COURSE OVERVIEW FE0987

Thermography Level 2

(SNT-TC-1A)

Course Title

Thermography Level 2: *(SNT-TC-1A)*

Course Date/Venue

Session 1: April 19-23, 2026/Crowne Meeting Room, Crowne Plaza Al Khobar, an IHG Hotel, Al Khobar, KSA

Session 2: November 22-26, 2026/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

3.4 CEUs (34 PDHs) AWARD

Course Reference

FE0987

Course Duration/Credits

Five days (34 hours)/3.4 CEUs/34 PDHs

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course will provide participants the theory lectures and practical training with a preliminary understanding of Thermal/Infrared Testing as per the ASNT Recommended Practice No. SNT-TC-1A for Personnel Qualification and Certification in Nondestructive Testing.

The course will discuss the basic calculations in the three methods of heat transfer covering conduction, convection, and radiation; the Planck's law/curves and radiosity problems comprising of emissivity problems, reflectivity problem and transmissivity problem; the resolution tests and calculations covering IFOV, FOV, MIFOV and MRTD; the simple infrared energy measurement; quantifying the emissivity of the target surface including temperature profiles; and the imager data and accurate images of transient process.

Further, the course will also discuss the equipment selection and operation for imaging from moving vehicles; the hot or cold fluid energy sources, heat lamp, flash lamp energy sources, electromagnetic induction and laser energy sources; the standards requirements for reporting and preparing proper reports efficiently; and the temperature measurements applications, energy loss analysis applications, active applications, filtered applications and transient applications.

Sample Questions for general examinations will be presented in the question booklet A that was obtained from ASNT headquarters. Participants will further demonstrate familiarity with and ability to operate the necessary equipment for Thermal/Infrared Testing, record and analyse the resultant information to the degree required as well as test flawed specimen and component and analyse the results of NDT as part of the practical training.

Course Objectives

Upon the successful completion of the course, each participant will be able to:-

- Get certified as a *"Certified NDT Level II in Thermal/Infrared Testing"*
- Discuss the basic calculations in the three methods of heat transfer covering conduction, convection and radiation
- Explain Planck's law/curves and identify radiosity problems comprising of emissivity problems, reflectivity problem and transmissivity problem
- Carryout resolution tests and calculations covering IFOV, FOV, MIFOV and MRTD
- Illustrate simple infrared energy measurement and quantify the emissivity of the target surface including temperature profiles
- Enhance imager data, produce accurate images and record accurate images of transient process
- Apply equipment selection and operation for imaging from moving vehicles
- Identify hot or cold fluid energy sources, heat lamp, and flash lamp energy sources, electromagnetic induction and laser energy sources
- Apply standard requirements for reporting and prepare proper reports efficiently
- Carryout temperature measurements applications, energy loss analysis applications, active applications, filtered applications and transient applications

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides a wide understanding and deeper appreciation of thermal infrared testing for level I thermographer, plant engineer, quality control personnel, NDT technician and all the personnel in maintenance activities (electrical, mechanical, material testing).

Exam Eligibility & Structure

Exam Candidates shall have the following minimum prerequisites:-

Initial Training & Experience Levels			
Level	Training Hours	Experience	
		Minimum Hours in Method	Total Hours in NDT
I	32	210	400
II - Building Diagnostics	34	1260	1800
II – Electrical and Mechanical	34	1260	1800
II – Materials Testing	34	1260	1800

A person may be qualified directly to NDT Level II with no time as a certified NDT Level I, providing the recommended training and experience consist of the sum of the hours recommended for NDT Level I and Level II.

Examinations Category & Criteria

Vision Examinations

- Near-Vision Acuity
  - This examination should ensure natural or corrected (no pharmacological agents) near-distance acuity in at least one eye such that the applicant is capable of reading a minimum of Jaeger Number 2 or equivalent type and size letter at the distance designated on the chart but not less than 12 inches (30.5 cm) on a standard Jaeger test chart. The ability to perceive an Ortho-Rater minimum of 8 or similar test pattern is also acceptable. This should be administered annually.
  - Pharmacological agents (eye drops) that would improve or enhance visual acuity at any distance shall not be used
- Color Contrast Differentiation
  - This examination should demonstrate the capability of distinguishing and differentiating contrast among colors or shades of gray used in the method as determined by the employer. This should be conducted upon initial certification and at five-year intervals thereafter
  - Vision examinations expire on the last day of the month of expiration

General (Written)

- This General examinations should address the basic principles of the applicable method
- In preparing the examinations, the NDT Level III should select or devise appropriate questions covering the applicable method and techniques described by the employer's written practice and the applicable elements of the outline in ANSI/ANT CP-105
- The minimum number of questions that should be given is 40
- A valid ACCP, ASNT NDT or ASNT 9712 Level II certificate may be accepted as fulfilling the General examination criteria for each applicable method if the NDT Level III has determined that the ASNT examinations meet the requirements of the employer's written practice. This acceptance should be documented

Specific (Written)

- This specific examination should address the equipment, operating procedures and NDT techniques that the individual may encounter during specific assignments described by the employer's written practice and the applicable elements of the outline in ANSI/ASNT CP-105
- The specific examination should also cover the procedures, specifications or codes and acceptance criteria used in the NDT conducted by the employer
- The minimum number of questions that should be given is 20
- A valid ACCP, ASNT NDT, or ASNT 9712 Level II certificate may be accepted as fulfilling the Specific examination criteria for each applicable method if the NDT Level III has determined that the ASNT examinations meet the requirements of the employer's written practice. This acceptance should be documented. If this assessment cannot be accomplished, an employer-administered Specific examination should be completed

Practical

- The candidate should demonstrate familiarity with and ability to operate the necessary NDT equipment, record and analyse the resultant information to the degree required
- At least one flawed specimen or component should be tested and the results of the NDT analysed by the candidate
  - Phased Array Ultrasonic Testing and Time of Flight Diffraction Practical Examination. Flawed samples used for practical examinations should be representative of the components and/or configurations that the candidates would be testing under this technique and approved by the NDT Level III
  - Film Interpretation Limited Certification. The Practical examination should consist of review and grading of a sufficient number of radiographs to demonstrate satisfactory performance to the satisfaction of the NDT Level III. The number of radiographs should be addressed in the employer's written practice
- The description of the specimen, the NDT procedure including checkpoints and the results of the examination should be documented
- Specimens. Proficiency should be demonstrated in performing the applicable NDT technique on one or more flawed specimens as appropriate for the method and approved and documented by the NDT Level III (Grading Key)
- Evaluation. The NDT Level I should evaluate the results to the degree of responsibility as described in the employer's written practice. The candidate should detect all discontinuities and conditions specified and documented by the NDT Level III. The written practice should address the acceptable detection rate as well as the maximum number of false calls acceptable
- Grading. A checklist containing at least 10 different checkpoints requiring an understanding of test variables and the employer's procedural requirements should be included in this Practical examination. While it is normal to score the Practical on a percentile basis (80% required), the Practical examination checklist should also contain a single checkpoint or multiple checkpoints that failure to successfully complete will result in failure of the examination. This requirement should be clearly marked on the checkpoints)
- A valid ACCP or ASNT 9712 Level II certificate may be accepted as fulfilling the Practical examination criteria for each applicable method if the NDT Level III has determined that the ASNT examinations meet the requirements of the employer 's written practice. This acceptance should be documented. If this assessment cannot be accomplished, an employer-administered Practical examination should be completed.
- An example of a Practical examination checklist is attached as Appendix A to this Recommended Practice. The example checklist has been provided as guidance on the development of practical examinations for any method and level.

Additional Criteria

All written examinations will be closed-book except that necessary data such as graphs, tables, specifications, procedures, codes, etc., may be provided during the examination. All questions are approved by the responsible NDT Level III.

Course Certificate(s)

(1) Internationally recognized Competency Certificates will be issued to participants who completed a minimum of 80% of the total tuition hours and successfully passed the exam at the end of the course. Successful candidate will be certified as a "*Certified NDT Level II in Thermal/Infrared Testing*". Qualification Certificate is valid for 5 years.

Recertification is FOC for a Lifetime.

Sample of Certificates

The following are samples of the certificates that will be awarded to course participants:-

Qualification Certificate

Haward Technology Middle East

This is to certify that

Waleed Al Habeeb

has met the established & published Requirements for Certification in accordance with SNT-TC-1A and the company's Written Practice as

NDT Level II

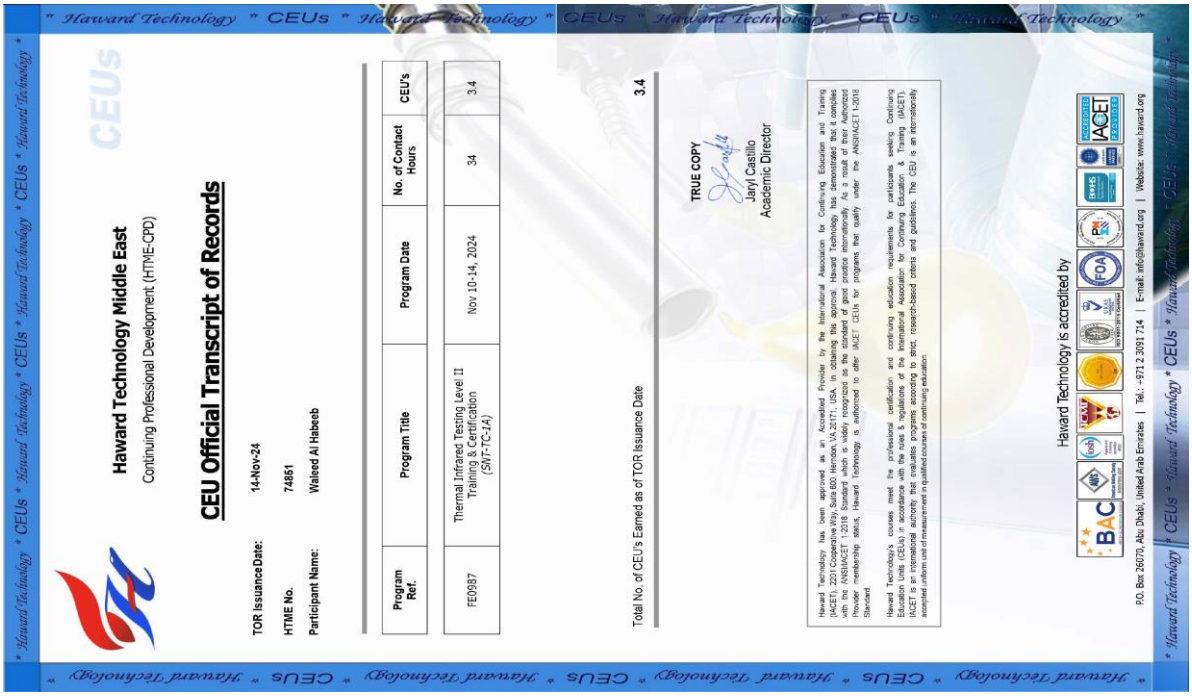
in the following Nondestructive Testing Methods:

Method	Product Form	Certificate No.	Issue Date	Expiry Date
Thermal Infrared Testing Level II	All Forms	74851/01/ FE0987/DXB/14.11.24	11/24	11/29

ASNT Level III Examiner
Mr. Talaat Mohamed (ASNT# 185107)
Signature & Stamp:

Mr. Jaryl Castillo
Academic Director

(2) Official Transcript of Records will be provided to the successful delegates with the equivalent number of ANSI/IACET accredited Continuing Education Units (CEUs) earned during the course



CEU Official Transcript of Records

Haward Technology Middle East
Continuing Professional Development (HTME-CPD)

TOR Issuance Date: 14-Nov-24
HTME No. 74851
Participant Name: Waleed Al Habeeb

Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
FE0987	Thermal Infrared Testing Level II Training & Certification (SNT-TC-1A)	Nov 10-14, 2024	34	3.4

Total No. of CEU's Earned as of TOR Issuance Date 3.4

TRUE COPY
Jaryl Castillo
Academic Director

Haward Technology has been approved as an Accredited Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way Suite 600 Herndon, VA 20171, USA. In obtaining this approval, Haward Technology has demonstrated that it complies with the ANSI/IACET 1-2018 Standard which is widely recognized as the standard of good practice internationally. As a result of their Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for programs that qualify under the ANSI/IACET 1-2018 Standard.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking Continuing Education Units (CEUs) in accordance with the rules & regulations of the International Association for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted standard of measurement of qualified participation in continuing education.

Haward Technology is accredited by

P.O. Box 26070, Abu Dhabi, United Arab Emirates | Tel.: +971 2 3091 714 | E-mail: info@haward.org | Website: www.haward.org

Certificate Accreditations

Haward's certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.4 CEUs** (Continuing Education Units) or **34 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Course Fee

US$ 8,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Mr. Luis Lopez is a **Senior Inspection Engineer** with extensive experience within the **Oil & Gas**, **Petrochemical** and **Refinery** industries. His expertise widely covers in the areas of **Thermography**, **Thermal Infrared** Testing, **Radiographic Film** Interpretation, **Visual** Testing, **Phased Array Ultrasonic** Testing, **Ultrasonic** Testing, **Magnetic Particle** Testing, **Liquid Penetrant** Testing, **Non-destructive Testing**, **NDT** Methods & Applications, **Electromagnetic** Testing, **Hydrostatic Leak** Testing, **Eddy Current** Testing, **Valve Inspection & Testing**, Codes & Standards Interpretation, **Corrosion** Engineering, **Corrosion & Metallurgy**, **Welding & Corrosion** Engineering, **Welding** Metrology, International Welding Codes, Practical **Welding** Technology, Plastic Pipe Welding, **Welding** Inspection, **Welding** Defects Analysis, **Welding** Joints & Coating Inspection, Post Weld Heat Treatment, Hardness Testing, **Welding** Electrodes Monitoring & Control, **Pipe** Testing, **Piping** System, **Steel** Structures, Metals Casting, Crane Functional Testing & Load Testing, **Hydrotesting**, **Pressure Testing** Procedure, **Pressure Equipment** Calibration, Stream Inspection, **Corrosion** Evaluation, **Casting** Products Inspection and Raw Materials Inspection. He is currently the **Senior NDT Instructor** of **SETE** wherein he is deeply involved in thermography, NDT qualification and certification of personnel.

During his career life, Mr. Lopez gained his practical and field experience through his various significant positions and dedication as the **Technical Manager**, **NDT Instructor**, **NDT Manager & Instructor**, **NDT Inspector**, **NDT Offshore Inspector & Quality Control**, **Phased Array Ultrasonic Technician** and **Radiographic Testing Technician** for various international companies such as the JP Inspections, Nova Inspection, NSD Services, Cotemar, UNISPEC Inspection and Ruiver.

Mr. Lopez holds a **Diploma** in **Professional Mechanical & Electrical Technician**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership and Management** (**ILM**), a **Certified ASNT-NDT Level III Inspector** in Infrared & Thermal Testing (**IR**), Liquid Penetrant Testing (**PT**), Magnetic Particle Testing (**MT**), Ultrasonic Testing (**UT**), Visual Testing (**VT**), Radiography Testing (**RT**), Leak Testing (**LT**), Electromagnetic Testing (**ET**), Certified Welding Inspection & Metallurgy Professional (**API 577**) and a **Certified AWS-CWI Welding Inspector**. He has further delivered numerous trainings, courses, workshops, seminars and conferences internationally.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Basic Calculations in the Three Modes of Heat Transfer*** *Conduction – Principles & Elementary Calculation • Convection - Principles & Elementary Calculation • Radiation - Principles & Elementary Calculation*
0930 – 0945	*Break*
0945 – 1200	***The Infrared Spectrum*** *Planck's Law/Curves*
1200 – 1300	*Lunch*
1300 – 1400	***Radiosity Problems*** *Blackbodies – Theory & Concepts • Emissivity Problems • Calculation of Emissivity, Reflectivity, & Transmissivity • Reflectivity Problem • Transmissivity Problem*
1400 – 1500	***Resolution Tests & Calculations*** *IFOV, FOV, & MIFOV Measurements & Calculations • MRTD Measurements & Calculations • Slit Response Function – Measurements, Calculations, Interpretations, & Comparisons*
1500 – 1515	*Break*
1515 – 1650	***Resolution Tests & Calculations*** *(cont'd)* *Resolution versus Lens & Distance • Dynamic Range • Data Acquisition Rate/Data Density • Frame Rate & Field Rate • Image Data Density*
1650 – 1700	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1700	*End of Day One*

Day 2

0730 – 0930	***Operating for Infrared Measurements (Quantification)*** *Simple Infrared Energy Measurement • Quantifying the Emissivity of the Target Surface*
0930 – 0945	*Break*
0945 – 1200	***Operating for Infrared Measurements (Quantification) (cont'd)*** *Quantifying Temperature Profiles • Computer Processing to Enhance Imager Data*
1200 – 1300	*Lunch*
1300 – 1400	***Operating for High-Speed Data Collection*** *Producing Accurate Images of Transient Processes • Recording Accurate Images of Transient Process*
1400 – 1500	***Operating for High-Speed Data Collection (cont'd)*** *Equipment Selection & Operation for Imaging from Moving Vehicles*
1500 – 1515	*Break*
1515 – 1650	***Operating Special Equipment for "Active" Technique*** *Hot or Cold Fluid Energy Sources • Heat Lamp Energy Sources • Flash Lamp Energy Sources*
1650 – 1700	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1700	*End of Day Two*

Day 3

0730 – 0930	***Operating Special Equipment For "Active" Technique (cont'd)*** *Electromagnetic Induction • Laser Energy Sources*
0930 – 0945	*Break*
0945 – 1200	***Report & Documentation*** *Standardization Requirements & Records*
1200 – 1300	*Lunch*
1300 – 1400	***Report & Documentation (cont'd)*** *Report Data Requirements • Preparing Reports*
1400 – 1500	***Temperature Measurements Applications*** *Isotherms/Alarms Levels - Personnel Safety Audits, etc.*
1500 – 1515	*Break*
1515 – 1650	***Temperature Measurements Applications (cont'd)*** *Profiles*
1650 – 1700	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1700	*End of Day Three*

Day 4

0730 – 0930	***Energy Loss Analysis Applications*** *Conduction Losses through Envelops*
0930 – 0945	*Break*
0945 – 1200	***Energy Loss Analysis Applications (cont'd)*** *Mass – Transfer Heat Exchange (Air or Other Flows into or Out of the System)*
1200 – 1300	*Lunch*
1300 – 1400	***"Active" Applications*** *Insulation Flaws • Delamination of Composites*
1400 – 1500	***"Active" Applications (cont'd)*** *Bond Quality of Coatings • Location of High Heat-Capacity Components*
1500 – 1515	*Break*
1515 - 1650	***Filtered Applications*** *Sunlight • Furnace Interiors*
1650 - 1700	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1700	*End of Day Four*

Day 5: Friday, 13th of February 2026

0730 – 0845	***Filtered Applications (cont'd)*** *Semitransparent Targets*
0845 – 0900	*Break*
0900 – 1000	***Transient Applications*** *Imaging a Rapidly Moving Process*
1000 - 1115	***Transient Applications (cont'd)*** *Imaging from a Vehicle*
1115 – 1215	*Lunch*
1215 – 1415	***Theoretical Examination***
1415 – 1430	*Break*
1430 – 1530	***Theoretical Examination (cont'd)***
1530 – 1630	***Practical Examination***
1630 – 1645	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1645 – 1700	*Presentation of Course Certificates*
1700	*End of Course*

Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the state-of-the-art "FLIR TG165-X Thermal Camera" and our specifically designed flawed specimen test components.

FLIR

MSX® THERMAL CAMERA

FLIR TG165-X™

The FLIR TG165-X dramatically reduces inspection and diagnostic time by helping you visually pinpoint the source of electrical, mechanical, and HVAC/R system faults. Instead of searching for temperature anomalies with a single-spot IR thermometer, this non-contact temperature measurement and imaging tool displays a thermal picture of your target including any hot spots or cold zones that could indicate a problem. See wires or components clearly and even read labels thanks to FLIR patented MSX image enhancement, which adds visual details to full thermal images. The bullseye laser helps ensure you're always targeting the right component for measurement while the drop-tested, portable design with easy-to-use buttons and settings help you complete the job quickly and stress-free. With internal storage for up to 50,000 images and rechargeable Li-ion battery, the FLIR TG165-X is ready to go right out of the box.

PINPOINT THE SOURCE OF SYSTEM FAILURES

Troubleshoot electrical, mechanical, and building issues with this handheld thermal imager

- See temperature anomalies immediately in the thermal image instead of searching for them with a single-spot IR thermometer
- Speed inspections with a thermal view that tells you instantly whether a target has overheating components or hidden air leaks
- Measure a wide range of temperatures, from -25°C to 300°C (-13°F to 572°F), with an accuracy of up to ±1.5°C (±3°F)

COMPLETE INSPECTIONS QUICKLY & EASILY

See the detail needed to troubleshoot faults and gauge their severity

- Interpret images faster and easier with MSX® two-camera technology, which enhances thermal images with crisp visual details
- Identify the exact area that you're measuring using the bullseye laser pointer
- Capture thermal MSX or visual images plus temperature readings with a simple trigger-pull
- Demonstrate the problem was found and corrected with recorded before-and-after images

WORK WITH CONFIDENCE

Take the TG165-X anywhere thanks to its portable design and protective IP54 enclosure

- Work safely and worry-free knowing that the thermal imager can withstand a 2-meter drop
- See into dark or hard-to-reach areas with the bright LED worklight
- Easily view live thermal or recorded images on 2.4-in. display
- Rely on the security of the world-class FLIR 2-10 warranty

Thermal Camera

Flawed Specimen Test Components

Course Coordinator
Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org