LEVEL I ELECTRICAL THERMOGRAPHY TRAINING

The Level I Electrical Thermography certification training course is designed for new infrared camera owners and practicing thermographers seeking specialized training on electrical thermographic inspections. The course will provide fundamental training on camera operation, heat transfer, and thermal science, along with applications discussions and examples focused on inspecting commercial electrical systems. Attendees who complete all training course requirements will receive an ITC Level I Infrared Thermography Certification.

TRAINING COURSE BENEFITS

- Introduction to thermal imaging and measurement systems for electrical applications. No experience in thermography is necessary.
- Collect quality data and measure temperatures accurately by compensating for the effects of emissivity, reflected temperature, and other critical parameters.
- Interpret thermal images and make informed decisions by applying heat transfer and measurement concepts learned in class.
- Avoid costly mistakes - learn to distinguish between hot spots and reflections, direct vs. indirect readings and qualitative vs. quantitative thermography.
- Discuss the use of infrared windows, their placement and installation, and how to properly compensate for transmission loss using the cameras and software.
- Review severity criteria used for electrical inspections.
- Discuss the application of thermal imaging for inspecting and diagnosing indoor and outdoor electrical equipment:
    - Approaching a facility inspection; where to start and what to look for.
    - Tools for data acquisition and structuring surveys.
    - How to apply thermal imaging when inspecting switchgear, MCCs, breakers, transformers, bus ducts, conductors, cables, motors, bearings, solar panels, outdoor utilities, and other electrical equipment.
- Review safety considerations when performing electrical inspections.
- Challenge yourself with lab exercises that closely simulate real-world infrared applications.

TUITION

A registration fee of $2,200 USD includes course instruction, course materials, and certification. Please note that prices may vary for courses conducted outside the continental U.S.; please confirm your price with your local ITC course agent.

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.

- 32 hours (24 ITC certification renewal credits)
- This course is eligible for 16 NETA Continuing Technical Development Credits (CTDs).

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 (http://www.irtraining.com) for your specific FLIR camera before coming to class.

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. 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
    e. Define qualitative and quantitative thermography.
    f. Describe the electromagnetic spectrum.
    g. Identify infrared wave bands with emphasis on usefulness.
    h. 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. Severity Criteria for Electrical Inspections
10. Electrical Applications
    a. Facility inspections: where to begin and what to look for.
    b. Discuss complementary technologies for data collection and analysis.
    c. Review indoor and outdoor electrical applications:
        i. Switchgear and MCCs.
        ii. Breakers
        iii. Fused Disconnects
        iv. Bus Ducts
        v. Conductors and Cables
        vi. Transformers
        vii. Motors and Bearings
        viii. Solar Panels
        ix. Outdoor Utilities

11. General and Electrical Safety Advice

SYLLABUS

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