COURSE OVERVIEW FE0790
Radiographic Testing Level I Training & Certification
(ASNT, SNT-TC-1A)

Course Title
Radiographic Testing Level I Training & Certification (*ASNT, SNT-TC-1A)*

Course Date/Venue
Session 1: April 13-17, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
Session 2: October 06-10, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
FE0790

Course Duration/Credits
Five days (40 hours)/4.0 CEUs/40 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 equipment.

This course is designed to provide participants the theory lectures and practical training with a preliminary understanding of Radiography Testing (RT) as per the ASNT Recommended Practice No. SNT-TC-1A for Personnel Qualification and Certification in Non-destructive Testing.

This course covers the basic radiology physics and the industrial radiography; the fundamental properties of matter, radioactive materials and the various types of radiation; the interaction of radiation with matter, exposure devices and radiation sources; the radiological safety principles covering controlling personnel exposure, time, distance, shielding concepts, ALARA concept, radiation-detection equipment and exposure-device operating characteristics; and the radiographic technique and the process of radiography.

During this interactive course, participants will learn the basic principles of radiography including geometric exposure principles, radiographic screens, radiographic cassettes, composition of industrial radiographic film and the 'heel effect' with x-ray tubes; the radiographs and radiographic image quality; the proper film handling, loading and processing; and the various exposure techniques and fluoroscopic techniques in radiography.

Sample Questions for general examinations are presented in the separate question booklets that can be obtained from ASNT International Service Center. Participants will further demonstrate familiarity with and ability to operate the necessary equipment for RT, 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.

At the completion of the course, participants will be appearing for a Level I exam. Each candidate will be a 'Certified ASNT NDT Level I in Radiographic Testing' upon successfully passing the examination with a minimum passing composite grade of at least 80 percent (%).

Course Objectives

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

- Get certified as a *"Certified ASNT NDT Level I in Radiographic Testing"*
- Perform specific calibrations, specific non-destructive testing (NDT) and specific evaluations properly for acceptance or rejection determinations according to written instructions and record results
- Discuss the basic radiographic physics and define industrial radiography
- Identify the fundamental properties of matter, radioactive materials and the various types of radiation
- Recognize interaction of radiation with matter, exposure devices and radiation sources
- Review radiological safety principles covering controlling personnel exposure, time, distance, shielding concepts, ALARA concept, radiation-detection equipment and exposure-device operating characteristics
- Employ radiographic technique and the process of radiography
- Explain the basic principles of radiography including geometric exposure principles, radiographic screens, radiographic cassettes, composition of industrial radiographic film and the 'heel effect' with x-ray tubes
- Describe radiographs and radiographic image quality as well as perform proper film handling, loading and processing
- Carryout various exposure techniques and fluoroscopic techniques in radiography

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 an overview of all significant aspects and considerations of radiographic testing in accordance with the ASNT international standard for all engineers and other technical staff working in the field of welding technology and quality assurance of welded joints using radiographic testing and in order to investigate material with such technique.

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.

Exam Eligibility & Structure

Exam candidates shall have the following minimum pre-requisites:-

Initial Training & Experience Levels			
Level	**Training Hours**	**Minimum Hours in RT Method**	**Total Hours in NDT**
I	40	210	400
II	40	630	1200

The experience shall consist of time at NDT Level I or equivalent. If a person is being qualified directly to NDT Level II with no time at NDT Level I, the experience (both Method and Total NDT) shall consist of the sum of the hours for NDT Level I and Level II and the training shall consist of the sum of the hours for NDT Level I and Level II.

Examinations Category & Criteria

Vision Examinations

- Near-Vision Acuity
    - This examination will ensure natural or corrected 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 than12 inches (30.5 cm) or a standard Jaeger test chart. The ability to perceive an Ortho-Rater minimum of 8 or similar test pattern is also acceptable. This examination shall be administered annually.
- Color Contrast Differentiation
    - This examination will demonstrate the capability of distinguishing and differentiating contrast among colors or shades of gray used in the method as determined by the employer. This shall be conducted upon initial certification and at five-year intervals thereafter

General (Written)

- This examination will address the basic principles of the applicable method
- The NDT Level III will provide appropriate questions covering the applicable method to the degree required by the employer's written practice
- The minimum number of examination questions that will be given is 40

Specific (Written)

- This examination will address the equipment, operating procedures and NDT techniques that the individual may encounter during specific assignments to the degree required by the employer's written practice
- The specific examination will also cover the specifications or codes and acceptance criteria used in the employer's NDT procedures
- The minimum number of examination questions that will be given is 20

Practical

- The candidate shall 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 shall be tested and the results of the NDT analysed by the candidate
- The description of the specimen, the NDT procedure including check points and the results of the examination shall be documented
- Proficiency shall be demonstrated in performing the applicable NDT technique on one or more specimens or machine problems approved by the NDT Level III and in evaluating the results to the degree of responsibility as described in the employer's written practice. At least ten (10) different checkpoints requiring an understanding of test variables and the employer's procedural requirements will be included. The candidate shall detect all discontinuities and conditions specified by the NDT Level III

  Note: While it is normal to score the practical on a percentile basis, practical examinations will contain check points that failure to successfully complete will result in failure of the examination

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 Fee

US$ 6,000 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day

Accommodation

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

Qualification Certificate(s)

(1) Internationally recognized Qualification Certificates will be issued to participants who have successfully completed the course and passed the exam at the end of the course. Successful candidate will be certified as a *"Certified ASNT NDT Level I in Radiographic Testing"*. Qualification Certificate is valid for 5 years.

Sample of Certificates

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

Qualification Certificate

Haward Technology Middle East

الشركة السعودية للكهرباء
Saudi Electricity Company

This is to certify that

Ahmed Al-Hajri

has met the established & published Requirements for Certification by ASNT in accordance with SNT-TC-1A (2020) and the company's Written Practice as

ASNT NDT Level I

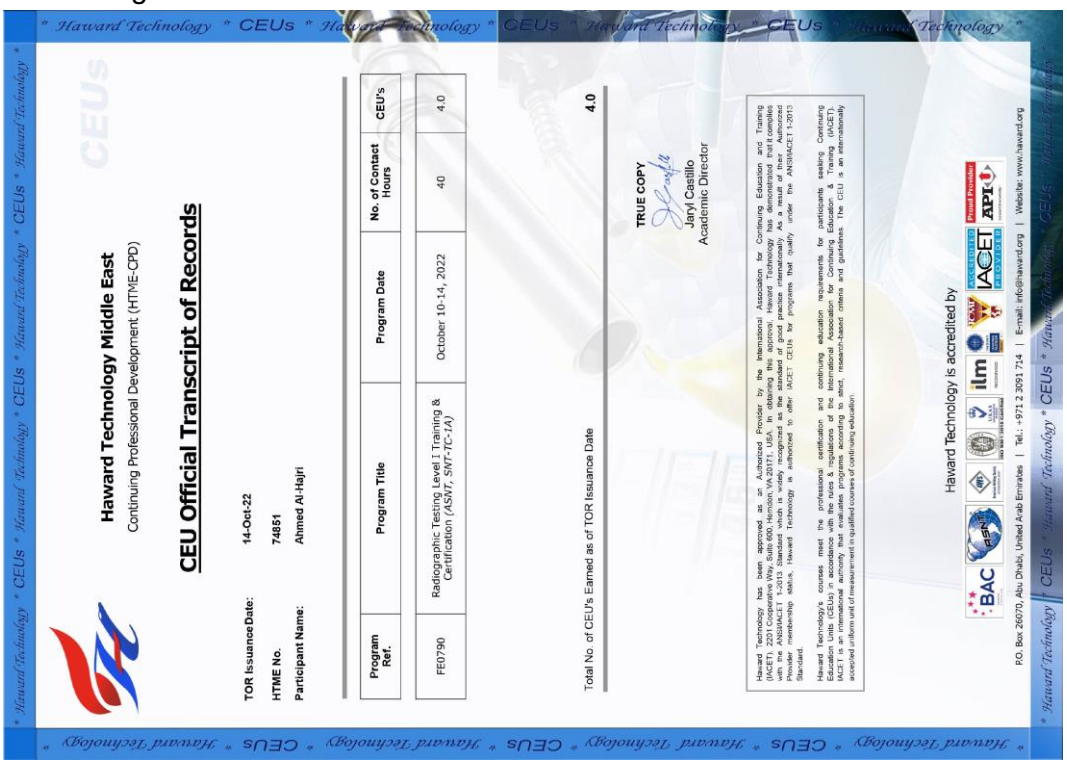
in the following Nondestructive Testing Methods:

Method	Product Form	Certificate No.	Issue Date	Expiry Date
Radiographic Testing	All Forms	74851/01/FE0790/DMM/14.10.22	10/22	10/27

ASNT Level III Examiner
Mr. Luis Lopez (ASNT# 219655)
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



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

CEU Official Transcript of Records

TOR Issuance Date: 14-Oct-22
HTME No. 74851
Participant Name: Ahmed Al-Hajri

Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
FE0790	Radiographic Testing Level I Training & Certification (ASNT, SNT-TC-1A)	October 10-14, 2022	40	4.0

Total No. of CEU's Earned as of TOR Issuance Date: 4.0

TRUE COPY
Jaryl Castillo
Academic Director

Haward Technology is accredited by

Haward Technology has been approved as an Authorized Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way, Herndon, VA 20171, USA. In obtaining this approval, Haward Technology has demonstrated that it complies with the ANSI/IACET 1-2013 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 1-2013 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 standards development organization which facilitates the creation and dissemination of high-quality, research-based learning standards and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

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Certificate Accreditations

Certificates are accredited by the following international accreditation organizations:-

- The American Society for Nondestructive Testing (ASNT)

  Haward Technology has certain instructors who are certified by **The American Society for Nondestructive Testing** (**ASNT**) and are authorized to conduct ASNT's certification programs for specific NDT methods. ASNT is the world's largest technical society for nondestructive testing (NDT) that provides a forum for exchange of NDT technical information, NDT educational materials and programs, and standards and services for the qualification and certification of NDT personnel.

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. 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 **4.0 CEUs** (Continuing Education Units) or **40 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 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.

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	***Introduction*** *History & Discovery of Radioactive Materials ● Definition of Industrial Radiographic Testing (RT) ● Radiation Protection – Why? ● Basic Math Review – Exponents, Square Root, etc.*
0930 – 0945	*Break*
0945 – 1200	***Fundamental Properties of Matter*** *Elements & Atoms ● Molecules & Compounds ● Atomic Particles – Properties of Protons, Electrons & Neutrons ● Atomic Structure ● Atomic Number & Weight ● Isotope versus Radioisotope*
1200 – 1300	*Lunch*
1300 – 1500	***Radioactive Materials*** *Production (Neutron Activation, Nuclear Fission) ● Stable versus Unstable (Radioactive) Atoms ● Becquerel – The Unit of Activity ● Half-life of Radioactive Materials ● Plotting of Radioactive Decay ● Specific Activity – Becquerels/Gram*
1500 – 1515	*Break*
1515 – 1650	***Types of Radiation*** *Particulate Radiation – Properties: Alpha, Beta, Neutron ● Electromagnetic Radiation – X-ray, Gamma Ray ● X-ray Production ● Gamma-ray Production ● Gamma-ray Energy ● Energy Characteristics of Common Radioisotope Sources ● Energy Characteristics of X-ray Machines*
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	***Interaction of Radiation with Matter*** *Ionization ● Radiation Interaction with Matter (Photoelectric Effect, Compton Scattering, Pair Production) ● Unit of Radiation Exposure – Coulomb per Kilogram (C/kg) ● Emissivity of Commonly Used Radiographic Sources ● Emissivity of X-ray Exposure Devices ● Attenuation of Electromagnetic Radiation – Shielding ● Half-value Layers (HVL), Tenth-value Layers (TVL) ● Inverse Square Law*
0930 – 0945	*Break*
0945 – 1200	***Exposure Devices & Radiation Sources*** *Radioisotope Sources (Sealed-source Design & Fabrication, Gamma Ray Sources, Beta & Bremsstrahlung Sources, Neutron Sources) ● Radioisotope Exposure Device Characteristics ● Electronic Radiation Sources – 500 keV & Less, Low Energy (Generator-High-Voltage Rectifiers, X-Ray Tube Design & Fabrication, X-Ray Control Circuits, Accelerating Potential, Target Material & Configuration, Heat Dissipation, Duty Cycle, Beam Filtration)*

1200 – 1300	*Lunch*
1300 – 1500	***Exposure Devices & Radiation Sources (cont'd)*** *Electronic Radiation Sources – Medium & High Energy (Resonance Transformer, Van de Graaff Accelerator, Linear Accelerator, Betatron, Coulomb per Kilogram (C/kg) Output, Equipment Design & Fabrication, Beam Filtration)● Fluoroscopic Radiation Sources (Fluoroscopic Equipment Design, Direct-Viewing Screens, Image Amplification, Special X-Ray Tube Considerations & Duty Cycle, Screen Unsharpness, Screen Conversion Efficiency)*
1500 – 1515	*Break*
1515 – 1650	***Radiographic Safety Principles Review*** *Controlling Personnel Exposure ● Time, Distance, Shielding Concepts ● As Low as Reasonably Achievable (ALARA) Concept ● Radiation-Detection Equipment ● Exposure-device Operating Characteristics*
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	***Radiographic Technique*** *Process of Radiography ● Types of Electromagnetic Radiation Sources ● Electromagnetic Spectrum ● Penetrating Ability or "Quality" of X-rays & Gamma Rays*
0930 – 0945	*Break*
0945 – 1200	***Radiographic Technique (cont'd)*** *Spectrum of X-ray Tube Source ● Spectrum of Gamma-Radioisotope Source ● X-ray Tube – Change of mA of kVp Effect on "Quality" & Intensity*
1200 – 1300	*Lunch*
1300 – 1500	***Basic Principles of Radiography*** *Geometric Exposure Principles ("Shadow" Formation & Distortion, Shadow Enlargement Calculation, Shadow Sharpness, Geometric Unsharpness, Finding Discontinuity Depth) ● Radiographic Screens (Lead Intensifying Screens, Fluorescent Intensifying Screens, Intensifying Factors, Importance to Screen-to-Film Contact, Importance of Screen Cleanliness & Care, Techniques for Cleaning Screens) ● Radiographic Cassettes ● Composition of Industrial Radiographic Film ● The "Heel Effect" with X-ray Tubes*
1500 – 1515	*Break*
1515 – 1650	***Radiographs*** *Formation of the Latent Image on Film ● Inherent Unsharpness ● Arithmetic of Radiographic Exposure (Milliamperage- Distance-Time Relationship, Reciprocity Law, Photographic Density, X-ray Exposure Charts- Material Thickness, kV & Exposure, Gamma-ray Exposure Chart, Inverse Square-Law Considerations, Calculation of Exposure Time for Gamma & X-ray Sources) ● Characteristic (Hurter & Driffield) Curve ● Film Speed & Class Descriptions ● Selection of Film for Particular Purpose*
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	***Radiographic Image Quality*** *Radiographic Sensitivity ● Radiographic Contrast ● Film Contrast ● Subject Contrast*
0930 – 0945	*Break*
0945 – 1200	***Radiographic Image Quality (cont'd)*** *Definition ● Film Graininess & Screen Mottle Effects ● Image Quality Indicators (IQIs)*
1200 – 1300	*Lunch*
1300 – 1500	***Film Handling, Loading & Processing*** *Safelight & Darkroom Practices ● Loading Bench & Cleanliness ● Opening of Film Boxes & Packets*
1500 – 1515	*Break*
1515 – 1650	***Film Handling, Loading & Processing (cont'd)*** *Loading of Film & Sealing Cassettes ● Handling Techniques for "Green Film" ● Elements of Manual Film Processing*
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

0730 – 0830	***Exposure Techniques – Radiography*** *Single-wall Radiography ● Double-wall Radiography (Viewing Two Walls Simultaneously, Off-set Double-wall Exposure Single-wall Viewing, Elliptical Techniques)*
0830 - 0930	***Exposure Techniques – Radiography (cont'd)*** *Panoramic Radiography ● Use of Multiple-film Loading ● Specimen Configuration*
0930 – 0945	*Break*
0945 -1030	***Fluoroscopic Techniques*** *Dark Adaptation & Eye Sensitivity ● Special Scattered Radiation Techniques ● Personnel Protection ● Sensitivity*
1030 - 1115	***Fluoroscopic Techniques (cont'd)*** *Limitations ● Direct-screen Viewing ● Indirect- & Remote-screen Viewing*
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*

Practical Sessions

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will carryout NDT inspection using our "Radiographic Testing (RT) Equipment".

Applications

The Model 880 devices are used for industrial applications of gamma radiography, mainly with Iridium-192, to inspect materials and structures in the density range of approximately 2.71 g/cm^3 through 8.53 g/cm^3. The Model 880 devices also accommodate low energy isotopes to permit radiography of materials and structures of thin sections of steel and low-density alloys. The Model 880 exposure devices are also designed for use with low activity sources with high photon energies that are used for mass absorption (gamma scanning) studies of high-density materials up to 18.7 g/cm^3.

Standard Source Assembly

Metallic Iridium-192 discs and pellets are doubly encapsulated in welded stainless steel or titanium capsules. The sealed sources are designed and tested to achieve an ISO/ANSI minimum classification of 97C64515 and to comply with the IAEA and USDOT requirements for 'Special Form' radioactive material. The ISO/ANSI classification 97C64515 stated in this manual refers to the complete source capsule which is attached to the source assembly. This classification also applies to the Se-75, Co-60 and Cs-137 versions of the source assemblies.

The sealed source is swaged to one end of a source holder consisting of a short flexible steel cable which has a female half of a connector at the other end, used for coupling to a control cable connector. The female connector also incorporates a stainless steel stop-ball swaged onto it (older versions of this source wire had the stop-ball as a separate component from the female connector). The purpose of the stop-ball is to provide mechanical positioning of the source assembly within the exposure device's shielding and to provide a means of securing the source assembly in the exposure device's locking mechanism.

Model 880 Delta authorized contents

Isotope	Assembly Model Number	Gamma Energy Range	Half Life	Approximate Steel Working Thickness	Device/Source Maximum Capacity
Ytterbium-169	*	8-308 keV	32 days	2-20 mm	108 Ci 4.00 TBq
Selenium-75	A424-25W A424-25**	66-401 keV	120 days	3-29 mm	150 Ci 5.55 TBq
Iridium-192	A424-9 A424-23**	206-612 keV	74 days	12-63 mm	150 Ci 5.55 TBq
Cobalt-60	A424-19	1.17-1.33 MeV	5.27 years	50-150 mm	65 mCi 2.40 GBq
Cesium-137	A424-30	663 keV	30 years	12-63 mm	380 mCi 14.0 GBq

Model 880 Sigma authorized contents

Isotope	Assembly Model Number	Gamma Energy Range	Half Life	Approximate Steel Working Thickness	Device/Source Maximum Capacity
Ytterbium-169	*	8-308 keV	32 days	2-20 mm	108 Ci 4.00 TBq
Selenium-75	A424-25W A424-25**	66-401 keV	120 days	3-29 mm	150 Ci 5.55 TBq
Iridium-192	A424-9 A424-23**	206-612 keV	74 days	12-63 mm	130 Ci 4.81 TBq
Cobalt-60	A424-19	1.17-1.33 MeV	5.27 years	50-150 mm	25 mCi 925 MBq
Cesium-137	A424-30	663 keV	30 years	12-63 mm	380 mCi 14.0 GBq

Dummy RT Projector

Model 880 Elite authorized contents

Isotope	Assembly Model Number	Gamma Energy Range	Half Life	Approximate Steel Working Thickness	Device/Source Maximum Capacity
Ytterbium-169	*	8-308 keV	32 days	2-20 mm	108 Ci 4.00 TBq
Selenium-75	A424-25W A424-25**	66-401 keV	120 days	3-29 mm	150 Ci 5.55 TBq
Iridium-192	A424-9 A424-23**	206-612 keV	74 days	12-63 mm	50 Ci 1.85 TBq
Cobalt-60	A424-19	1.17-1.33 MeV	5.27 years	50-150 mm	25 mCi 925 MBq
Cesium-137	A424-30	663 keV	30 years	12-63 mm	380 mCi 14.0 GBq

Model 880 Omega authorized contents

Isotope	Assembly Model Number	Gamma Energy Range	Half Life	Approximate Steel Working Thickness	Device/Source Maximum Capacity
Ytterbium-169	*	8-308 keV	32 days	2-20 mm	108 Ci 4.00 TBq
Selenium-75	A424-25W A424-25**	66-401 keV	120 days	3-29 mm	80 Ci 2.96 TBq
Iridium-192	A424-9 A424-23**	206-612 keV	74 days	12-63 mm	15 Ci 0.55 TBq

* Source assemblies with A1 quantities available for use in international jurisdictions.
** Approved for international transport, except in Canada.

Model 880 Atlas authorized contents

Isotope	Assembly Model Number	Gamma Energy Range	Half Life	Approximate Steel Working Thickness	Device/Source Maximum Capacity
Ytterbium-169	*	8-308 keV	32 days	2-20 mm	108 Ci 4.00 TBq
Selenium-75	A424-25W A424-25**	66-401 keV	120 days	3-29 mm	81 Ci 3.0 TBq
Iridium-192	A424-9 A424-23**	206-612 keV	74 days	12-63 mm	27 Ci 1.0 TBq

* Source assemblies with A1 quantities available for use in international jurisdictions.
** Approved for international transport, except in Canada.

The tungsten shielded Model 880 Atlas was evaluated as a USDOT Type A transport container. The Model 880 Atlas is NOT approved as a Type B transport package. Labeling for the Model 880 Atlas reflects Type A information for the package instead of the Type B information labeling on all other Model 880 exposure devices.

Source output

Isotope	At 1 m per Ci (37 GBq)		At 1 ft per Ci (37 GBq)	
Ytterbium-169	0.125 R/hr	1.25 mSv/hr	1.3 R/hr	13.0 mSv/hr
Selenium-75	0.203 R/hr	2.03 mSv/hr	2.2 R/hr	22.0 mSv/hr
Iridium-192	0.48 R/hr	4.80 mSv/hr	5.2 R/hr	52.0 mSv/hr
Cobalt-60	1.30 R/hr	13.0 mSv/hr	14.0 R/hr	140 mSv/hr
Cesium-137	0.32 R/hr	3.20 mSv/hr	3.4 R/hr	34.0 mSv/hr

Selected attenuation data

Material	Approximate Material Density (g/cm^3)	Approximate Half Value Thickness Inches (mm)				
		Ytterbium-169	Selenium-75	Iridium-192	Cobalt-60	Cesium-137
Concrete	2.35	1.140 (29.0)	1.180 (30.0)	1.700 (43.2)	2.400 (61.0)	3.00 (76.2)
Aluminum	2.65	-	1.100 (27.0)	-	-	-
Steel	7.80	0.170 (4.3)	0.315 (8.0)	0.512 (13.0)	0.827 (21.0)	0.900 (22.9)
Lead	11.34	0.032 (0.8)	0.039 (1.0)	0.200 (5.1)	0.500 (12.7)	0.250 (6.4)
Tungsten	17.80	-	0.032 (0.8)	0.130 (3.3)	0.310 (7.9)	0.225 (5.7)
DU	18.70	-	-	0.050 (1.3)	0.270 (6.8)	0.125 (3.2)

LED FILM VIEWER

Technical Specifications:

- Light Source – LED (White)
- Viewing density range – Up to 1.0 up to 4.5. D.
- Power source – AC, 230V 50/60Hz
- Max Luminance – 84,600 Cd/m2
- Film viewer body –Powder Coated Aluminium Body.
- Weight – 3.6 Kg
- Operating temperature: (-)10 C to (+) 60C .
- Cooling – High speed fans.
- Variable Light intensity control.
- Foot –switch control and cover on viewing screen.

Common features for all Film Viewers

- All film viewers are High Intensity type for viewing Industrial X-ray Films.
- A step-less control is provided for controlling Light Intensity.
- All film viewers are provided with Cooling fan, Heat absorbing glasses etc.
- A foot control switch helps in easy on-off operation.
- A built-in table lamp helps in making notes in dark.

Digit X Densitometer

"The densitometer of choice for the NDT industry"

The Digit-X NDTdensitometer is designed to meet the need for a robust and dependable instrument to measure any film directly from a viewer. Weighing just 175g and powered by battery, the device is portable and extremely practical across different settings.

Digit-X is a favourite amongst professionals in the Non-Destructive Testing (NDT) sector used for applications in Oil & Gas, Construction, Engineering, Fabrication, Inspection and other services.

British-manufactured combining ease of use with high accuracy and repeatability.

The *Digit-X* NDT densitometer is manufactured by Xograph, which has nearly fifty years' experience in designing and building reliable quality instruments. The *Digit-X*NDT densitometer provides immediate, precise and repeatable results.

Sturdy and robust design

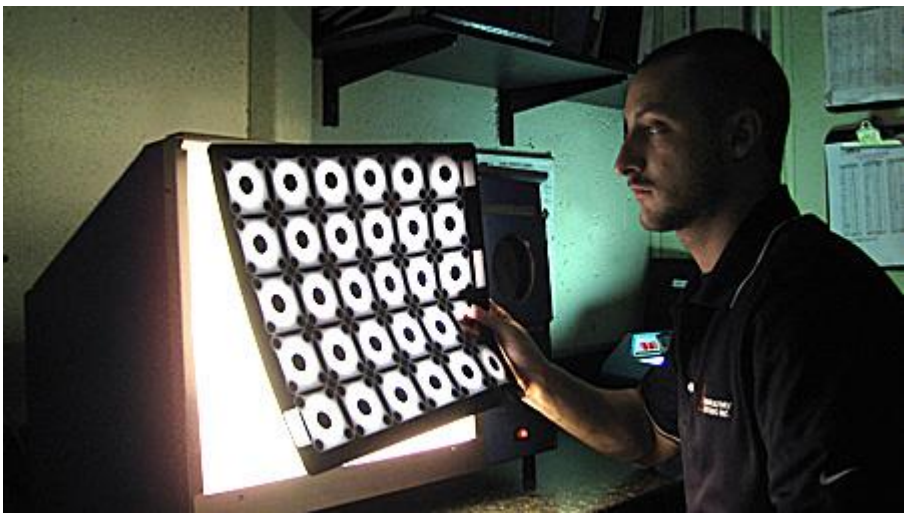
With its sturdy and robust design, minimal drift and no warm up time *Digit-X* provides fast dependable readings. The fine fibre-optic probe allows small areas of film to be measured accurately with readings being displayed on the large clear LCD panel to 2 decimal places. Featuring 0.00 to 4.00 Optical Density.

Ready to use; backed by a 'no fuss' warranty

Digit-X comes complete with its own battery in a handy sturdy portable carry case, ready to use straight away.Backed by Xograph's established 'no fuss' one year warranty makes the *Digit-X* NDTdensitometer the best-value choice for reading film on a viewer.

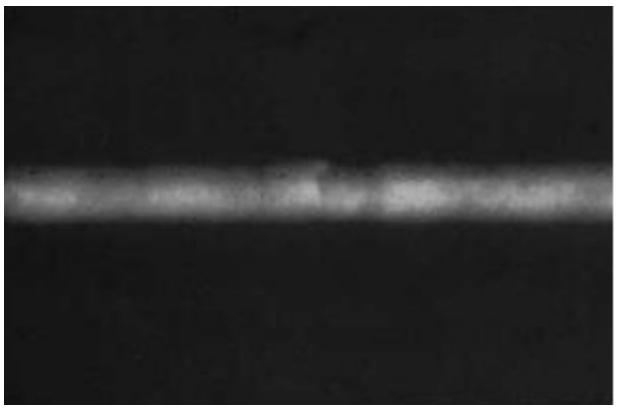
***Digit-X* NDT Densitometer Specifications**

- Density Range 0.00 to 4.00 D
- Fibre Optic Aperture: 3mm
- Resolution: 0.01OD
- Accuracy: 0.05OD
- Repeatability: 0.02OD
- Drift: 0.0005/min
- Power Supply: 9v PP3 Battery
- Battery Life: Alkaline 2500 Hrs
- Size: 210x60x40mm
- Weight: 175kg



Standard Radiographs/Local Radiographs

Standard Film Strip



Sample Exposed RT Films

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