Level I/Category 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/Category I certification course, *Fundamentals of Infrared Thermography*.

In this certification course, you'll learn how infrared cameras create 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/Category 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/Category I Topics Include:

- The factors that make thermal images look the way they do and how these factors influence temperature measurement accuracy.
- Infrared image analysis and interpretation techniques.
- The basics of infrared science concepts such as emissivity, reflected apparent temperature, heat transfer, and the influence of the atmosphere.
- Inspection technique fundamentals, including advice on data collection, how to approach different types of inspections, and important safety considerations.
- What information to include in a report and how to use thermal analysis software to quickly 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, mechanical, and building inspections.

Course Development Standards

The learning objectives, testing, and certification policies are based on ASNT CP-105, ANST SNT-TC-1A, and ISO 18436-7 guidelines.

- 32 hours (24 ITC certification renewal credits).
- Building Performance Institute, Inc. has approved this course for 16.5 BPI continuing education units.
- NETA has approved this course for 16 continuing technical development credits (CTDs).

Please contacting the issuing institution regarding 3rd-party continuing education credits. The Infrared Training Center does not award credits on behave of other institutions.

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.
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. Explain the relationship between object size and distance and the importance of spot size for measurement.
    f. Review some common camera settings, measurement tools, and color palettes.
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 three modes of heat transfer.
    c. Identify the variables involved with conduction heat transfer.
    d. Explain the difference between steady state and transient heat transfer.
    e. Identify conduction and convection thermal patterns.
    f. Explain wind speed effects on temperature measurements.
    g. Discuss heat capacity and specific heat.
7. Fundamentals of IR Science
    a. Discuss why it is necessary to understand IR science when using an infrared camera.
    b. Define qualitative and quantitative thermography.
    c. Describe the electromagnetic spectrum.
    d. Identify some common infrared wavebands.
    e. Understand material surface properties and how these factors can impact the apparent temperature image.
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 the emissivity of a target.
9. Condition Monitoring
    a. Name the conditions for when to use qualitative and quantitative methods.
    b. Understand the importance of fault classification criteria.
    c. Apply given classification criteria to a quantitative result.
    d. Describe the purpose of baseline data.
    e. Define diagnostics and some diagnostic approaches.
    f. Explain the general principles of condition monitoring program design.
10. Reporting
    a. Discuss best practices for report design and content based on ISO 18434-1.
    b. Review image analysis and reporting using FLIR Ignite and Thermal Studio software.

11. Practical Safety
    a. List the basic safety practices for a thermography survey.
    b. Identify Personal Protective Equipment (PPE).
    c. Identify potential jobsite safety hazards.
12. Practical Applications of Thermography
    a. Provide advice for performing electrical, mechanical, and building inspections.
    b. Discuss recommendations for data collection according to ISO 18434-1.
    c. Review several common electrical, mechanical, and building faults.

SYLLABUS

Time	Day 1	Day 2	Day 3	Day 4
0800 – 0830	Introduction and Certification Overview	Thermal Science Fundamentals	Fundamentals of Infrared Science	Condition Monitoring
0830 – 0900				
0900 – 0930	Introduction to Thermography			Reporting
0930 – 1000		Heat Transfer	Measurement Techniques	
1000 – 1030	Camera Operation			
1030 – 1100				Safety
1100 – 1130				
1130 – 1200	Lunch	Lunch	Lunch	Lunch
1200 – 1230				
1230 – 1300	Camera Operation	Heat Transfer	Measurement Techniques	Applications Overview
1300 – 1330				
1330 – 1400		Fundamentals of Infrared Science		
1400 – 1430				Exam Review
1430 – 1500				
1500 – 1530				
1530 – 1600	Camera Labs	Camera Labs	Camera Labs	Final Exam
1600 – 1630				
1630 – 1700	Study Guide Review	Study Guide Review	Study Guide Review	