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# LEVEL I THERMOGRAPHY CERTIFICATION TRAINING

Learn everything you need to get started as an infrared thermographer the right way with the Infrared Training Center's Level I certification course, Fundamentals of Infrared Thermography.

In this certification course, you'll learn how infrared cameras make and capture images, how to take accurate temperature measurements with an infrared camera, and all of the foundational science you'll need to get the most out of your camera. Plus, you'll discover how to conduct safe thermographic inspections in a variety of common use cases and create basic reports so you can share your findings with team members, customers, and other stakeholders.

In short, a Level I certification gives you all the tools you need to begin your journey as a safe, capable thermographer, getting the most value out of your investment in infrared cameras and adding tremendous value to your organization or business.

## LEVEL I TOPICS INCLUDE:

- The factors that make thermal images look the way they do and influence temperature measurement accuracy.
- Inspection technique fundamentals, including safety considerations vital to working around energized equipment.
- Infrared image analysis and interpretation techniques.
- The basics of infrared science concepts such as emissivity, reflectivity, heat transfer, and the impact of atmosphere.
- How to use thermography analysis software and create simple, easy-to-understand reports.
- Hands-on exercises that let you get practical experiences of the theoretical concepts taught throughout the week.
- Vital application-specific insights for electrical inspections, mechanical reliability maintenance, building envelope, and roof moisture surveys.

## ACCREDITATION

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

- 32 hours (24 ITC certification renewal credits)
- Building Performance Institute, Inc. has approved this course for 16.5 BPI continuing education units.
- This course is eligible for 16 NETA Continuing Technical Development Credits (CTDs).

## INSTRUCTORS

Infrared courses are developed and taught by the Infrared Training Center's Level III, ASNT Level III, or EPRI Level III Instructors. Our 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 Thermography
  - a. Definition of thermography.
  - b. How it compares to night vision.
  - c. Benefits of thermography and how it can be applied.
  - d. Examples of common applications.
4. Camera Operation
  - a. List the image parameters that cannot be changed in post processing software.
  - b. Discuss the importance of optical focus.
  - c. Discuss the concept of thermal tuning and thermal contrast.
  - d. Understand the camera's measurement range limits.
  - e. Apply common measurement tools.
  - f. Relate image measurement parameters.
  - g. Explain the relationship between object size and distance.
5. 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.
  - d. Demonstrate how to convert between Celsius and Fahrenheit temperature differentials.
6. Heat Transfer
  - a. Define heat transfer.
  - b. Explain the difference between Steady State and Transient heat transfer.
  - c. Identify various thermal patterns.
  - d. Explain wind speed effects on temperature and differentials.
  - e. Identify a thermal capacitance application.
7. Fundamentals of IR Science
  - a. Define qualitative and quantitative thermography.
  - b. Describe the electromagnetic spectrum.
  - c. Identify infrared wave bands with emphasis on usefulness.
  - d. Identify what objects emit infrared energy and how this is affected by temperature.
8. Measurement Techniques
  - a. Camera calibration
  - b. Compensation for effects of the surroundings
    - i. Explain the concept of reflected apparent temperature.
    - ii. Describe the difference between a specular and diffuse reflector.
    - iii. Describe which camera settings correct for atmospheric transmission losses.
  - c. Emissivity
    - i. Discuss how emitted radiation relates to temperature.
    - ii. Demonstrate knowledge and practical ability of how to measure emissivity.
    - iii. List which factors affect emissivity of a target.
  - d. Describe which camera settings correct for atmospheric transmission losses.
9. Overview of Inspection Report Creation
10. Practical Applications of Thermography
  - a. Electrical Applications
  - b. Mechanical Applications
  - c. Building Diagnostics and Home Inspection Applications

## SYLLABUS

| Time        | Day 1                           | Day 2                           | Day 3                         | Day 4              |
|-------------|---------------------------------|---------------------------------|-------------------------------|--------------------|
| 0800 – 0830 | Class Introductions             | Thermal Science<br>Fundamentals | Fundamentals of IR<br>Science | Applications       |
| 0830 – 0900 | Resources and Support           |                                 |                               |                    |
| 0900 – 0930 | Goals and Certification         |                                 |                               |                    |
| 0930 – 1000 | Introduction to<br>Thermography |                                 |                               |                    |
| 1000 – 1030 |                                 |                                 |                               |                    |
| 1030 – 1100 |                                 |                                 |                               |                    |
| 1100 – 1130 |                                 |                                 |                               |                    |
| 1130 – 1200 | <b>Lunch</b>                    | <b>Lunch</b>                    | <b>Lunch</b>                  | <b>Lunch</b>       |
| 1200 – 1230 |                                 |                                 |                               |                    |
| 1230 – 1300 | Camera Operation                | Heat Transfer                   | Measurement Techniques        | Study Guide Review |
| 1300 – 1330 |                                 |                                 |                               |                    |
| 1330 – 1400 |                                 |                                 |                               | Final Exam         |
| 1400 – 1430 |                                 |                                 |                               |                    |
| 1430 – 1500 |                                 |                                 |                               |                    |
| 1500 – 1530 | Labs                            | Labs                            | Labs                          |                    |
| 1530 – 1600 |                                 |                                 |                               |                    |
| 1600 – 1630 |                                 |                                 |                               |                    |
| 1630 – 1700 | Study Guide Review              | Study Guide Review              | Study Guide Review            |                    |