

Cable Placing in Duct - Methods & Equipment for Manholes and Vaults

AEN168, Revision 4

This Applications Engineering Note (AE Note) addresses common issues regarding cable pay-off during outside plant installations known as cable squirting, cable tangling during payoff, and reel storage. A check list is also provided to cover these plus other issues that are related to placing cable.

Critical to monitor during installation of cable in ducts:

- MBR – Minimum Bend Radius – always maintain
- Pulling Tension – do not exceed specification for cable, do not hand push and pull at the same time.
- Twisting Avoidance – use a break away swivel, verify load rating is 600 lbs. or less.
- Allow Cable to squirt out of the arbor hole. Remove all of cable attached prior to start of placing located on the outside flange except for approximately one foot. Allow it to freely squirt out, cut off when too long and interferes with placing. Placing will need to stop to cut off cable. See [AEN165](#)
- Tighten Bolts prior to and during installation. See [AEN165](#)

Other References:

- SRP Duct Installation: [SRP 005-011](#)
- AE Note 167 Split Duct Equipment: [AEN167](#)
- AE Note 166 Check List for Rocket Ribbon Cable: [AEN166](#)
- SRP 004-279 Rocket Ribbon Cable Access: [SRP 004-279-EN](#)

Summary of Basic Steps to Install Cable in Ducts:

Prior to start of cable installation:

1. Store cable on solid ground to avoid reel flanges sinking into soft earth.
2. Blow any water out of ducts and proof ducts with a mandrel that is at least 80% of duct size.
3. Verify that there are no duct bends that exceed the cable's minimum bend diameter
4. Use fill ratio calculator verify cable fits in duct, [Fill Ratio Calculator](#), **1728 recommend minimum 1.25" duct, 3456 recommend a minimum 2.0" duct.**
5. Tighten bolts on wood reel before starting installation and during installation when stopped for figure 8 or "railroad" – Use of alternate railroad method eliminates need to flip cable – see [SRP 005-011](#), [AENote 166](#) or <https://youtu.be/e28MKr2Dxi8>
6. Allow Cable to squirt out of the arbor hole. Remove all of cable attached prior to start of placing located on the outside flange except for approximately one foot. Allow it to freely squirt out, cut off when too long and interferes with placing. Placing will need to stop to cut off cable. See [AENote165](#)
7. Install wire mesh pulling grip, or fabric mesh if needed to streamline for cases when there is limited space in duct. It is recommended to use fabric mesh grips when installing 1728 in 1.25" ducts due to limited space.
 - a. Order from Maxcell: Direct 330-335-6824; www.MaxCell.us;
 - b. MaxCell Part Number: **MXCPM1728**
 - c. MaxCell Pulling Mesh 5-foot length, 1728 fiber (1/2"-1 1/4" Cable size range)
 - d. MaxCell Part Number: **MXCPM3456**
 - e. MaxCell Pulling Mesh 5-foot length, 3456 fiber (5/8"-1 5/8" Cable size range)

8. Install breakaway swivel with a rating of 600 lbs. or less, verify load on cable specification sheet. Use lubricant.
9. Use a tugger that stops prior to reaching maximum tension of 600 lbs. Make sure it is calibrated.
10. Make sure the capstan and sheave wheels used are correct size, at least cable min bend diameter.
11. Control reel during payoff – do not allow reel to spin faster than needed.
12. Maintain minimum bend diameter during installation – check cable specification sheet.
13. When installing cable into a manhole that has a cover less than the allowed minimum bend diameter of the cable after a figure 8 or railroad is formed, it is acceptable to push the remaining cable with no tension into the manhole.
14. 1728 Rocket Cable vault slack for midspan access: 75 ft. max in a 30X60 vault. (75 ft. also for cable ends)
15. Corning recommends a teardrop slack coil with a maximum cable length of 75 ft.
16. 1728 Rocket Cable vault slack off a midspan capstan if left coiled in vault: 75 ft. max in a 30X60 vault.
Note: Remember that 2 people in tandem can pull over 600 lbs. and should be avoided, do not hand push-pull.
17. After cable is installed OTDR test all fibers.

Various Equipment to maintain minimum bend radius when cable enters and exits vaults or manholes:

- A. **Split Ducts (MDPE) are available in 2-inch and 4-inch diameter sizes from Highland Supply Company.** The ducts are coupled to entry ducts and extended to a position lined up with the tugger.
Data Center Kit – 4-inch: PN DCKIT4 (for large vaults)
Manhole Kit – 4-inch: PN MHKIT4 (for large manholes)
Small Vault Kit – 2-inch: PN VAULTKIT2 (for small vaults)
Note: Bend radius of 20+ inches will be maintained by the ducts.
See [AEN167](#) for details. How to Order: By Phone- Call Highland Valley Supply at 877-803-1478 or Send email to sales@highlandvalley.com
- B. **Split (Flexible Steel) Ducts are available in 4-inch diameter from GMP Company for use in large vaults and manholes.** These split flexible cable guides (“Elephant Trunks”) allow for entry and exit of cables in manholes. The 90-inch main is used as the first section with a nozzle that is inserted into the entry 4-inch duct. Length is extended by adding additional sections of 90-inch or 36-inch extender pieces. See [AEN167](#).
 - ✓ <https://www.gmptools.com/split-cable-feeder/>
 - ✓ <https://www.gmptools.com/cable-feeder-nozzles/>
 - Nozzle PN 60596 – 4-inch
 - 90-inch main – PN 88830
 - 90-inch extension – PN 88832
 - 36-inch extension – PN 88831Note: Bend radius of 20+ inches will be maintained by the ducts.
How to order: <https://www.gmptools.com/where-to-buy/>
- C. **Split Sheave Wheels installed with a shackle (or Jam Skid) for large diameter bend requirements are needed when used in a manhole with a round cover.** Split sheave wheels to achieve a large diameter are required for 1728 and 3456 fiber cable (3456 needs a 40-inch diameter sheave wheel and 1728 needs a 30-inch sheave wheel) to be installed in a manhole (32-inch cover) when in two pieces and then reassembled. Sizes: 32-inch and 40-inch diameters Note: Capstans must also meet minimum bend diameter of cable used.

<https://www.gmptools.com/jamb-skid/>; <https://www.gmptools.com/fiber-optic-sheave-shackle/>
How to order: <https://www.gmptools.com/where-to-buy/>

D. **Customize ducts as needed to use as guides or to modify equipment such as quadrant blocks or manhole lip rollers.**

Special note: small diameter rollers used in lip rollers and quadrant blocks have been proven to break fibers and should never be used.

- Modify to eliminate small rollers direct contact with the cable (Figure 1)



Figure 1

- Customized duct in field to guide cable out of vault during placing (Figure 2)



Figure 2

Specification sheets for 1728 and 3456 RocketRibbon Cables

- [RocketRibbon® Dielectric Cable-250, 1728F](#)
- [RocketRibbon® Dielectric Cable-250, 3456F](#)