

Blasting Near Optical Fiber Cable

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It is often necessary to locate several utility services along the same right-of-way. Installation of services such as water, sewer, and gas pipelines, power cables, etc. may require blasting to clear areas of rock. In the event that an optical fiber cable is located along the same right of way, concerns may arise as to its safety. The primary recurring concerns are: catastrophic physical damage resulting in immediate cable failure or a reduced operating lifetime, an increase in fiber attenuation due to cable deformation, and momentary increases in bit error rate in operational systems from the shock of a blast.

Because of the potential time and expense associated with restoring a severed or severely damaged optical fiber cable, Corning Optical Communications' has conducted testing to assess the potential impact of blasting in the vicinity of optical fiber cable. The most significant test results are summarized herein, with further information available in Reference 1.

Testing

Test Setup

The cable tested was a Corning Optical Communications' single armor, double jacket, loose tube cable design. The cable was direct buried in a bed of shale using a vibratory plow and was actively carrying a test data stream at the time of blasting.

Tests

- 1) One 35 lb (16 kg) charge of dynamite located 10 ft (3 m) directly below the cable.
- 2) Two 1.25 lb (0.6 kg) sticks of dynamite located within 4 ft (1.2 m) on each side of the cable and ignited simultaneously.

Results

When subjected to the referenced blasting, the optical fiber cable did not sustain any noticeable physical damage, or exhibit any increase in attenuation or bit error rate.

Summary

These tests demonstrate the durability and ruggedness of Corning Optical Communications' loose tube cable designs. The results of this testing do not serve to guarantee that optical cable will always be unaffected by blasting, as each particular occurrence involves a unique set of circumstances that must be considered, but it does serve to prove that such cable can survive near proximity blasting from moderate-sized charges. For installers or owners faced with such a situation, care still must be taken to minimize the probability of cable damage from blasting by considering the specifics of the situation. The following general guidelines apply:

- Maximize the distance between the blast and the cable - A general rule is to maintain a minimum distance between the charge and the cable of at least three times the charge depth, or 10 ft (3 m), whichever is greater. This applies for charges up to 100 lb (45 kg).
- Minimize the size of the charge to that needed for the job. Larger charges increase the probability for cable damage in any event as more energy is released.
- Consider the potential impact on services in the unlikely event that a cable is negatively affected by blasting, when deciding whether to blast near an optical fiber cable in operation. Rerouting data during blasting is generally not necessary, but may be considered in extreme circumstances.

Experimental evidence indicates that outside plant optical fiber cables are not especially sensitive to blasting and that no long-term degradation is expected due to blasting in the vicinity of such cables. The presence of optical fiber cables need not preclude blasting provided that standard processes and procedures are used, and reasonable precautions are taken to minimize the potential for damage.

REFERENCES

1. Blasting Near Fiber Optic Cable, Mark A. Setman and Max J. Brandtner, International Wire & Cable Symposium Proceedings 1988.