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# OPTICAL GAS IMAGING I THERMOGRAPHY TRAINING

Skilled users of the FLIR GF-Series and legacy GasFindIR cameras can inspect more than 3,000 connections per day in many applications—six times more than inspectors using current sniffer technology. This provides organizations with the most efficient LDAR inspection technology so they can meet many required emission reduction actions, including regulatory oversight like the US EPA OOOOa for the Oil and Gas Industry.

Students in the Optical Gas Imaging Certification course will learn how to set up and operate FLIR optical gas imaging (OGI) cameras to ensure maximum proficiency. They will learn how to optimally adjust their cameras for varying field conditions to find gas leaks and under what environmental parameters gas leaks are most easily found, somewhat easy to find, and difficult to find. With this, students are able to ensure their OGI camera and inspections meet a wide variety of operating envelope challenges, with the ultimate goal of meeting any required work practices or verification checks of the technology.

## OGI I TOPICS INCLUDE:

- All key fundamental concepts of the OGI technology.
- The regulatory framework associated with optical gas imaging.
- How to perform a technology verification check.
- OGI certification and calibration process or requirements.
- Proper operation of a FLIR GF-Series or GasFindIR OGI camera.
- The basics tenets of thermal science.
- What parameters can affect detection with an OGI camera.
- Basic safety practices for performing an OGI inspection.

## ACCREDITATION

The learning objectives, contact hours, and written exam of ITC's courses are based on the requirements outlined by ANSI/ASNT CP-105 of the American Society for Non-Destructive Testing.

- 24 hours (24 ITC certification renewal credits)

## INSTRUCTORS

Infrared courses are developed and taught by ITC's Level III, ASNT Level III, or EPRI Level III Instructors. ITC's domestic and international training staff includes several Level III thermographers certified by ASNT and BINDT with over 100 years combined infrared thermography applications experience. The Level II infrared training courses are taught by certified instructors with extensive experience in a wide variety of infrared thermography and thermal imaging applications.

## SOFTWARE TRAINING

An overview of image analysis and reporting is provided for the latest FLIR software.

## CAMERA TRAINING

Our instructor led training classes cover basic camera operation. We highly recommend viewing one of our free on demand courses for your specific FLIR camera before coming to class. Please visit <http://www.infraredtraining.com> to view available courses.

Please note that on demand courses may not be available for some camera models. If a course is not offered for your camera type, please refer to your user's manual. All manuals and datasheets for FLIR cameras can be found at <http://support.flir.com>. For other vendors please visit the vendor's website.

## TOPICAL OUTLINE

1. Introductions.
2. Certification Overview.
3. Introduction to Optical Gas Imaging.
  - a. Understand how OGI, Method 21, and OOOOa relate.
  - b. Identify the agency within the US Federal Government which has jurisdiction over environmental regulations.
  - c. Identify several approved methods for leak detection.
  - d. Identify EPA mandated records retention rules.
  - e. Learn about EPA requirements for recording leaks that cannot be repaired in the field.
  - f. Learn environmental and infrared parameters critical to meeting the EPA requirements for inspections.
  - g. Learn how different cameras detect different types of gasses.
4. Camera Operation.
  - a. Demonstrate proper operation of FLIR GF series cameras.
  - b. Identify the components inside the camera carrying case.
  - c. Demonstrate how to insert the battery, power on the camera, and set important parameters in the camera.
  - d. Demonstrate the proper performance of a non-uniformity correction (NUC) on the camera.
  - e. Explain the importance of camera focus.
  - f. Describe the camera integration ranges and/or display modes and when to use them.
  - g. Identify what devices are available for storing video from the camera.
  - h. Demonstrate proper lens cleaning techniques.
5. Techniques for Successful Gas Detection.
  - a. Identify some best practices for performing a successful and safe OGI inspection.
  - b. Review the importance of planning and understanding goals, safety requirements, reporting requirements, and environmental conditions.
  - c. Review the importance of understanding which type of gas is leaking.
6. Thermal Science Fundamentals.
  - a. Explain the difference between heat and temperature.
  - b. Identify common heat measurement units.
  - c. Explain the difference between absolute and relative temperature scales.
    - a. Explain why gases change temperature with changes in pressure.
7. Heat Transfer.
  - a. Define heat transfer.
  - b. Explain the difference between Steady State and Transient heat transfer.
  - c. Describe the three modes of heat transfer.
  - d. Identify various thermal patterns.
  - e. Identify a thermal capacitance application.
8. Fundamentals of IR Science.
  - a. Explain the basics of infrared science.
  - b. Describe the process of calibrating the camera.
  - c. Explain how OGI cameras see gas clouds.
  - d. Identify optimum conditions for gas detection.
  - e. Learn how IR radiation interacts with other matter.
  - f. State where infrared energy fits into the electromagnetic spectrum.
  - g. Describe the basic effects of the atmosphere on the transmission of infrared energy.
  - h. Discuss some common OGI wavebands.
9. OGI Applications.
  - a. Describe some common applications of OGI.
  - b. Describe the difference between a properly operating flare and an improperly operating flare.
10. Gas Insulated Switchgear Applications and How to Identify SF<sub>6</sub> leaks.
11. Safety Considerations and Requirements.

## SYLLABUS

Time	Day 1	Day 2	Day 3
0800 – 0830	Class Introductions	Detection	OGI Applications
0830 – 0900			
0900 – 0930	OGI Certification	Thermal Science Fundamentals	
0930 – 1000			
1000 – 1030	Introduction to Optical Gas Imaging	Heat Transfer	Safety
1030 – 1100			
1100 – 1130			
1130 – 1200			
1200 – 1230	Lunch	Lunch	Lunch
1230 – 1300			
1300 – 1330	Camera Setup & Operation	IR Science	Exam
1330 – 1400			
1400 – 1430			
1430 – 1500			
1500 – 1530			
1530 – 1600			
1600 – 1630			
1630 – 1700			