UNDERGROUND CONSTRUCTION AND MAINTENANCE**





**DISTRIBUTION UNDERGROUND ELECTRIC IS A MULTI-FACETED  
AND NECESSARY PART OF THE COMPLEX UTILITY  
INFRASTRUCTURE IN THE UNITED STATES OF AMERICA**



# Heavy Underground



# First Downfeed from Substation



# UNDERGROUND SECONDARY VOLTAGE NETWORKS

**URD**



# UNDERGROUND SYSTEMS INSTALLED IN THE LATE 1800'S – EARLY 1960'S



**DIFFERENT PPE STANDARDS**



**NICE TRUCK!**

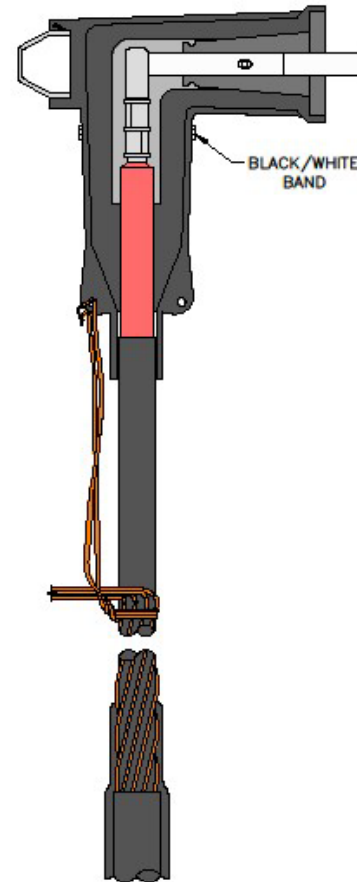


**EARLY INVENTIONS**

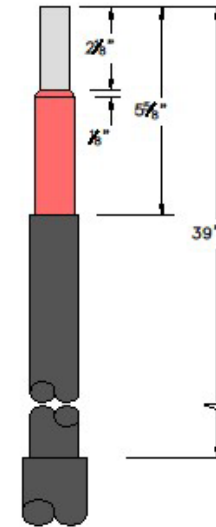
# ONE SPECIFICATION FOR ELBOWS?



## EXAMPLE



#2 AL CONCENTRIC JACKETED



CABLE AND PREPARATION

- (1) TRAIN CABLE INTO FINAL POSITION. MAKE FIRST CUT AT 24 INCHES ABOVE CENTERLINE OF BUSHING. REMOVE JACKET AND UNDERLYING WATER BLOCK TAPE TO 39 INCHES FROM END OF CABLE (IF PRESENT).
- (2) SEAL EDGE OF JACKET.
- (3) BIND CONCENTRIC WIRES WITH #16 COPPER WIRE AT 36 INCHES FROM END OF CABLE. LEAVE TWO 12 INCH PIGTAILS OF BINDING WIRE. 1
- (4) MAKE SECOND CABLE CUT AT CENTERLINE OF BUSHING.
- (5) REMOVE INSULATION SHIELDING TO DIMENSION SHOWN.
- (6) PREASSEMBLE THE PROBE INTO THE COMPRESSION LUG TO ENSURE PROPER THREAD ENGAGEMENT. DISASSEMBLE THE PROBE AND PROCEED TO THE NEXT STEP.
- (7) REMOVE CABLE INSULATION TO DIMENSION SHOWN. CHAMFER INSULATION FOR 1/8 INCH. CLEAN CONDUCTOR WITH WIRE BRUSH. (FIGURE 2)  
NOTE: USE THE TEMPLATE TO VERIFY ALL CUTBACKS.
- (8) PLACE CONNECTOR ONTO CONDUCTOR, ALIGN THREADED HOLE WITH BUSHING AND CRIMP CONNECTOR (SEE PRESSING TABLE). ROTATE PRESS AFTER EACH CRIMP. REMOVE EXCESS INHIBITOR AND ANY SHARP FLASHING AFTER CRIMPING.
- (9) CLEAN EXPOSED INSULATION WITH APPROVED CLEANER SOLVENT AND CLEAN RAGS.
- (10) LUBRICATE CABLE, CONNECTOR, AND INSIDE ELBOW CABLE ENTRANCE WITH RED LABEL LUBRICANT. INSTALL ELBOW ONTO CABLE. ALIGN HOLE IN CONNECTOR.
- (11) INSERT CONTACT PROBE INTO ELBOW AND HAND TIGHTEN WHILE BEING CAREFUL NOT TO CROSSTHREAD THE PROBE INTO CONNECTOR THREADS. THEN TIGHTEN CONTACT PROBE WITH WRENCH FROM KIT UNITS. WRENCH DISTORTS.
- (12) CONNECT PIGTAILS FROM BINDING WIRE TO ELBOW GROUNDING EYE.
- (13) CONNECT CONCENTRIC WIRES TO GROUND BUS.
- (14) CLEAN BUSHING. LUBRICATE BUSHING AND INSIDE OF ELBOW INTERFACE WITH YELLOW LABEL LUBRICANT. INSTALL ELBOW ONTO BUSHING.

# SAFETY AND HYGIENE



**FRIABLE ASBESTOS**



**BIOHAZARDS**



**CONFINED SPACES**



**YUCK!**





**BOOM IS BAD!!**



**WHERE'S MY FILTER SOCK?!?**

# **ROAD WORK CHALLENGES**





**PROUD TO BE**





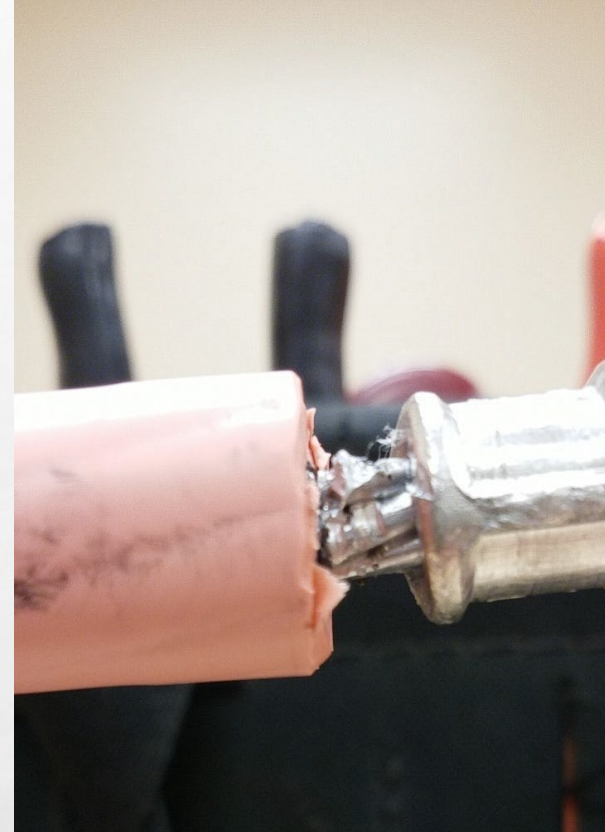
LAUGH



HUMOR



**“LIKE MEN AMONGST SNAKES.”**



**THE IMPORTANCE OF SPLICE QUALITY**



# UNDERGROUNDING FACILITIES



**BEST PRESENTATION EVER**



**RIGHT**



BAD EXPERIENCE

WORST

AWFUL I HATE IT

UNSATISFACTORY

DISAPPOINTED

UPSET

NEVER AGAIN

POOR QUALITY



**JOHN M PEREZ**

