



SUBMITTAL FOR THE
VeriCure®
CIPP Curing
Monitoring System

**THE MONITORING OF
CIPP LINING SYSTEM
FOR INSTALLATION OF
Gravity Storm &
Sewer Pipelines**



Table of Contents

1	Company Experience & Expertise	1-2
2	Training & Certification	3-5
3	VeriCure® Product Information	6-7
	• VeriCure Flyer	8-9
	• CMS 1022 TDS	10
	• Roundtemp TDS	11-12
	• FlatTemp TDS	13-14
4	Deliverables	15-37
	• Read Only Software	16
	• Curing Guidelines	17
	• VeriCure Report	18-37
5	CMS Specification	38-39



Company Experience & Expertise

Vortex Companies: Products Division

Founded in 2015, the Vortex Companies is a collection of business segments with both a national and international footprint. As both a horizontally and vertically integrated business, the Company executes on its vision of providing a comprehensive suite of trenchless solutions that deliver quality engineered solutions, products and services that improve the efficiency, safety and long-term reliability of its client's assets.

This unique approach allows the Company to effectively design, develop, manufacture and/or commercialize a wide variety of products and services for its broad customer base. The business segments, which represent the broader Vortex family, have origins dating back to 1972, and include some of the most respected, experienced, and driven staff in each of their respective industry focuses.

At present Vortex Products has two strategically located manufacturing and service facilities:

Vortex Products - Greenville, SC

Sales, service, fabrication, and training of advanced robotics, lining systems, high-speed drain tools, custom rehab rigs, and other infrastructure repair solutions.

Vortex Products - Sandy Utah

Formulation, toll blending and distribution of all Quadex Repair Materials including epoxies, resins, grouts, and industrial coatings.

VORTEX PRODUCTS BUSINESS UNITS

Products/Manufacturing

- Vortex Products
- Schwalm USA
- Quadex®, LLC
- Vortex Technology Group, LLC

| Training & Certification

TRAINING & CERTIFICATION PROCESS

At Vortex, we are dedicated to providing the highest level of service, technical support, and training to ensure the VeriCure® system delivers the results promised. Our skilled VeriCure experts will guide you through the VeriCure Certification process to improve the quality and efficiency of your CIPP installation. With VeriCure you will:

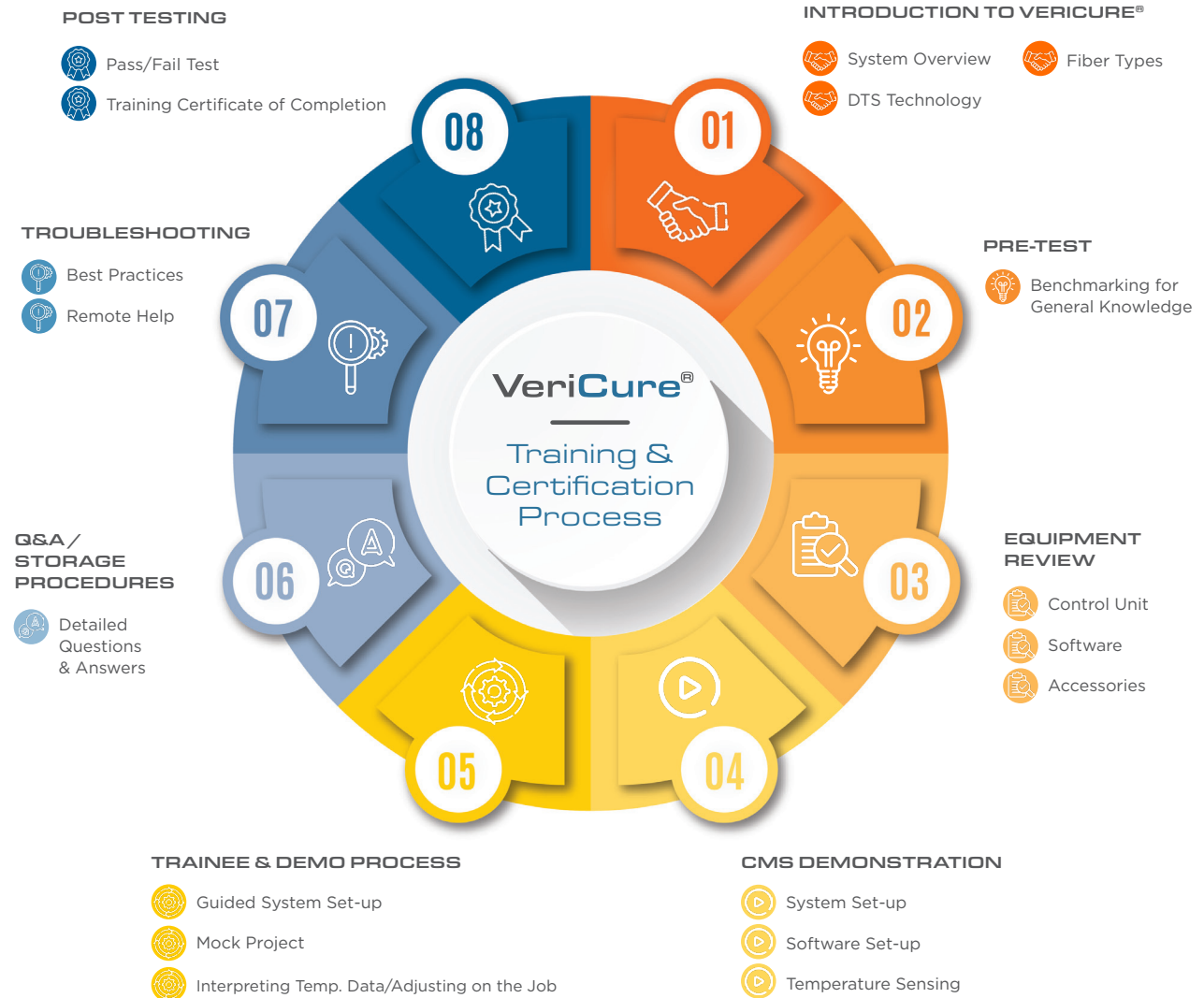
- Verify a complete cure and reduce operating costs
- Deliver supporting analytics and reports to the customer
- Build confidence in your team
- Reduce the risk of failed liners
- Reduce the number of callbacks
- Improve customer relationships

CASE STUDY

MAKING A CASE FOR VERICURE®

Major US CIPP contractor incorporated VeriCure into its SOP for 40+ CIPP installation crews. The goal was to reduce labor and equipment costs, while improving QA/QC.

- Training and certification was deployed company wide and found integral to success.
- Data was managed live by field and project leadership for swift operations adjustments.
- A 7-figure cost reduction was realized in one (1) year through avoidance of liner lifts and reduced boiler run time.



| Online Support

HOW IT WORKS

For a general overview of the VeriCure system operation, features, and benefits to the owner, visit:
<https://vortexcompanies.com/products/cipp-sensors-software/>

VERICURE BEST PRACTICES

Vortex has developed a series of 'Best Practices' videos that address 90% of typical problems or issues a VeriCure owner may encounter:
<https://www.youtube.com/playlist?list=PLFgZnPVtCBSeNeOYr14lOXzOodb58WBN5>



VeriCure® Product Information



Introducing VeriCure®

VeriCure® is a breakthrough curing monitoring system (CMS), built around Fiber-Optic Distributed Temperature Sensing (DTS) technology, designed to improve the CIPP curing process. Its ability to continuously monitor the temperature during the liner installation helps confirm a more complete cure throughout the length of the host pipe. The result is a fully cured, leak-free pipe, rehabilitated with confidence and verified with data. By using VeriCure, installers are able to address potential concerns in real-time.

THE VERICURE ADVANTAGE

- Optical fiber monitors temperature along the entire length of the CIPP liner
- VeriCure software verifies the cure and installation
- Identifies potential issues in real-time
- Achieve full cure in less time
- Reduce labor, equipment, and fuel cost
- Comprehensive real-time and historical data

Cure With Confidence



VeriCure[®]

Curing Monitoring System

CIPP Liner Curing Monitoring System

US patents: US 8,162,535 B2 and US 13,403,393

VERICURE[®] CIPP CURING MONITORING SYSTEM

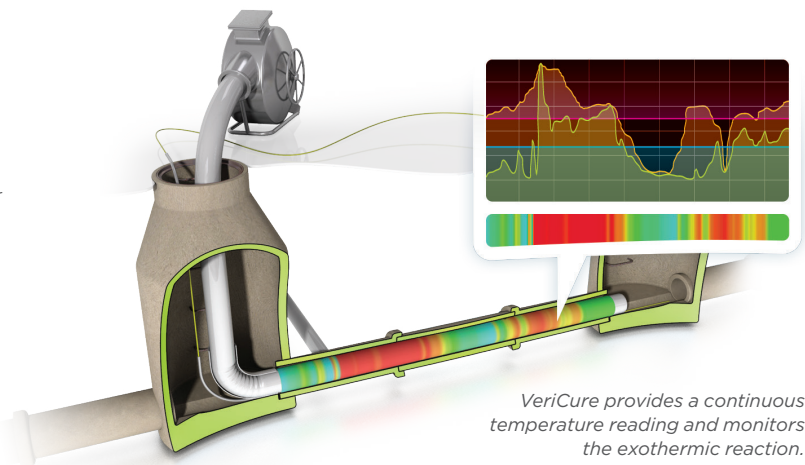
VeriCure[®] is a breakthrough curing monitoring system (CMS), built around Fiber-Optic Distributed Temperature Sensing (DTS) technology, designed to improve the CIPP curing process. Its ability to continuously monitor the temperature during the liner installation helps confirm a more complete cure throughout the length of the host pipe. The result is a fully cured, leak-free pipe, rehabilitated with confidence and verified with data. By using VeriCure, installers are able to address potential concerns in real-time.

A SIMPLE SOLUTION TO A COMPLEX PROBLEM

Easy to use, the VeriCure optical fiber cable runs along the invert of the host pipe (or attached to the crown in pipe 60 in. or greater). Once the CIPP liner has been inverted and inflated inside the pipe, the curing process is initiated. With the optical fiber cable connected to the CMS control unit, the VeriCure software will continuously record the temperature profile along the entire length of the liner. Regardless of the existing flow, VeriCure can provide highly accurate and localized temperature data, increasing the likelihood of a thoroughly cured liner.

The VeriCure Advantage

- Optical fiber monitors temperature along the entire length of the CIPP liner
- VeriCure software verifies the cure and installation
- Identifies potential issues in real-time
- Achieve full cure in less time
- Reduce labor, equipment, and fuel cost
- Comprehensive real-time and historical data



VeriCure provides a continuous temperature reading and monitors the exothermic reaction.

Cure With Confidence

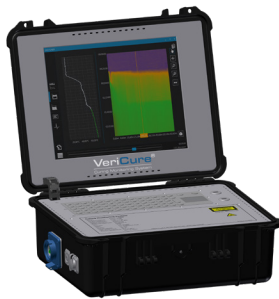
Using VeriCure® with the CIPP lining process is simple while improving the quality and completeness of the installation.

1. Feed the fiber cable into the invert of the pipe
2. Turn on Control Unit prior to inversion and inflation of the liner
3. Enter project parameters into VeriCure software
4. Insert and then invert CIPP liner into pipe
5. Start recording and begin curing
6. Monitor throughout installation and run report for customer at completion

VeriCure software is tailored for CIPP installation professionals. Real-time data viewing allows you to monitor and control the cure for maximum quality and efficiency. VeriCure software also ensures that each zone has met and maintained the proper cure temperature while also monitoring cool down. The final data is summarized in a gradient chart to show temperature change over time.

IMPROVED QUALITY CONTROL, ENVIRONMENTALLY FRIENDLY

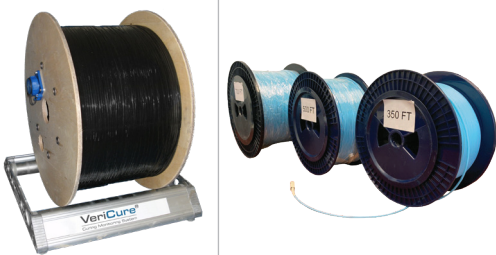
VeriCure reduces the risk of lifts, delamination, over-tensioning, and environmental contamination. The system's ability to constantly monitor temperature conditions results in a thoroughly cured, data validated installation while eliminating costs associated with over-cooking the liner. Not only does this save time, but it also lowers construction site emissions.



PORTABLE VERICURE CONTROL UNIT

Designed for durability and portability, the VeriCure Control System is housed in an industrial-strength, protective pelican case for use in the field and on the VeriCure CMS-1022 features an industrial grade PC and features the following:

- DTS measuring instrument
- VeriCure software package
- Fiberoptic sensor cable connector
- LAN socket
- Energy supply socket



OPTICAL FIBER CABLE

Choose from two options

VeriCure FlatTemp

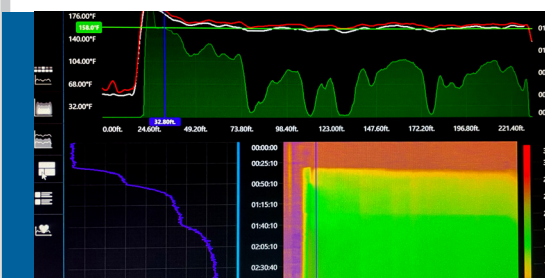
This optical fiber cable features a rectangular profile and contains GFK elements and aramid fibers. Best for short segments or pipe runs of 1,000 ft. or more.

- Available in 6,234 ft. (1900 m) spools

VeriCure RoundTemp

This is an armored, ultra-bendable optical fiber and exhibits exceptional crush resistance and macrobending performance. Best for pipelines with multiple bends.

- Available in spools: 350 ft. (106.7m), 500 ft. (152.4m), 600 ft. (182.9m), 700 ft. (213.4m) and 800 ft. (243.8m)



REPORTS & ANALYTICS

VeriCure's powerful real-time reporting and analytics allow you to view detailed graphs to monitor temperature throughout the entire length of the pipe for both steam and hot water curing applications. These reports also provide validation data detailing the completeness of the cure.

VeriCure[®]

Curing Monitoring System

ACCESSORIES

Product	Order No.	Package
Power supply	AS-1023	1 piece

TECHNICAL DATA OF THE INDUSTRIAL PC (IPC)

- **Display:** 17" Touch display
- **Resolution:** 1280x1024 Pixel
- **CPU:** IntelCore i3
- **Memory:** 4GB
- **HDD:** 120GB SSD
- **Additional Network:** Wireless Lan 300MBit

CELLULAR DATA

Coverage encompasses 470+ carriers in 200 countries including AT&T, T-Mobile, and Sprint in the US.



Portable CMS-1022 Controller with Integrated Industrial PC

DESCRIPTION

Portable VeriCure[®] CMS controller with integrated industrial PC for the spatial resolved measurement of the thermal curing of CIPP liners.

CMS Patent (Curing Monitoring System) of the Vortex Companies.

Patent: EP 2 037 246 A2 in DE, GB, FR, IT, ES, TR, PL, NL, BE, SE, AT, CH, CZ, RO, PT, DK, FI, HU

Patent: US 8,162, 535 B2

Patent: US 13,403,393

TECHNICAL DATA OF THE PORTABLE CONTROLLER

- **Temperature accuracy:** ±2°K
- **Sampling resolution:** 4 in. (0.1m)
- **Spatial resolution:** 3 ft. (1m)
- **Range:** 6,561 ft (2,000m)
- **Laser class:** 1M

GENERAL DATA OF THE PORTABLE CMS CONTROLLER

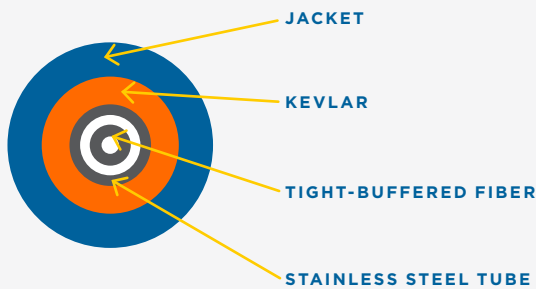
- **Voltage range:** 24VDC
- **Working area:** 32°-104°F (0°- 40°C)
- **Dimensions:** 20.5 x 16.75 x 8.5 in. (52.1x 42.5 x 21.6cm)

CONNECTIONS OF THE PORTABLE CMS CONTROLLER

- **Optical connector:** Screw cap with integrated E2000/APC connector
- **Power supply:** DC main socket
- **Communication:** Wlan
- **Ports:** 2x USB

VeriCure[®]

Curing Monitoring System

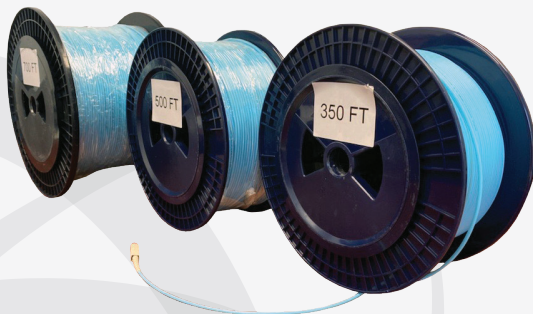


FEATURES AND BENEFITS

- Increased bend radius good for pipes with multiple bends
- Armored sheathing allows for increased bend radius
- High crush resistance
- Flame retardant, meets industry standards
- Soft, flexible, yet extremely durable
- Easy to splice
- Performs well over long lengths

NUMERICAL APERTURE

- 0.200 ± 0.015



US patents: US 8,162,535 B2 and US 13,403,393

VeriCure[®] RoundTemp — Multimode Optical Fiber Cable

DESCRIPTION

VeriCure RoundTemp cable is a multimode, ultra-bendable optical fiber that delivers the best bend radius (macro-bending) performance in the industry. Designed to withstand tight bends and challenging cabling routes, RoundTemp experiences less signal loss than conventional multimode fiber. This allows installers to use multimode optical fiber in a package that is easier to handle and install.

VeriCure RoundTemp cable is armored for maximum strength and durability without sacrificing flexibility or size. It is crush and rodent resistant without being bulky, heavy or messy. This means that it can be used in hazardous areas where more rugged cable is required.

APPLICATION

- Sanitary sewers, force main sewers, storm sewers, potable water lines, process piping, electrical conduits, and ventilation systems
- Round and non-round pipe

PACKAGING

Available in spools, broad range of lengths:

- 350 ft. (106.7m), 500 ft. (152.4m), 600 ft. (182.9m), 700 ft. (213.4m) and 800 ft. (243.8m)

COATING GEOMETRY

- Coating Diameter: 242 ± 5 µm
- Coating-Cladding Concentricity: < 12 µm

GLASS GEOMETRY

- Core Diameter: 50.0 ± 2.5 µm
- Cladding Diameter: 125.0 ± 1.0 µm
- Core-Clad Concentricity: ≤ 1.5 µm
- Cladding Non-Circularity: ≤ 1.0%
- Core Non-Circularity: ≤ 5%



MACROBEND LOSS

MANDREL RADIUS (mm)	NUMBER OF TURNS	INDUCED ATTENUATION (dB)	
		850 nm	1300 nm
37.5	100	≤ 0.05	≤ 0.15
15	2	≤ 0.1	≤ 0.3
7.5	2	≤ 0.2	≤ 0.5

ATTENUATION

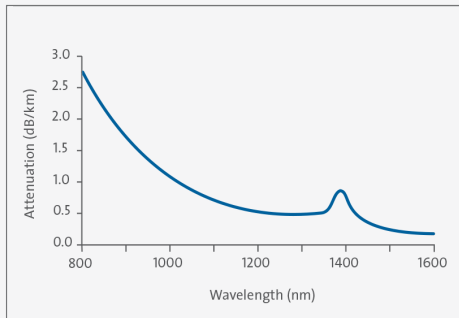
WAVELENGTH	MAXIMUM VALUE (dB/km)
850	≤ 2.3
1300	≤ 0.6

No point discontinuity greater than 0.2 dB. Attenuation at 1380 nm does not exceed the attenuation at 1300 nm by more than 3.0 dB/km.

PROOF TEST

The entire fiber length is subjected to a tensile stress ≥ 100 kpsi (0.7 GN/m²).

SPECTRAL ATTENUATION (TYPICAL FIBER)



BEND PERFORMANCE AND COMPATIBILITY

- Industry-leading macrobending performance below 10 mm radius
- High-performance minEMBc certified bandwidth to support 850 nm transmission at data rates up to 100 Gb/s
- Higher data aggregation in the backbone, riser, and high-speed parallel interconnects (HSPIs)
- Superior measurement technology and manufacturing control
- Industry-leading CPC® coatings for superior microbend and environmental performance

PERFORMANCE CHARACTERIZATIONS

- Refractive Index Difference: 1%
- Effective Group Index of Refraction (N_{eff}):
850 nm: 1.480 | 1300 nm: 1.479
- N_{eff} was empirically derived to the third decimal place using a specific commercially available OTDR
- Fatigue Resistance Parameter (n_f): 20
- Coating Strip Force:
Dry: 0.6 lbs (2.7N)
Wet: 14 days in 73.4°F (23°C) water soak: 0.6 lbs (2.7N)
- Chromatic Dispersion:
Zero Dispersion Wavelength (λ_0): 1295 nm ≤ λ_0 ≤ 1315 nm
- Zero Dispersion Slope (S_0): ≤ 0.101 ps/(nm²•km)

CABLE PARAMETERS

CABLE DIAMETER (Φa) MM	STAINLESS STEEL TUBE DIAMETER (Φb) MM	TIGHT BUFFERED FIBER DIAMETER MM
Φ3.0±0.1	Φ1.4±0.05	Φ0.9

CABLE DIAMETER MM	CABLE WEIGHT KG/KM	TENSILE N SHORT TIME	TENSILE N LONG TIME	CRUSH N/100 MM
Φ3.0±0.1	11.0	450	200	3500

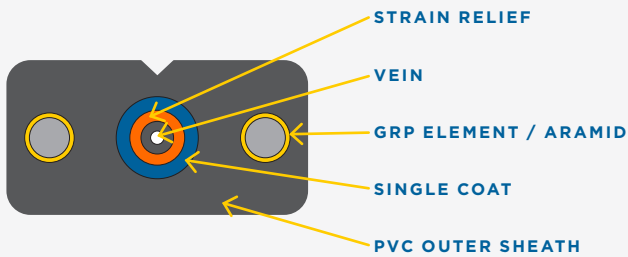
ENVIRONMENTAL

ENVIRONMENTAL TEST	TEST CONDITION	INDUCED ATTENUATION 850 NM & 1300 NM (DB/KM)
Temperature Dependence	-76°F (-60°C) to 185°F (+85°C)	≤ 0.10
Temperature Humidity Cycling	14°F (-10°C) to 185°F (+85°C) and 4% to 98% RH	≤ 0.10
Water Immersion	73.4°F ± 2°F (23°C ± 2°C)	≤ 0.20
Heat Aging	185°F ± 2°F (85°C ± 2°C)	≤ 0.20
Damp Heat	185°F (85°C) at 85% RH	≤ 0.20

Operating Temperature Range: -60°C to + 85°C

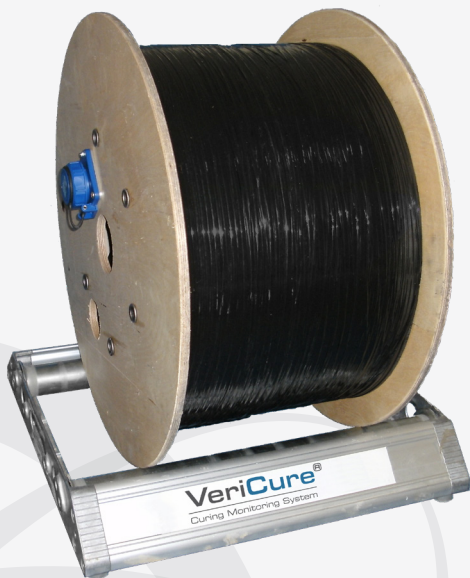
VeriCure[®]

Curing Monitoring System



MECHANICAL PROPERTIES

- **Minimum bend radius: 30mm**
- **Maximum tensile force: 400N**
- **Weight: ca. 28kg/km**
- **Long-term crush resistance max. 400 N / dm**



VeriCure CMS sensor cable with cable roller equipment as accessory.

US patents: US 8,162,535 B2 and US 13,403,393

VeriCure[®] FlatTemp — CMS Optical Temperature Measurement Cable

DESCRIPTION

VeriCure FlatTemp optical fiber cable is our standard cable featuring a rectangular profile that contains GFK elements and aramid fibers. It is halogen-free and possesses exceptional pull force, bend radius and long-term crush properties. FlatTemp's durable PVC outer sheath is also marked with feet and meter indicators for fast and efficient insertion and measurement.

FlatTemp comes in 6,234 ft. spool lengths and is perfect for short segments or pipe runs of 1,000 ft. or more.

APPLICATIONS

- **Sanitary sewers, force main sewers, storm sewers, potable water lines, process piping, electrical conduits, and ventilation systems**
- **Round and non-round pipe**

OPTICAL PROPERTIES

- **Optical loss: Max. 1,5dB/km (1300nm)**
- **Connector (cable drum): Screw cap with integrated E2000/APC connector**

THERMAL PROPERTIES

- **Transport and storage: -13°F — 158°F (-25°C — +70°C)**
- **Installation: 23°F — 122°F (-5°C — +50°C)**
- **Operation: 25°C to + 70°C**
- **Temperature at the outer sheath of the liner: Up to 302°F (+150°C) (measurement of exothermic reactions)**

FLATTEMP CABLE PARTS DESCRIPTION

- **1 drum approx. 6,234 ft. / 1,900 m**

FIRE BEHAVIOR

- **Halogen-free**



CHEMICAL PROPERTIES

- Resistant to oil

CONNECTION CABLE TECHNICAL DATA & ACCESSORIES

- Optical plug: E2000/APC (at both sides)
- Strain relief: Screw connections from both sides
- Protection of connection: Transparent protection tube

FLATTEMP OPTICAL FIBER PROPERTIES

- FO fiber G50 / 125 μm , (according to IEC 60793-2-10 type A1a.1) with optical core diameter 50 μm +/- 2.5 μm and optical jacket, diameter 125 μm +/- 1 μm
- Primary coating in two-layer acrylate structure, diameter 245 μm +/- 10 μm

FLATTEMP OPTICAL FIBER GEOMETRIC PROPERTIES

- Core circularity deviation <5%
- Material circularity deviation <1%
- Core-clad eccentricity <1.5 μm
- Coating eccentricity <10 μm
- SCREEN test 1% elongation for 1 s (corresponds to 100 kpsi or 8.8 N)

FLATTEMP OPTICAL FIBER TRANSMISSION PROPERTIES

Damping:

- At 850 nm max. 3.0 dB / km
- At 1300 nm max. 1.0 dB / km

Bandwidth (Overfilled Launch):

- At 850 nm min. 500 MHz x km
- At 1300 nm min. 500 MHz x km
- Numerical aperture 0.200 +/- 0.015

Macrobending, Induced Damping:

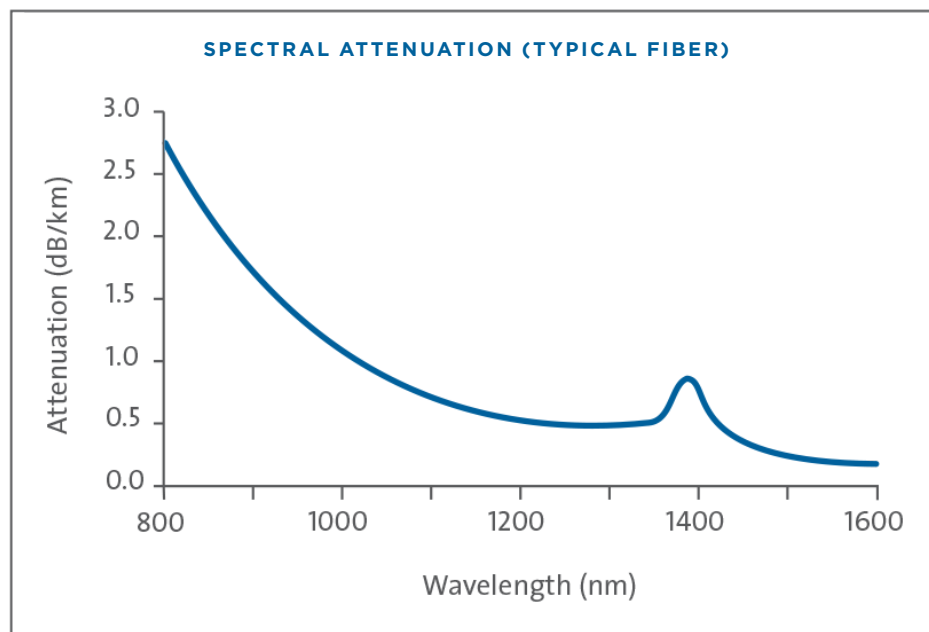
- 100 turns, 37.5 mm </ = 0.05 dB (at 850 nm)
- 100 turns, 37.5 mm </ = 0.15 dB (at 1300 nm)
- 2 turns, 15 mm </ = 0.1 dB (at 850 nm)
- 2 turns, 15 mm </ = 0.3 dB (at 1300 nm)
- 2 turns, 7.5 mm </ = 0.2 dB (at 850 nm)

Group Refractive Index:

- At 850 nm 1.483
- At 1300 nm 1.478

Link Lengths:

- Gigabit Ethernet
- 1000BASE-SX (850 nm) min. 500 m
- 1000BASE-LX (1300 nm) min. 500 m



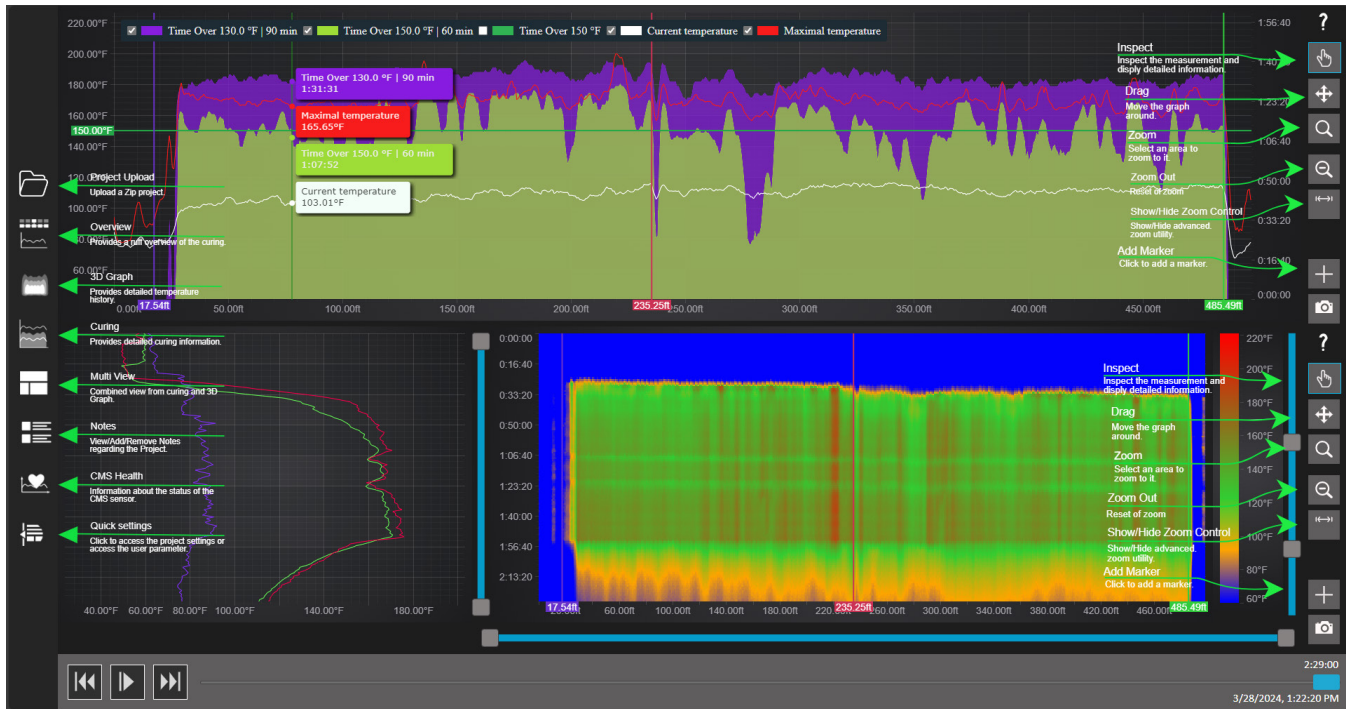
I Deliverables

Deliverables

- **Read Only Software** (see below)
- **Curing Guidelines** (see following page)
- **VeriCure Report** (see following pages)

READ ONLY SOFTWARE LINK

To review the curing process, at a later date, there is a "read only" software link for existing customers: vericure.io



SAMPLE

AOC: L721-LTA POLYESTER RESIN

The following cure procedures are recommended when using the L721-LTA polyester resin in Cured-In-Place Pipe applications.

L721-LTA polyester resin can be cured using either hot water or steam. The recommended post cure temperatures are 180°F±10°F for water cures and 230°F±20°F for steam cures. Maximum exotherm temperatures in the field should be 400°F.

Interface temperatures should be monitored and will typically range from 110°F to 170°F depending on site conditions and liner thickness.

LINER THICKNESS	WATER CURE HOLD TIME	STEAM CURE HOLD TIME	MIN. INTERFACE TEMPERATURE	MINIMUM COOL DOWN
< 10.5 mm	3 hr.	1.5 hr.	130°F	½ hr.
< 10.5 mm	2.5 hr.	1 hr.	150°F	½ hr.
< 10.5 mm	2 hr.	0.5 hr.	180°F	½ hr.
10.5 to 18 mm	3 hr.	2 hr.	130°F	¾ hr.
10.5 to 18 mm	3 hr.	1.5 hr.	150°F	¾ hr.
19.5 to 30 mm	4 hr.	3 hr.	120°F	2 hr.
> 30 mm	5 hr.	4 hr.	110°F	4 hr.

1. Recommended post cure times, interface temperatures, and minimum cool down times are listed in the table above. Note that the shorter cure times can be used in some cases based on achieving a higher interface temperature. For steam cure on liners greater than 400 ft add a minimum of 0.5 hrs. to the corresponding minimum hold time.
2. Additional cure time is also recommended in very cold or very wet conditions.
3. If interface temperatures are low, additional cure time is recommended. If the pipe to be lined contains a bituminous coating, the use of a pre-liner is recommended.
4. **Using the Curing Monitoring System (CMS):** Use the **LOWEST** temperature along the line for post cure temperature. Always install and monitor thermocouple wires at the column and tail end for redundancy in case of a CMS malfunction.
5. The liner shall be cooled to an interface temperature of 110±10°F using the minimum cool down period listed in the table above.
6. **Do not “shock” the liner with dramatically cooler air.** Instead slowly introduce cooler air into the cool down cycle.

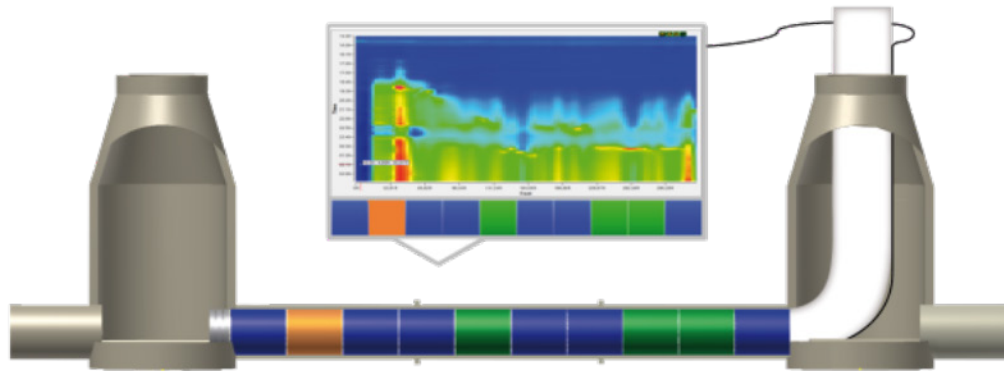
IMPORTANT NOTE: Always use the CMS in cold or wet conditions, when excessive groundwater conditions are present, and with long install lengths. Additional cure time may be required when those conditions exist and when interface temperatures are below the minimums defined above.

THESE ARE INTENDED TO BE MINIMUM GUIDELINES ONLY. FIELD JUDGMENT MUST BE USED IN ALL SITUATIONS INCLUDING THOSE WITH EXCESSIVE GROUNDWATER, SMOOTH WALL PIPE AND LONG INSTALLATION FOOTAGES. CONSULT MANAGEMENT FOR ASSISTANCE IN ANY UNCERTAIN SITUATIONS.

VeriCure[®]

Curing Monitoring System

VeriCure Report



Project

Project name

Application version 2.4.8844.32546

Measured with version 2.4.8844.32546

CMS serial number DE10220140

Project information

General information

Holding	292.248ft.
First measurement	3/27/2024 11:13:54 AM
Last measurement	3/27/2024 2:54:52 PM

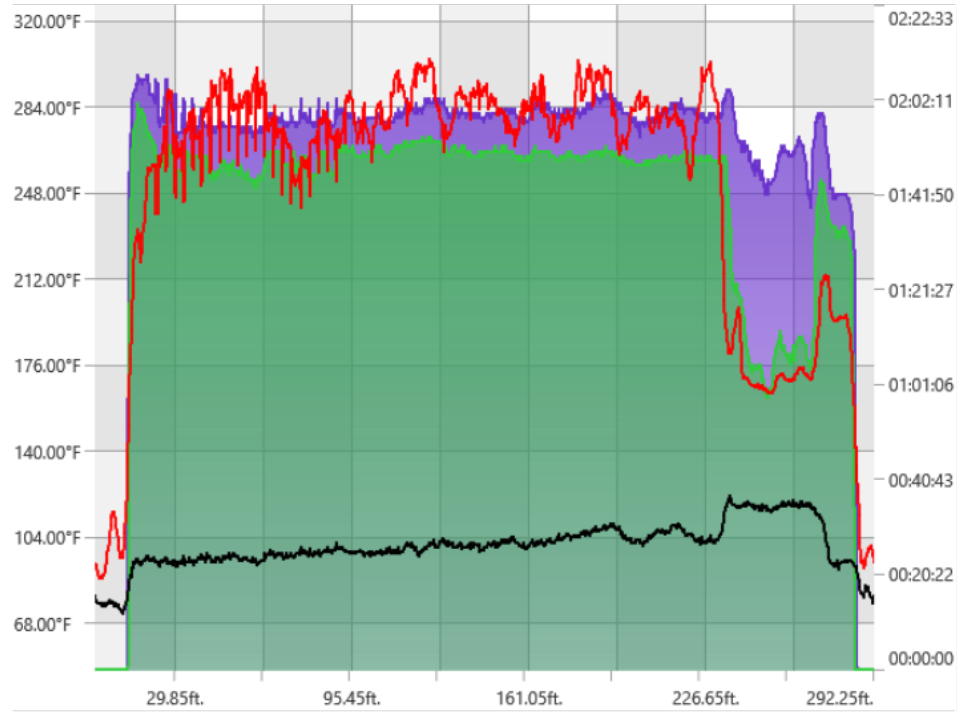
Temperatures

Cure temperature	150.8°F
Overheat temperature	325.4°F
Heatinput	180.0°F, 30min
Heatinput	150.0°F, 60min
Heatinput	130.0°F, 90min

User parameters

Utility	SS
Location of Utility	R/W
Pipe Size	10
Pipe Material	ductile /PVC
Liner Diameter/Thickness	9.75in/6mm
Resin Type	stock fill poly
Method of Cure	steam
Direction of Install	DS
Infiltration	NO/holes in pipe
Monitoring Technician	JR
VeriCure VID#	

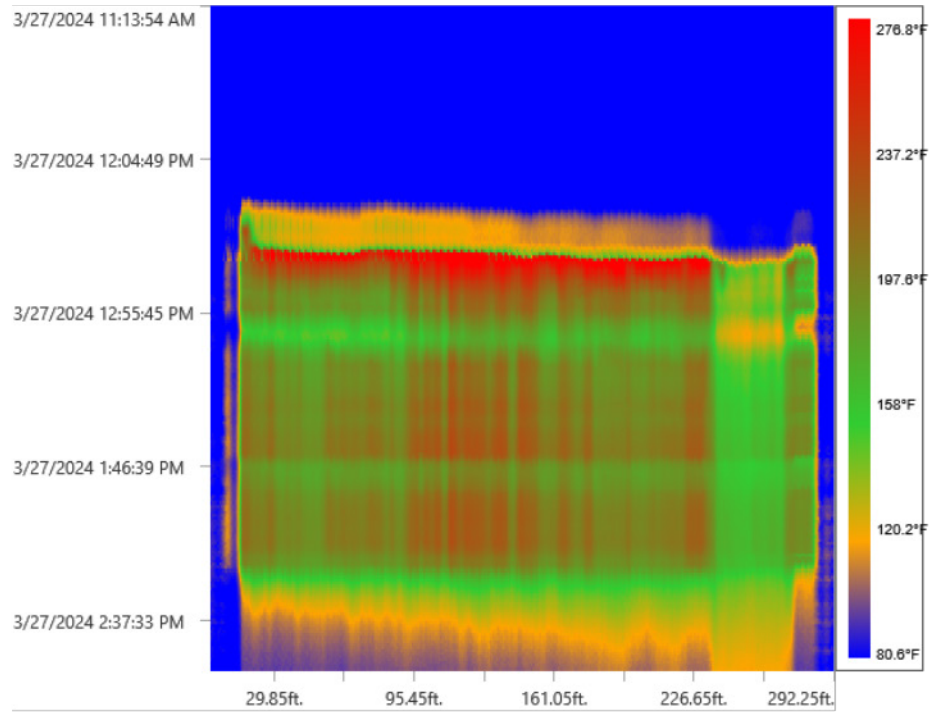
Curing



Legend

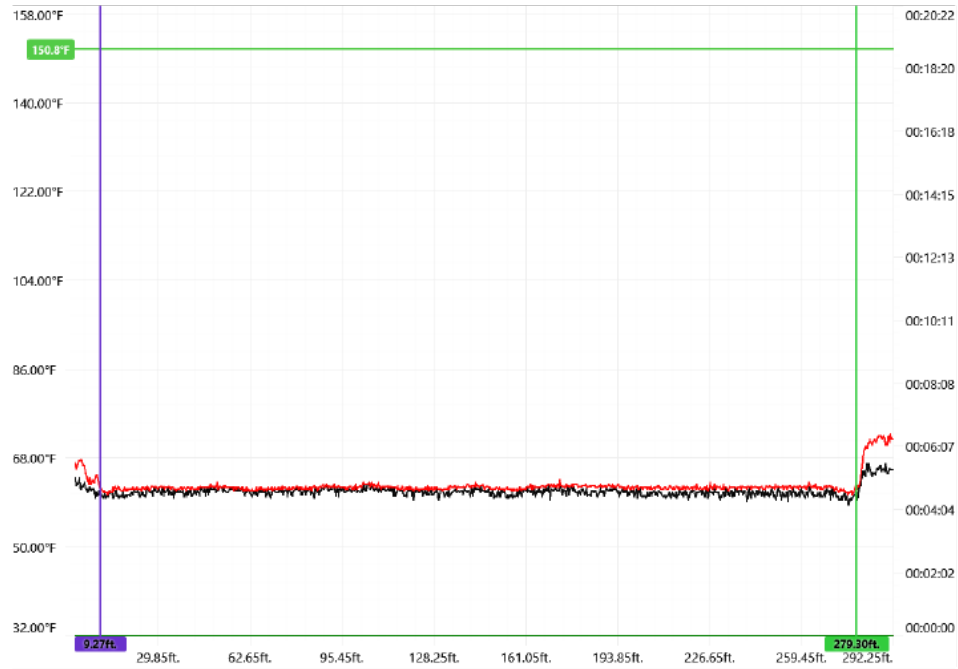
- Time over 130.0°F | 90min
- Time over 150.0°F | 60min
- Time over 180.0°F | 30min
- Time over 147.2°F
- Current temperature
- Maximal temperature

3D Graph



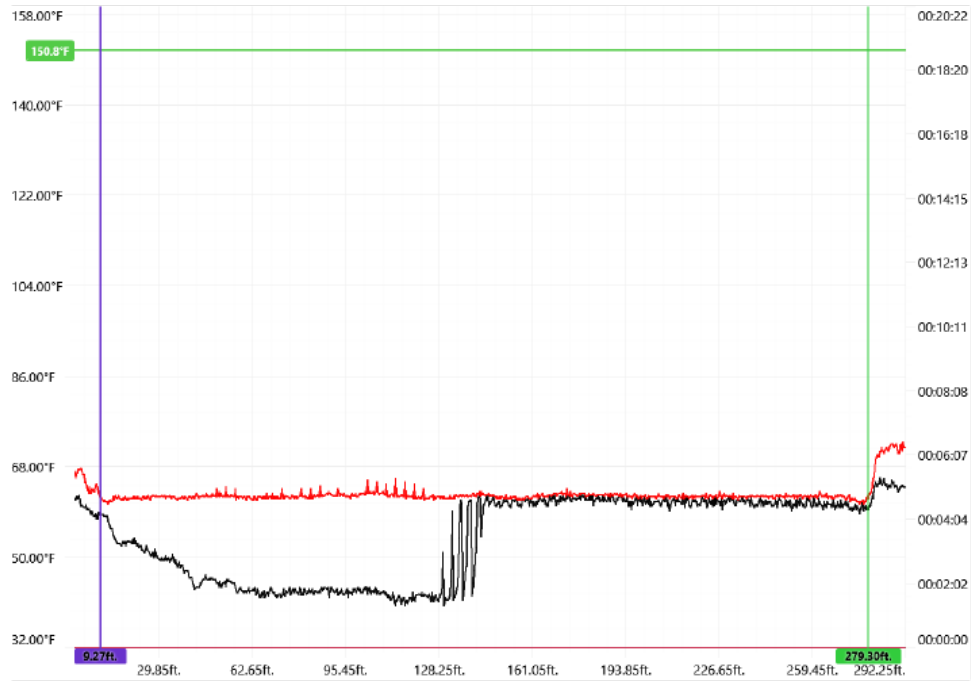
Notes

3/27/2024 11:52:24 AM



start liner inversion

3/27/2024 12:03:38 PM



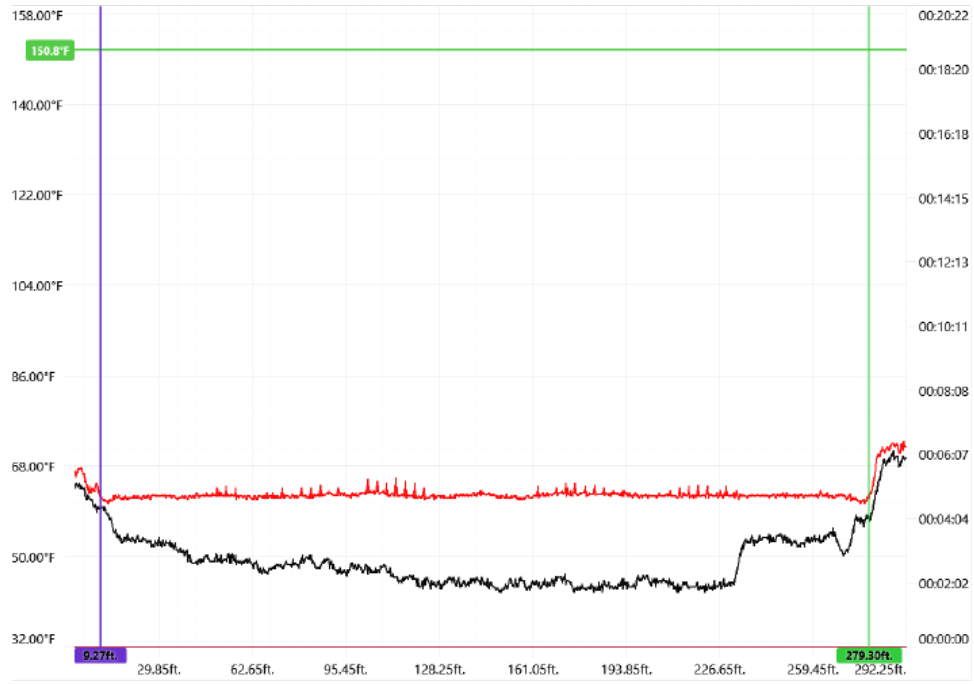
liner halfway installing rope to tail

3/27/2024 12:13:19 PM



liner installed
holding at 10psi

3/27/2024 12:15:47 PM



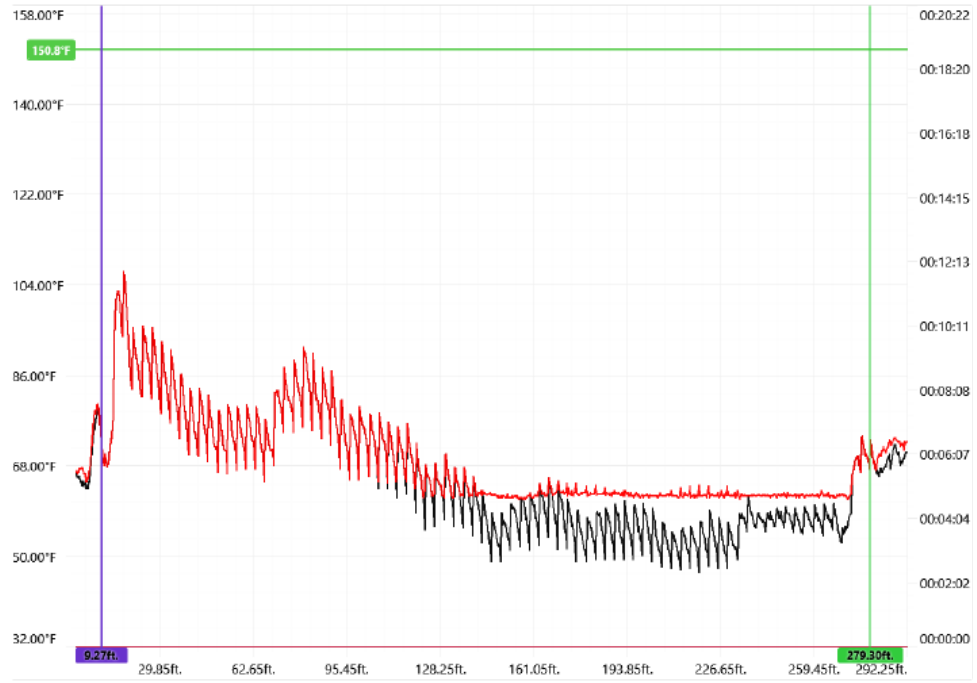
started steam

3/27/2024 12:17:27 PM



steam at b station

3/27/2024 12:19:32 PM



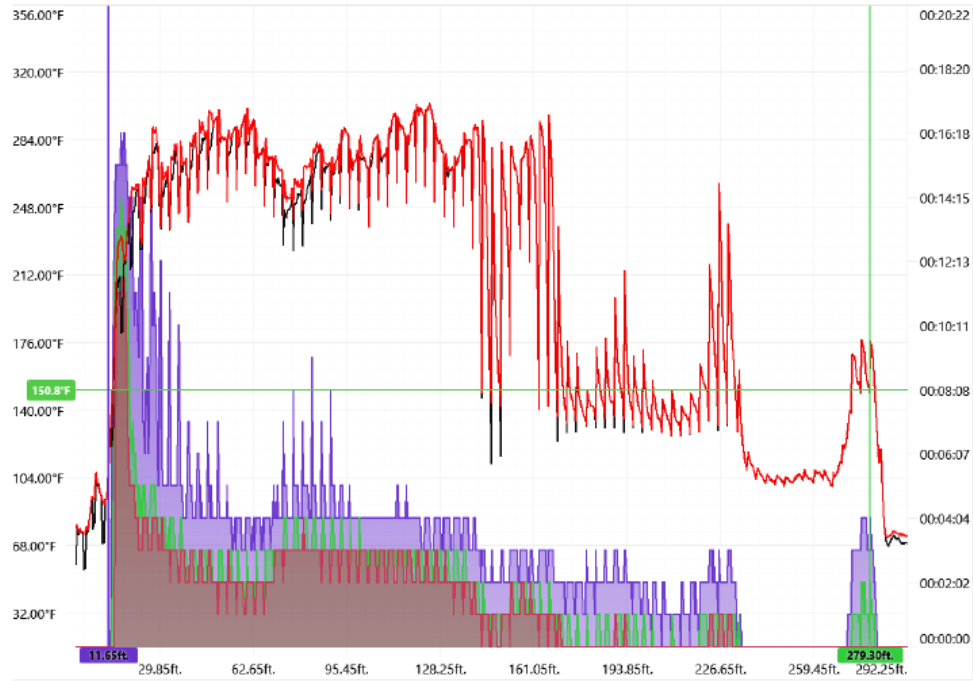
a station 240f
 b station 65f
 holding at 7psi

3/27/2024 12:26:58 PM



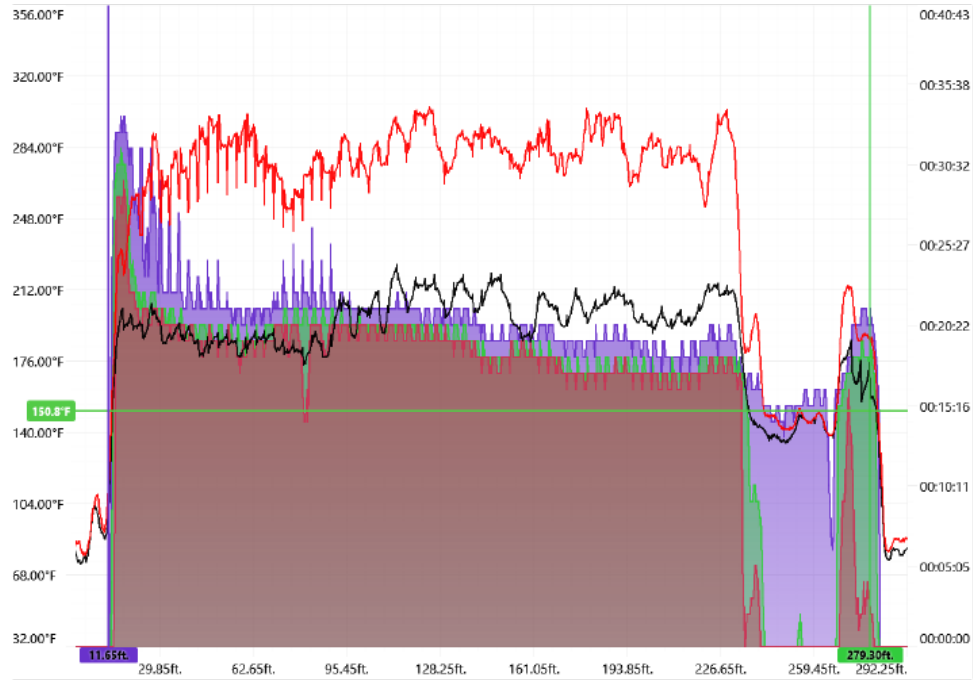
a station 240f
 b station 93f
 psi 7

3/27/2024 12:38:21 PM



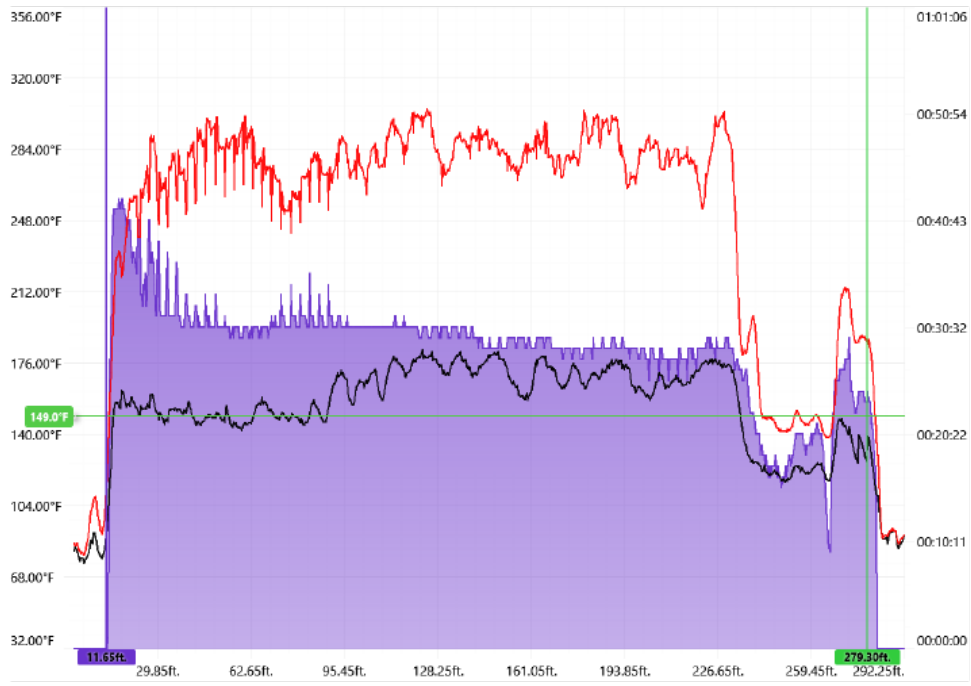
a station 250f
 b station 142f
 psi 7

3/27/2024 12:55:33 PM



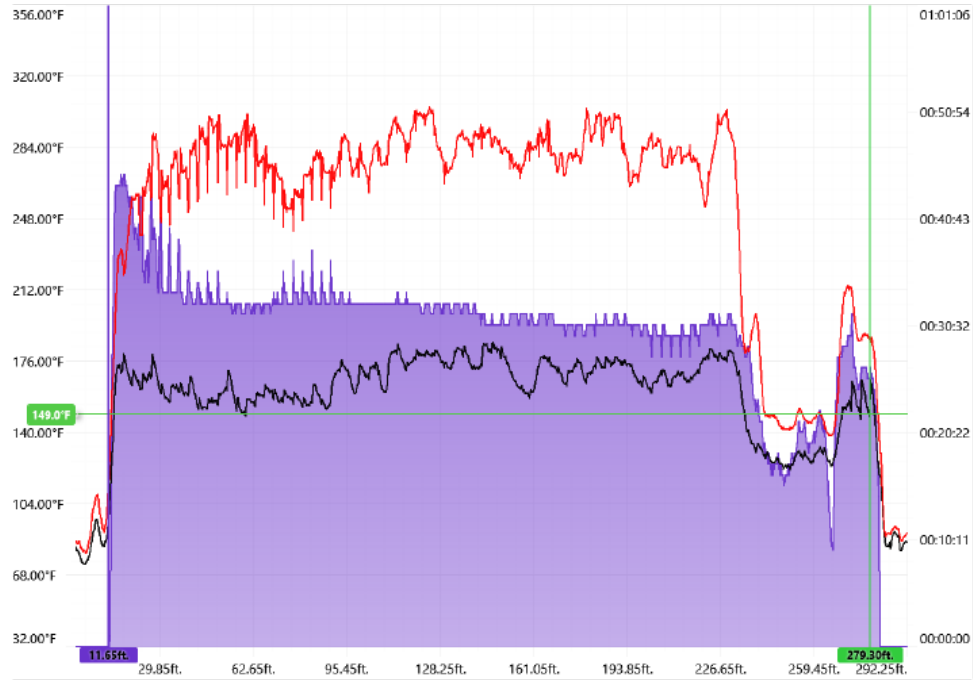
boiler keeps turning off
no steam

3/27/2024 1:05:00 PM



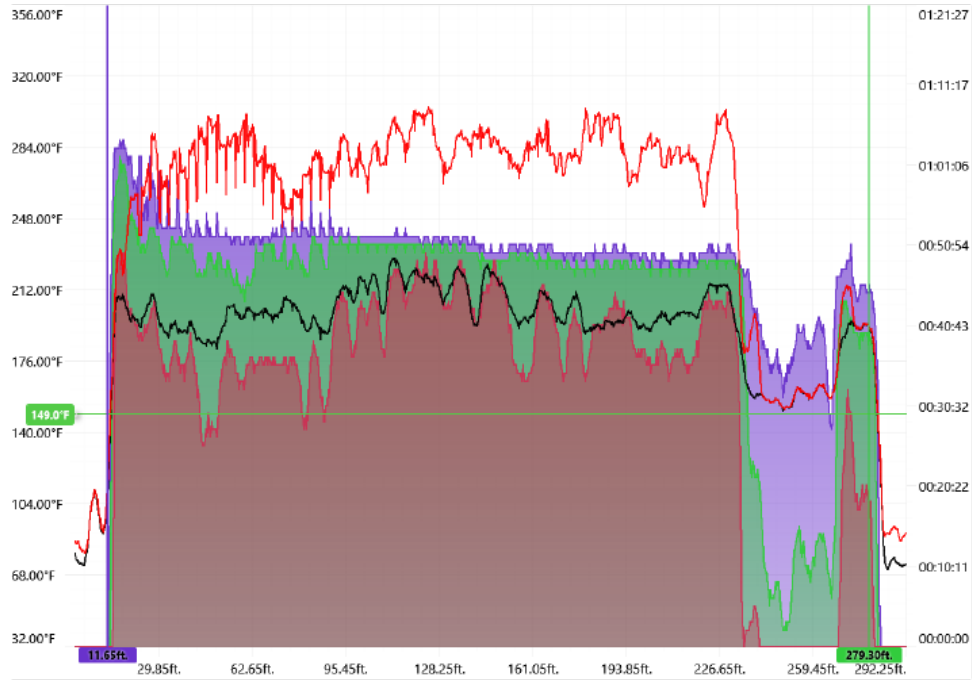
steam started

3/27/2024 1:06:26 PM



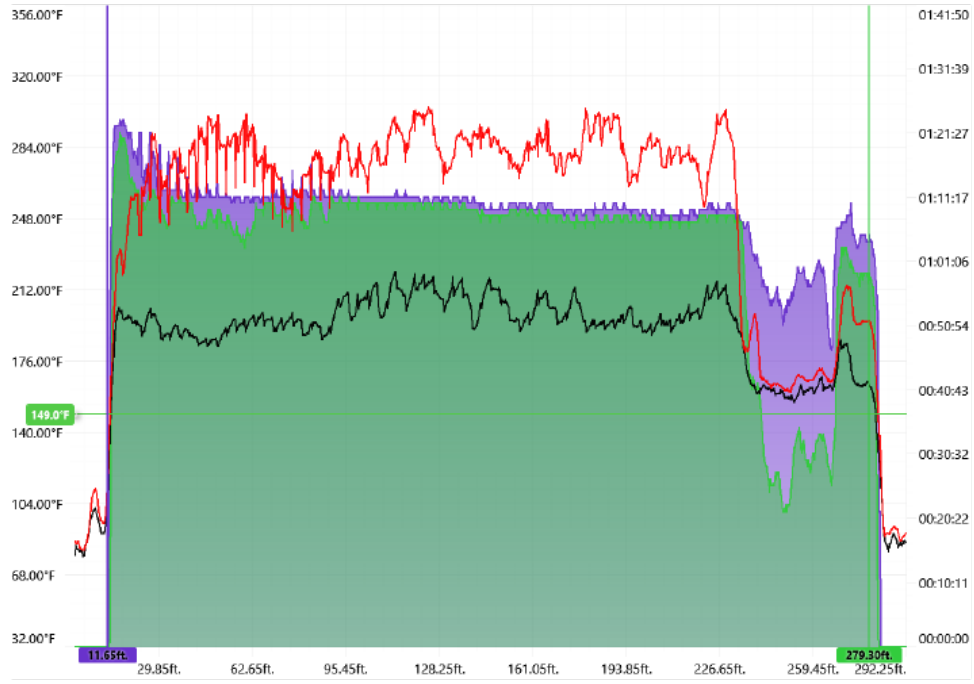
a station 240f
 b station 132f
 psi 7

3/27/2024 1:26:08 PM



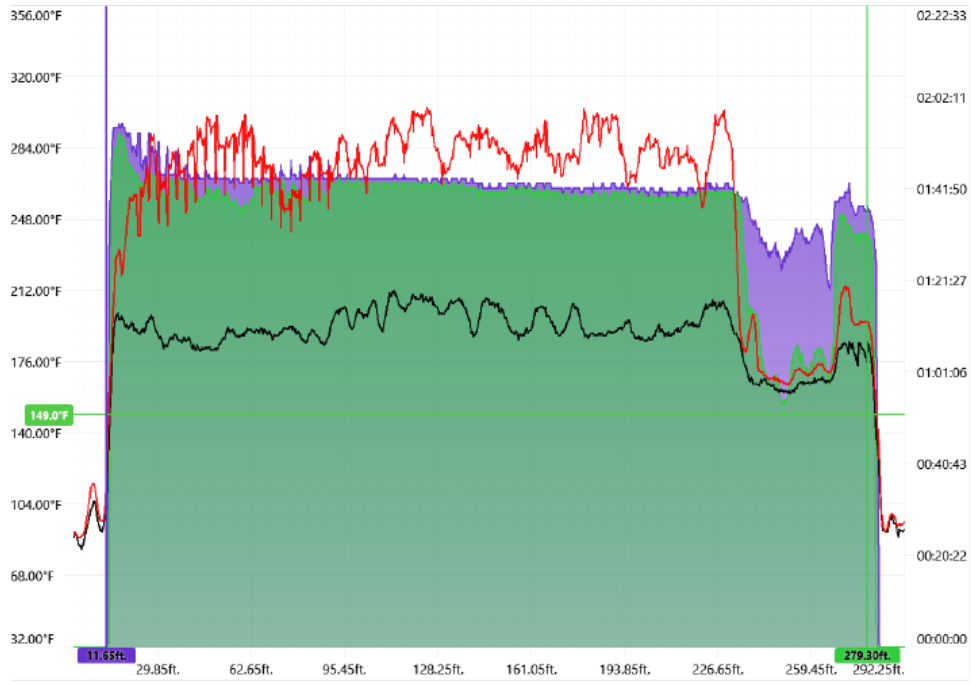
a station 250f
 b station 161f
 psi 7

3/27/2024 1:45:03 PM



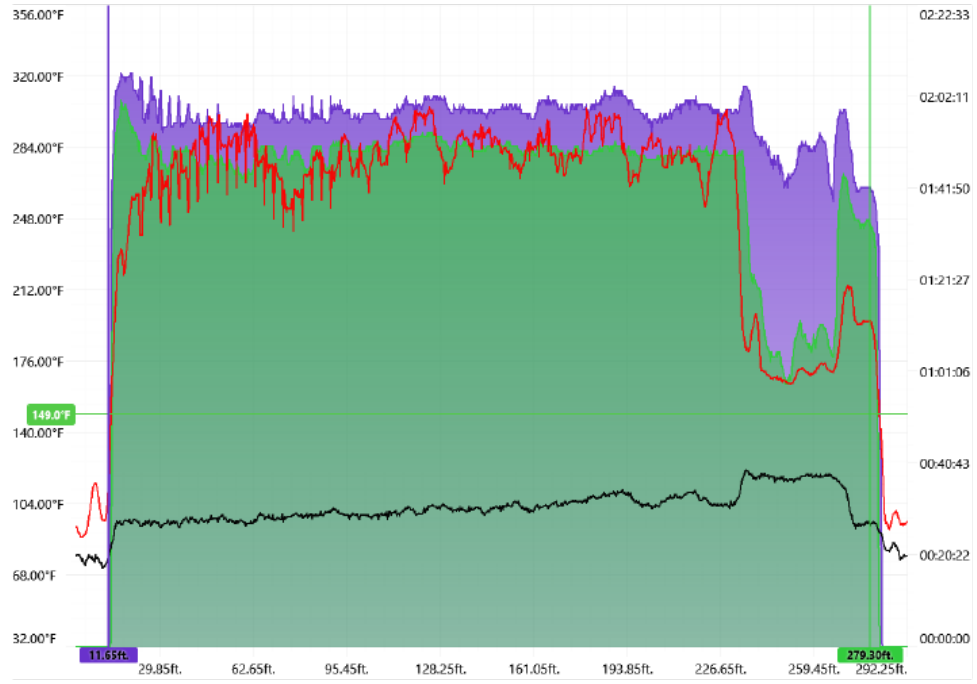
a station 250f
 b station 162f
 psi 7

3/27/2024 2:18:05 PM



starting cool down

3/27/2024 2:54:32 PM



finished

A vertical yellow bar is positioned to the left of the text.

CMS Specification

Curing Monitoring System (CMS) Specifications

1.01 CURING MONITORING SYSTEM (CMS)

- A. All pipes shall utilize a curing monitoring system and a fiber optics sensing cable which allows for the real-time ability to monitor and collect the temperature continuously along the entire length of the liner throughout the installation and curing process.
1. Continuous temperature sensing shall be taken at minimum intervals of every four-inch (4") at a thirty (30) second sampling rate or a maximum interval of twelve-inch (12") at sixty (60) second sampling rate.
 2. Thermal Coupler Sensor(s) shall be placed at access points (i.e. MHs) to be used as a fail-safe should the fiber optic cable be compromised.
 3. The system shall also provide a secure software link application that will allow Owner and Engineer the capability to log in from a computer and/or smartphone to monitor the curing process, remotely in real-time. Output from the system shall provide a read-only deliverable that allows Owner/Engineer to access and view/replay the interactive curing report(s) along with Contractor notes and project information.
 4. CMS, software and fiber optic cable(s) shall be supplied by the CMS manufacturer to ensure compatibility.

NOTE TO SPECIFIER

In submittal section of your specification, include requirement that Contractor provide a password protected weblink to the read-only deliverable and a PDF Report of the CMS results as collected during installation showing that appropriate temperatures were reached and held over proper durations for each installation.

TRAINING & CERTIFICATION PROCESS

Training and certification of the VeriCure® system is paramount to its success. To support all customers Vortex Technologies Group offers a comprehensive training and certification class that provides both in-depth classroom instruction and live field training to ensure complete knowledge and deliverables of the system.

The training course includes pre- and post-testing, hands-on software training, and in-field system operation training. The trainee must pass the certification test to receive a certificate of completion.



WWW.VORTEXCOMPANIES.COM
SALES@VORTEXCOMPANIES.COM

1-855-WHYDIG1
18150 IMPERIAL VALLEY DR.
HOUSTON, TX 77060

