

Cable Placing Checklist and Handling: Squirting, Tangling, and Storage

AEN165, 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.

READ BEFORE PLACING: Outside Plant Cable Check List

1. Inspect reel and cable prior to start for any damage, contact Corning if damaged.
2. Store reels on solid ground to avoid flanges from sinking into ground, do not lay on its side.
3. Only roll reel in direction of arrow on flange. Do not use forklift to slide cable reel.
4. Proof duct with a mandrel that is 80% fill of duct.
5. Determine minimum bend diameter from specification sheet of cable.
6. Limit max tension to 600 lbs. for Outside Plant Cables. Calibrate capstan to cable puller, use of a control box with auto shut down is best method. 600 lbs. not applicable to MiniXtend.
7. When pulling cable in duct, use breakaway swivel rated 600 lb, not applicable to MiniXtend.
8. If jetting cable in duct, perform crash test per manufacturer's procedure. Jetting machines with auto shut down is best method. Keep cable clean before it enters the jetting machine.
9. Remove cable tail from outside flange – cut off, leave about one foot to freely squirt out during placing. Cut off as needed always leaving the one-foot length. Same for steel reels.
10. Tighten wooden reel bolts prior to starting of placing with reel lifted off ground when on trailer. Periodically tighten bolts during placing, at least two other times during placing or whenever a pause during placing.
11. Manage cable payoff during placing, adjust speed as required to maintain control, i.e. reduce to 150 ft/min if necessary. Person should be in front of reel to coordinate speed with others. Do not allow reel to over-spin causing tangles or a kink. Do not allow cable to payoff of the side of the reel, this will cause twists.
12. Do not push and pull cable by hand, with puller, or with a jetting machine at the same time during placing.
13. Pay attention to cable on capstan to ensure it does not cross over a winding and cause a kink.
14. Use print on cable jacket as a guide to minimize twists on cable, keep the print straight. Avoid twists in bends, work twists out of bends. This is important with preferential bend cables that have wires or GRPs on outside of jacket.
15. Do not use small rollers: manhole lip rollers or block rollers – MBD is not maintained.

Cable Installation References

- Duct Installation of Fiber Optic Cable
<https://www.corning.com/catalog/coc/documents/standard-recommended-procedures/005-011.pdf>
- Mid-Span Coiling procedure for SST-Ribbon™ Cable, SST-UltraRibbon™ Cable, SST-Ribbon™ Dry-Lock Cable, RocketRibbon® Cable and any preferential bend cable
<https://www.corning.com/catalog/coc/documents/standard-recommended-procedures/004-086.pdf>
- Installation of Corning Optical Communications Self-Supporting (Figure-8) Aerial Cable
<https://www.corning.com/catalog/coc/documents/standard-recommended-procedures/005-026.pdf>
- Lashed Aerial Installation of Fiber Optic Cable
<https://www.corning.com/catalog/coc/documents/standard-recommended-procedures/005-010.pdf>
- Direct-Buried Installation of Fiber Optic Cable
<https://www.corning.com/catalog/coc/documents/standard-recommended-procedures/005-012.pdf>
- Installation of Solo® ADSS All-Dielectric Self-Supporting Fiber Optic Cables
<https://www.corning.com/catalog/coc/documents/standard-recommended-procedures/005-038.pdf>
- Cable Placing Checklist and Handling: Squirting, Tangling, and Storage
<https://www.corning.com/catalog/coc/documents/application-engineering-notes/AEN165.pdf>
- Micro cable Blowing Guide
<https://www.corning.com/catalog/coc/documents/application-engineering-notes/AEN154.pdf>
- Micro Cable Air-Assisted Installation Considerations
<https://www.corning.com/catalog/coc/documents/application-engineering-notes/AEN096.pdf>
- Air-Assisted Cable Installation Techniques
<https://www.corning.com/catalog/coc/documents/application-engineering-notes/AEN049.pdf>
- Best Practices for Optic Cable Installation
<https://www.isemag.com/2019/10/telecom-fiber-optic-cable-installation-best-practices>

Cable Squirting and Tangling

Cable squirting presents itself in multiple ways and cannot be reversed once it occurs. However, it can be controlled or prevented with proper reel and cable handling practices.

Cable squirting describes any of three conditions that sometimes occur with cable packaged on reels:

1. Cable “squirts” out of the entry (arbor) hole (the most common symptom) – Figure 1.
2. “Wavy” layers appear near the bottom of a reel – Figure 2.
3. A “loop” of cable pops through one or more covering layers – Figure 3.

The photos below show examples of these three scenarios.



Figure 1



Figure 2

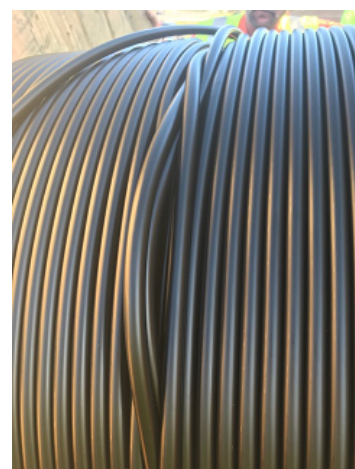


Figure 3

There are two common causes of cable squirting: dimensional instability of the reel and unequal tensions along the cable. Dimensional instability most often results when the flange bolts loosen during shipping or handling. Compounding this effect is reel expansion and contraction caused by environmental changes. Unequal tensions along the cable occur because of poor handling practices. The most common are rolling a cable against the “roll direction” arrows and allowing the reel to “over-spin” when paying off the cable (not maintaining back tension).

Corning Optical Communications recommends several steps to control cable squirting:

1. Minimize environmental exposure, especially of wooden reels. All packaging methods used by COC meet rigorous industry standards, but reels made from wood are subjected to the effects of weather on wood.
2. Hand tighten reel flange bolts just before paying off cable and stop periodically to re-tighten them.
3. Minimize the distance a reel of cable is rolled. Use a forklift or cable trailer to move it significant distances. Under no circumstances should a reel of cable be rolled against the roll direction as indicated by the arrow on the reel flange.

4. Manage back-tension during payoff to keep the top layer of cable tight on the reel. Slack in the top layer eventually loosens all of the cable, greatly increasing the likelihood of squirting, tangling, or kinking the cable.
5. Secure the outside end of unused cable on a reel when installation is completed to keep the top layer tight for future use of the remaining balance left on the reel provided squirting as shown in Fig. 3 did not start.
6. Release the cable attached to the flange that exits from the arbor hole and cut length down to about one foot remaining. The cable must be free to squirt out of the arbor hole when placing starts. Cut off any cable as it squirts so not to hinder installation, such as hitting the reel trailer.

Cable squirting is not correctable after it has started. If the cable has begun to squirt out of the entry (arbor) hole, do not attempt to stop it. Prior to paying off the cable, cut off all but one (1) ft. of the cable on the outside flange and leave it unsecured. During installation, stop and cut the cable “tail” as it pushes out of the reel entry (arbor) hole. If the cable is not allowed to squirt out of the entry (arbor) hole, then it will reverse squirt into the reel as shown in Figures 2 and 3. It is critical to unsecure the start-up end to prevent this. In the event that squirting within the reel occurs, stop the installation and carefully remove the cable by hand and re-spool or form it into a Figure-8. If left on the original reel the condition will likely worsen. Corning’s standard recommended procedure SRP-005-051 covers cutting and re-spooling fiber optic cable.

If wavy layers or “loops” have bent a cable tighter than its minimum rating (as shown in Fig. 2), the cable may be permanently damaged. Though the cable can be optically checked, it is not possible to rule out hidden structural damage and the cable may need to be replaced.

Cable Storage, Reel Loading/Off Loading

1. Store reels upright, resting on both flanges, and chock against rolling. Store multiple reels flange-to-flange; do not allow the flange from one reel to contact the cable on the drum of another. Never turn reels on their side.
2. Do not remove protective wrap until cable is to be used. If partial cable lengths are used, and the remainder is to be stored outdoors for an extended period, replace end-caps or re-seal ends with plastic tape, and replace the protective wrap. Ensure the loose end of the top layer is secured.
3. Store reels under cover and ventilated whenever possible. Wooden reels will deteriorate over time with continuous exposure to snow, rain, and sunlight.
4. Prevent reel flanges from sinking into soft earth by using a pallet or storing on a firm surface.
5. Protect reels from birds, insects, and animals nesting inside them.
6. Re-tighten flange bolts before using. Also, check reel flanges for nails that may have backed out during handling or storage.
7. If the cable is subjected to a wide range of temperatures and moisture, the integrity of the reel drum could be affected. Cable squirting can occur during installation if the reel drum is compromised. Make sure bolts are tight.

8. Do not store indoor cables outdoors. Indoor cables are not protected from exposure to UV radiation and are not water blocked, leaving them susceptible to moisture, humidity, and direct sunlight. Jacket degradation can also occur.
9. Never lift a reel by the drum (i.e. do not lift where cable bears the load).
10. When loading or off-loading cable reels onto or off a truck use a forklift with the flanges facing the driver, i.e.: only flanges are touching the forks. Another method is to use chains that are attached to a bar that is inserted through center hole of the reel and a second beam that is above the reel that keeps the chains spread. This method will keep the reel straight when lifted, which is important to not cause reel and cable damage.
11. Store cables within the specified temperature range.
12. When rolling a reel on the ground, follow the direction indicated by the arrow on the reel flange to mitigate unraveling. When paying off, the reel will spin in the opposite direction of the arrow.
13. Install a cable within six months of delivery, if possible.
14. Cables are tested prior to being shipped from the factory and provided there is no damage during transportation, testing performance should not be affected. However, if a reel is received with damage to the covering, the cable, or any part of the reel itself, then it must be re-tested. Notify Corning immediately upon finding the damaged reel and/or cable.
15. Above all, use common sense. Do not subject a cable reel to a storage environment that you would not expect untreated wood and fiberboard to survive.

References

1. ANSI/TIA-568-C.0: "Generic Telecommunications Cabling for Customer Premises"
2. IEEE Std 142: "IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems"
3. BICSI® Telecommunications Methods Manual (TDM), Chapter 17: "Grounding, Bonding and Electrical Protection"