



# Standard Practice for Operation and Maintenance of Sewers with Optical Fiber Systems<sup>1</sup>

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## 1. Scope

1.1 This practice applies to the operation and maintenance of sewers with a subsequent installation of optical fiber cable in accordance with Practice [F2303](#).

1.2 This practice applies to gravity flow storm sewers, sanitary sewers, and combined sewers.

1.3 This practice does not apply to force mains, siphons, or other pressurized sewers.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

[F2303 Practice for Selection of Gravity Sewers Suitable for Installation of Optical Fiber Cable and Conduits](#)

2.2 *ANSI Standard:*<sup>3</sup>

[ANSI Z117.1-2003 Safety Requirements for Confined Spaces](#)

2.3 *IEC Standards:*<sup>4</sup>

[IEC 60825-1 Ed. 1.2, en 2001, Safety of Laser Products—Part 1: Equipment Classification, Requirements and User's Guide](#)

[IEC 60050-731 Electrotechnical Vocabulary: Optical Fiber Communications](#)

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee F36 on Technology and Underground Utilities and is the direct responsibility of Subcommittee F36.10 on Optical Fiber Systems within Existing Infrastructure.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

<sup>4</sup> Available from International Electrotechnical Commission (IEC), 3 rue de Varembé, P.O. Box 131, CH-1211, Geneva 20, Switzerland, <http://www.iec.ch>.

2.4 *Federal Standard:*<sup>5</sup>

[OSHA Regulation 29 CFR Part 1910.146, Permit-Required Confined Spaces](#)

## 3. Terminology

3.1 *Definitions:*

3.1.1 *conduit, n*—tubing used to house optical fiber cable that is connected to, but separate from, a sewer pipeline.

3.1.2 *O&M, n*—operation and maintenance.

3.1.3 *optical fiber cable, n*—cable formed of one or more strands of optical fiber for transmission of data, video, audio, voice, or other information.

3.1.4 *optical fiber cable owner, n*—entity holding legal rights to, and responsible for the operation and maintenance of, the optical fiber cable. The optical fiber cable owner is also responsible for operation and maintenance of any components associated with the optical fiber system that are not part of the sewer pipeline as defined in this standard.

3.1.5 *optical fiber system, n*—group of components that comprise the elements necessary to enable optical fiber cable to be installed, maintained, and operated inside a sewer pipeline.

3.1.6 *sewers, n*—pipelines for the conveyance of wastewater or stormwater, or both.

3.1.7 *vault, n*—manhole, hand hole, or other buried enclosure used to store slack-loops of cable, fiber cable splices or provide access to the sewer for maintenance and inspection, or any combination thereof. Vaults designated only for optical fiber systems may be located within the street or off-street. Sewer vaults are typically located in the street and, as approved by the sewer pipeline operator, may serve the dual purpose of also housing optical fiber systems.

## 4. Summary of Practice

4.1 Sewers with optical fiber systems must be safely operated and maintained without significant negative impacts on sewer service and minimal impact on optical fiber system users. To satisfy that criteria, the equipment and practices must

<sup>5</sup> Available from U.S. Government Publishing Office, 732 N. Capitol St., NW, Washington, DC 20401-0001, <http://www.gpo.gov>.

be well defined and designed with responsible workers trained to implement and perform the required tasks. Key issues include:

- 4.1.1 General safety considerations;
- 4.1.2 Emergency response procedures, including sewage spill control, emergency sewer pipeline repair, and communication procedures;
- 4.1.3 Routine sewer O&M activities, including service and main connections; sewer pipeline repairs; periodic sewer inspection; sewer pipeline cleaning;
- 4.1.4 Routine optical fiber system O&M activities;
- 4.1.5 Cable and conduit marking; and
- 4.1.6 Worker qualification.

## 5. Significance and Use

5.1 This is intended to outline O&M issues that require discussion and mutual agreement by both the optical fiber cable owner and sewer pipeline operator. The purpose is developing sufficient written procedures and practices to allow optical fiber systems to coexist as a secondary use within a sewer. To the extent that sewers are primarily for conveying flow, it is the responsibility of the optical fiber cable owner to accommodate sewer O&M practices and develop optical fiber system O&M procedures that will not material impact the sewer's primary function.

5.2 Since the practice of integrating sewers and optical fiber systems is an emerging activity, this practice will help establish guidelines for its rapid and safe deployment, ensuring that the installed facilities are operable as intended on a long-term basis.

## 6. Operations and Maintenance

### 6.1 *General Safety Considerations:*

6.1.1 It may be necessary to continuously monitor air quality for noxious odors and explosive gases in or near sewers.

6.1.2 When working with optical fiber cables, care must be taken to avoid fiber penetration through the skin or laser-induced eye damage. For specific guidelines, refer to IEC 60825-1, Ed. 1.2, en 2001.

6.1.3 In all instances, only properly trained and certified workers with appropriate skills in optical fiber systems, sewer maintenance operations, traffic management, traffic safety, confined space, noxious air, flammable gases, hazardous waste disposal, and so forth, should access or work on sewers or optical fiber systems.

6.1.4 *Optical Fiber Fusion Splicing Operations*—Fiber fusion splicing equipment may provide a potential ignition source for flammable mixtures. Prior to fusion splicing, verify the safety of this operation in the presence of potentially flammable sources (vehicle exhaust, fuel storage, sewers, and so forth).

### 6.2 *Mapping and Record-Keeping:*

6.2.1 The optical fiber cable owner must maintain accurate and up-to-date records of the type and location of all parts of the optical fiber system and must provide copies to the sewer pipeline operator.

6.2.2 Unless otherwise required by the sewer pipeline operator, records may be in the form of maps, drawings, notes, or any combination thereof consistent with good practice for as-built documentation. As a minimum, the records must indicate the location, extent, size, and orientation of the optical fiber system along the sewer pipeline and through vaults.

### 6.3 *Sewer Emergency Response Procedures:*

6.3.1 *Field Activities*—During a sewer emergency, the pipeline operator controls all field activities necessary to mitigate or stabilize the emergency event. During such emergencies, all optical fiber cable operations and maintenance activities proceed only as permitted by the sewer pipeline operator. The need to remove an optical fiber cable or conduit, or both, may also arise where the sewer pipeline structural integrity is affected and a damaged sewer pipe section must be replaced. The optical fiber cable owner must provide the sewer pipeline operator with written procedures for its safe removal.

6.3.2 *Notification*—As possible, the pipeline operator will provide timely notification to the optical fiber cable owner of sewer emergencies and other events likely to affect the optical fiber system such as:

6.3.2.1 Prior to performing any operations that may damage the optical fiber cable system; and

6.3.2.2 Where assistance by the optical fiber cable owner may be necessary.

### 6.4 *Routine Operating Procedures:*

#### 6.4.1 *Notification:*

6.4.1.1 The sewer operator and fiber cable system owner should notify the other entity as far in advance as possible for planned, routine operations.

6.4.1.2 Improper cable repair or maintenance procedures may damage the sewer or optical fiber system, creating an unsafe situation. Because of this risk, the fiber cable system owner must notify the sewer pipeline operator as to the nature of the intended repair or maintenance and verify whether sewer operator supervision or oversight is required during the repair or maintenance.

6.4.2 *Extended Duration Access (4 hours+) to Sewer Vaults by Optical Fiber System Owner*—When accessing a sewer vault or sewer manhole, the optical fiber cable owner must provide the sewer pipeline operator with at least 48 hours prior notice. If re-cabling, replacing the conduit or other extended durations repairs are contemplated, the optical fiber system owner must provide with that notice, written repair procedures, the duration and hours that the vault or manhole is being accessed and other requirements which may be locally required (traffic control plans, odor control, and so forth).

6.4.3 *Sewer Service Connections*—The optical fiber cable owner must provide the sewer pipeline operator with preferred methods for adding sewer service connections. In the absence of those preferences, the sewer pipeline operator may use any customary method.

6.4.4 *Sewer Pipeline Maintenance and Rehabilitation*—The optical fiber cable owner must provide the sewer pipeline operator with preferred methods for chemicals used for odor, grease or root control, mechanical cleaning methods for blockages or roots, hydraulic cleaning or flushing methods, pipeline and manhole rehabilitation techniques, and so forth. In

the absence of those preferences, the sewer pipeline operator may use any customary method.

#### 6.5 *Mutual Advice:*

6.5.1 During any inspection, the sewer pipeline operator or optical fiber cable owner should advise the other of any damage observed in the other's facilities. Items that require attention by the sewer pipeline operator include infiltration, flooded manholes, root intrusions, and so forth. Items that require attention of the optical fiber cable owner include vault lid damage, crimps, open splice cases, standing water, pinches, nicks, or cuts in cable jacketing.

#### 6.6 *Marking and Identification:*

6.6.1 *Vaults*—In sewer reaches containing optical fiber cables, each sewer access (vault) must be clearly and conspicuously identified as containing optical fiber cables. A contact number must be provided where the optical fiber cable owner or sewer pipeline operator may access further instructions on how to safely proceed.

6.6.2 *Conduit*—Conduit containing optical fiber cable (located outside of the pipeline) must be clearly and uniquely marked to minimize the chances that the pipeline operator will inadvertently damage the cable by cutting or pinching operations.

## 7. O&M Manual

7.1 The discussions and agreements must be compiled as the O&M Manual to reflect:

7.1.1 The agreed upon procedures and policies to address 4.1;

7.1.2 Safety procedures and personal protective equipment for accessing a sewer vault;

7.1.3 The designated emergency notification contact(s) for the sewer operator and optical fiber cable owner;

7.1.4 The designated routine notification contact(s) for the sewer operator and optical fiber cable owner;

7.1.5 Activities that are routine sewer O&M (including equipment, sewer cleaning techniques and frequency);

7.1.6 Activities that are routine optical fiber cable O&M (including equipment and frequency);

7.1.7 Target times for advance notifications;

7.1.8 Any desire for the sewer pipeline operator or optical fiber cable owner to observe the other's field operations;

7.1.9 Preferred methods for adding new house connections to the sewer;

7.1.10 Preferred methods for sewer cleaning and maintenance;

7.1.11 Preferred methods for sewer pipeline and manhole rehabilitation;

7.1.12 Types of sealants, solvents, coatings, and other classes of materials that may be installed inside sewer pipeline systems;

7.1.13 Any local or regional permit and inspection requirements;

7.1.14 Any subsequent revisions that are agreed upon by both parties; and

7.1.15 Other items which enhances the O&M of the co-existing sewer and optical fiber systems.

## 8. Keywords

8.1 fiber in sewer; fiber installation method; operations and maintenance; optical fiber; sewer gas; sewers; telecommunications

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