



SGS NDT TRAINING & EXAMINATION CENTRE

PROFESSIONAL SERVICES FOR YOUR SAFETY AND REPUTATION





ABOUT NON DESTRUCTIVE TESTING (NDT)

ABOUT NDT

NDT plays a key role in assessing conformity and reliability of equipment and piping used in infrastructure and oil and gas and power industry. With the right NDT technology integrity assessments are made and corrosion data is gathered.

New and older technologies, however, only bring added value when used in a

proper way. Therefore operator training and certification is key in every inspection program to ensure compliance and improve quality and integrity.

Often expectations are not met because the operator was not trained well or wrong equipment has been used. Bad performed inspections can lead to unsafe situations, productions loss and non

conformities in international trade business.

The reliability of the NDT depends on many factors and operator training is one of the critical areas that are only too often overlooked. SGS NDT Training & Examination Centre can help you to manage risk, protect your company and its reputation.

ABOUT SGS NDT TRAINING & EXAMINATION CENTRE

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China represents huge business opportunities for every ambitious company in the Industrial markets. The market of China is ever increasing at an incredible pace, however, one area of concern that international clients have is the quality of the products produced in China. Often after delivery from the manufacturer in China it is found that the quality of the materials and products are not meeting the clients' requirements and expectation.

To manage this risk, NDT inspections are performed during and after manufacturing of the products, however, these tests and inspections are carried out by inspectors who have usually received little or inadequate training and examinations.

SGS now offers internationally recognised training and certification services in Non-Destructive Testing in China. The aim is to create a wider availability of inspectors and technicians who are trained and certified in accordance with the European and American standards for the qualification and certification of NDT personnel, EN473. This will ensure an increased quality of the inspection and therefore provide a lower risk of products being out of specification on arrival at their destination.

The training and examinations that SGS offers are in accordance with the highest European and American standards (EN473 / ISO 9712 / ASNT), with a particular focus on the extensive training syllabus for all NDT methods and will offer Personal

Certification of NDT (PCN) which are issued by the British Institute of NDT (BINDT).

The need for high quality NDT service in China is growing at a rapid pace and this new service is attractive for all companies and institutions that are doing business with international customers.

The courses will be held in Shanghai and at company premises should it be specifically requested. Examples of these services are

- Basic NDT awareness for engineers and managers
- Level 1, 2 and 3 PCN courses in RT, UT, MT, PT, VT
- Level 2 TOFD
- Level 3 consultancy services
- PED audit services



HOW TO **BOOK** YOUR TRAINING COURSE

HOW TO BOOK YOUR TRAINING COURSE

To book a training course or to receive a quotation from the SGS Training and Examination Centre, simply call + 86 (0)21 6818 3905 and we will be happy to discuss your requirements with you. If necessary we can provide advice on which type of training and certification is appropriate for you or your company, SGS can also conduct a specific training and examination course to meet your company requirements. Enquiries may

also be made via email to ndt.training@sgs.com or by visiting us on the web at www.cn.sgs.com/ndt-training.

On confirmation of the booking we will send to you an application form which must be completed and returned to us in order to confirm the booking process. Our staff will be on hand to provide the necessary assistance and support in completing the required information.

Training courses will be conducted on a weekly basis at our Shanghai Training and Examination Centre; in addition to this we are also able to conduct the services at your premises upon your request.

CONTACT US

WWW.SGS.COM

WWW.CN.SGS.COM

WWW.HK.SGS.COM

WWW.SGS.COM/NDT-TRAINING

WWW.CN.SGS.COM/NDT-TRAINING

SGS NDT TRAINING & EXAMINATION CENTRE

2F, Building 8, No. 69, 1159, East Kangqiao Road, Pudong District
Shanghai 201319, P. R. China
T +86 21 6818 3905
F +86 21 6818 3265
ndt.training@sgs.com
www.sgs.com/ndt-training



BASIC RADIATION SAFETY (BRS) & RADIATION PROTECTION SUPERVISORS (RPS)

BRS

To be eligible for the Radiographic Testing examination at either Level 1 or Level 2, the candidate must first successfully pass a Basic Radiation Safety (BRS) examination.

The minimum training hours for this examination is 16 hours and is in addition to the hours required for either Level 1 or Level 2 Radiographic Certification.

BRS COURSE CONTENT

- Basic Radiation Physics
- Radiographic Equipment
- Radiation Units
- Biological Effects
- Dose Limits
- Radiation Detection and Measurement
- Protection against Radiation
- Calculations for Radiation Protection

- Storage of Radiation Sources
- Transport of Radioactive Substances
- Appointments & Responsibilities
- Local Rules and Contingency Plans
- Personal Dosimetry
- Normative Documents
- Knowledge and Understanding of IRR 1999

RPS

For candidates who are working with ionizing radiation in supervisory roles an additional advanced training course and examination are available, which is the PCN – Radiation Protection Supervisor (RPS). The minimum requirements for taking this examination are

- Must hold a current BRS Certification
- An additional 24 hours training
- Must have held BRS Certification for a minimum of 9 months

RPS COURSE CONTENT

- Review of Basic Radiation Safety
- Normative Documents and Legislative Structure
- Biological Effects
- Radioactive Substances Act
- Dose Limitation
- The Regulation of Work with Radiation
- The Role of the RPA and RPS
- Advanced Scientific Calculations for Radiological Protection
- Principles and practices of radiation protection
- Radiation Monitoring
- Transport of Radioactive Substances
- Personal Dosimetry
- Emergency Procedures
- The Ionizing Radiations Regulations 1993
- Knowledge and Understanding of IRR 1999



MAGNETIC PARTICLE INSPECTION (MT)

This method involves the component under inspection being magnetized, this magnetization process is supplemented by the application of ferromagnetic particles to the already magnetized surface. The magnetic particles are attracted to areas of flux leakage (escaping magnetism) and indications formed at that point. This method is used to test welds, castings, and forgings for surface or slightly subsurface defects.

However MT can only be used to inspect materials that can be magnetized, i.e. ferromagnetic materials.

We can provide Magnetic Particle training courses and examinations suitable for any of the following certification schemes

- PCN / EN 473 / ISO 9712 Level 1, 2 and 3
- SNT-TC-1A in accordance with your company written practice

We can also provide

- Preparation training for ASNT Level 3

An example of the syllabus that is used for magnetic particle training courses is shown below for Level 1 and Level 2. SGS can tailor make the syllabus to satisfy the requirements of an individuals company specific written practice if requested.

LEVEL 1

GENERAL THEORY

- Safety Precautions
- Basic Principles of Magnetic Particle Inspection
- Methods of Magnetisation
- Inspection and Detection of Indications
- Checks and Calibrations
- Equipment

- Test Procedures
- Detectability of Defects
- Standards and Specifications

SPECIFIC THEORY

Application of the Method and use of Codes, Specifications and Procedures, applicable to the company, including the relevant control checks.

PRACTICAL EXAMINATION

Follow written instructions and process the inspection test pieces, record and report defects from known datum markers, carry out pre-test calibration checks and post-test procedures.

LEVEL 2

GENERAL THEORY

(in addition to the Level 1 Syllabus above)

- Safety Precautions
- Testing Procedures
- Detectability of Defects
- Interpretation and Reporting
- Post Test Procedures
- Calculations
- Selection of Appropriate Techniques

SPECIFIC THEORY

Application of the Method to the specific requirements of the company, in particular making reference to those Codes, Specifications and Procedures used by the Company, including the relevant control checks. Product technology of the products for the relevant sector, i.e. welds, castings, forgings, this includes, manufacturing processes, defect formation and detection.

PRACTICAL EXAMINATION

Production of written instruction, determine the best inspection techniques for the individual parts, process the inspection test pieces, record and report defects from know datum markers, carry out pre test calibration checks, post test procedures.



LIQUID PENETRANT INSPECTION (PT)

This involves applying a liquid dye to the surface of a material and leaving the dye to “dwell” on the surface for a predetermined period of time. The liquid can be either a colour that is easily visible under normal lighting conditions or a yellow/green fluorescent colour that requires special lighting conditions to be seen effectively.

This liquid dye enters into discontinuities that are open to the surface of the material through a phenomenon called “capillary action”. This capillary action takes place throughout the dwell time and the discontinuity retains this dye when the excess dye is cleaned from the surface. A type of developer is then

applied to the surface of the material and the dye that is trapped inside the surface discontinuities is blotted back out on to the surface and forms an indication. This indication is then interpreted by a qualified interpreter.

The PT method is suitable on most non absorbent materials.

We can provide Liquid Penetrant (PT) training courses and examinations suitable for the following certification schemes at Level 1, 2 and 3

- PCN / EN 473 / ISO 9712
- SNT-TC-1A in accordance with your company written practice

We can also provide

- Preparation training for ASNT Level 3

An example of the syllabus that is used for Liquid Penetrant training courses is shown below for Level 1 and 2. SGS can tailor make the syllabus to satisfy the requirements of an individuals company specific written practice if requested.

An example of the syllabus that is used for ultrasonic examination training courses is shown below for level 1 and 2. SGS can tailor make the syllabus to satisfy the requirements of an individuals company specific written practice if requested.



LIQUID PENETRANT INSPECTION (PT)

LEVEL 1

GENERAL THEORY

- Basic Principles of Liquid Penetrant Inspection
- Safety Precautions
- Surface Preparation of Materials for Inspection
- Materials and Equipment used
- Assessment and Implementation of Control Tests
- Suitable Testing Technique
- Post Test Procedures

SPECIFIC THEORY

Application of the Method and use of Codes, Specifications and Procedures, applicable to the company, including the relevant control checks.

PRACTICAL EXAMINATION

Follow written instructions and process the inspection test pieces, record and report defects from known datum markers, carry out pre-test calibration checks, post-test procedures.

LEVEL 2

GENERAL THEORY

(in addition to the Level 1 Syllabus above)

- Safety Precautions
- Testing Procedures
- Detectability of Defects
- Interpretation and Reporting
- Post Test Procedures
- Selection of Appropriate Techniques

SPECIFIC THEORY

Application of the Method to the specific requirements of the company, in particular making reference to those Codes, Specifications and Procedures used by the company, including the relevant control checks. Product technology of the products for the relevant sector, i.e. welds, castings, forgings, this includes, manufacturing processes, defect formation and detection.

PRACTICAL EXAMINATION

Production of written instructions, determine the best inspection techniques for the individual parts, process the inspection test pieces, record and report defects from known datum markers, carry out pre-test calibration checks and post-test procedures.



RADIOGRAPHIC TESTING (RT)

This method is based on the same principle as medical radiography in a hospital. A piece of radiographic film is placed on the remote side of the material under inspection and radiation is then transmitted through from one side of the material to the remote side where the radiographic film is placed.

The radiographic film detects the radiation and measures the various quantities of radiation received over the entire surface of the film. This film is then processed under dark room conditions and the various degrees of radiation received by the film are imaged by the display of different degrees of black and white, this is termed the film density and is viewed on a special light emitting device.

Discontinuities in the material affect the amount of radiation being received by the film through that particular plane of the material. Qualified inspectors can interpret the resultant images and record the location and type of defect present in

the material. Radiography can be used on most materials and product forms, e.g. welds, castings, composites etc.

Radiographic testing provides a permanent record in the form of a radiograph and provides a highly sensitive image of the internal structure of the material. Radiography is split into two main categories

- Radiographic Testing
- Radiographic Interpretation

The radiographic testing course is for NDT personnel who execute the practical inspection using radioactive material or radiation emitting devices. The radiographic interpretation course is designed purely for the interpretation of the resultant radiographic image.

However, to understand the principles of image formation, sensitivity and correct techniques the general theory syllabus is the same for both courses.

The two sectors of the Radiographic Testing examination that are NOT

required for the Radiographic Interpretation examination are

- Basic Radiation Safety (BRS)
- Practical Examination of the Specimens

PCN MINIMUM WORK EXPERIENCE AND TRAINING HOURS' REQUIREMENTS FOR RT EXAMINATIONS

LEVEL 1

- 40 hours Training
- 3 months Work Experience

LEVEL 2

- 80 hours Training (additional to the 40 hours for Level 1)
- 9 months Work Experience (additional to the 3 months for Level 1)

If a candidate wishes to go direct to Level 2 without first taking the Level 1 route, the minimum requirements are the total accumulative requirements of both Level 1 and 2.



RADIOGRAPHIC TESTING (RT)

We can provide Radiographic Testing and Interpretation training courses and examinations suitable for any of the following certification schemes

- PCN / EN 473 / ISO 9712 Level 1, 2 and 3
- SNT-TC-1A in accordance with your company written practice

We can also provide

- Preparation training for ASNT Level 3

An example of the syllabus that is used for Radiographic training courses is shown below for Level 1 and 2. SGS can tailor make the syllabus to satisfy the requirements of an individuals company specific written practice if requested.

RADIOGRAPHIC TESTING

Radiographic Testing is split into specific product sectors for certification at Level 1 and 2, this is

- Welds
- Castings

Each of these categories is further split into sub groups

- Light Metal X-ray
- Dense Metal X-ray (and/or Gamma ray)
- Light and Dense Metal, both X-ray and Gamma ray

LEVEL 1

GENERAL THEORY

- Properties and Production of X-ray and Gamma ray
- The Formation of a Latent Image
- Radiographic Film
- Development / Processing
- Practical Exercises
- Radiographic Quality
- Image Quality
- Radiographic Techniques
- Density Monitoring

SPECIFIC THEORY

Application of the Method and use of Codes, Specifications and Procedures, applicable to the company, including the relevant control checks.

PRACTICAL EXAMINATION

Follow written instructions and process the inspection test pieces, record and report defects from known datum markers, carry out pre-test calibration checks and post-test procedures.

LEVEL 2

GENERAL THEORY

(in addition to the Level 1 Syllabus above)

- The properties of X-ray and Gamma rays
- Personnel Protection and Safety Procedures
- Atomic Structures
- Generation of X-rays
- Natural and Artificial Gamma Radiation Sources
- Gamma ray Equipment
- Radiographic Film
- Intensifying Screens
- Exposure Charts
- Characteristic Curves
- Diagnostic Film Lengths
- Exposure Calculations
- Techniques for Weld Radiography
- Darkroom Procedures
- Radiographic Quality
- Introduction to the Interpretation of Radiographs
- Specifications and Procedures

SPECIFIC THEORY

Application of the Method to the specific requirements of the company, in particular making reference to those Codes, Specifications and Procedures used by the company, including the relevant control checks. Product technology of the products for the relevant sector, i.e. welds, castings, forgings, this includes, manufacturing processes, defect formation and detection.

PRACTICAL EXAMINATION

Production of written instruction, determine the best inspection techniques for the individual parts, process the inspection test pieces, record and report defects from known datum markers, carry out pre-test calibration checks and post-test procedures.



ULTRASONIC TESTING (UT)

This method employs high frequency sound pulses that are emitted from a transducer; this sound wave is induced in to the material through a probe which is usually in contact with the material. These sound waves propagate through the material, and are reflected back to the probe when they reach an interface. The reflected waves are transmitted back through the probe and connecting leads to a detector which can be either analogue or digital. The sounds waves are then displayed as a series of signals on a monitor and the qualified inspector can measure, and interpret these signals to allow accurate evaluation of the internal structure of the material.

Ultrasonic testing can not only be used to indicate a surface or subsurface flaw it can also be used to determine the depth, size and type of flaw. Another advantage

of using UT is the accurate measurement of the thickness of the material. The method can be applied to most materials providing the material can transmit sound waves. UT is considered to be a fast and effective way of inspection providing high sensitive results.

PCN MINIMUM WORK EXPERIENCE AND TRAINING HOUR'S REQUIREMENTS FOR UT EXAMINATIONS

LEVEL 1

- 40 hours Training
- 3 months Work Experience

LEVEL 2

- 80 hours Training (additional to the 40 hours for Level 1)
- 3 months Work Experience (additional to the 3 month for Level 1)

If a candidate wishes to go direct to Level 2 without first taking the Level 1 route, the minimum requirements are the total accumulative requirements of both Level 1 and 2.

We can provide Ultrasonic training courses and examinations suitable for any of the following certification schemes

- PCN / EN 473 / ISO 9712 Levels 1, 2 and 3
- SNT-TC-1A in accordance with your company written practice

We can also provide

- Preparation training for ASNT Level 3



ULTRASONIC TESTING (UT)

An example of the syllabus that is used for ultrasonic examination training courses is shown below for level 1 and 2. SGS can tailor make the syllabus to satisfy the requirements of an individuals company specific written practice if requested.

In the PCN certification scheme Ultrasonic Testing is separated into three specific product sectors for certification purposes, these are

- Welds
- Wrought Products (Forgings)
- Castings

The welds sector is further sub divided into groups, these are

- Plate Butt Welds
- Pipe Butt Welds
- Constructional "T" Joint
- Nozzles
- Nodes

LEVEL 1

GENERAL THEORY

- Principles of Ultrasonic Testing
- Equipment
- Testing Techniques
- Calibration of Testing Systems

SECTOR SPECIFIC THEORY

- Detectability of Defects
- Factors Affecting the Performance of the Ultrasonic Test
- Codes of Practice and Standards
- Conducting and Recording the Test

PRACTICAL EXAMINATION

Follow written instructions and process the inspection test pieces, record and report defects from know datum markers, carry out pre test calibration checks, post test procedures.

LEVEL 2

GENERAL THEORY

(in addition to the Level 1 Syllabus above)

- Principles of Ultrasonic Testing
- Equipment
- Testing Techniques
- Calibration of Testing Systems

SECTOR SPECIFIC THEORY

- Detectability of Defects
- Factors Affecting the Performance of the Ultrasonic Test
- Codes of Practice and Standards
- Conducting and Recording the Test
- Interpretation of Test Results
- Product Technology Theory

PRACTICAL EXAMINATION

Production of written instruction, determine the best inspection techniques for the individual parts, process the inspection test pieces, record and report defects from know datum markers, carry out pre test calibration checks, post test procedures.



VISUAL INSPECTION (VT)

This method involves both direct and indirect visual inspection techniques, direct inspection is where the material is inspected directly by the human eye with no additional visual aids, indirect inspection may involve the use of magnifying glass, mirror, borescope (mini camera), closed-circuit TV etc.

Visual inspection is a crucial NDT method which is too often overlooked, this should be the basis for inspectors starting out in the NDT industry, for example, a visual examination of an operational plant can often reveal obvious problem areas, such as leaks, excess vibration, corrosion or misalignment, this inspection is a very cost effective exercise and can be used to identify areas that require further NDT applications.

PCN MINIMUM WORK EXPERIENCE AND TRAINING HOUR'S REQUIREMENTS FOR VT EXAMINATIONS

LEVEL 1

- 16 hours Training
- 1 month Work Experience

LEVEL 2

- 24 hours Training (additional to the 16 hours for Level 1)
- 3 months Work Experience (additional to the 1 month for Level 1)

If a candidate wishes to go direct to Level 2 without first taking the Level 1 route, the minimum requirements are the total accumulative requirements of both Level 1 and 2.

We can provide visual test training courses and examinations suitable for any of the following certification schemes

- PCN / EN 473 / ISO 9712 Levels 1, 2 and 3
- SNT-TC-1A in accordance with your company written practice

We can also provide

- Preparation training for ASNT Level 3

An example of the syllabus that is used for visual inspection training courses is shown below for Level 1 and 2. SGS can tailor make the syllabus to satisfy the requirements of an individuals company specific written practice if requested.



VISUAL INSPECTION (VT)

LEVEL 1

GENERAL THEORY

- Introduction to Visual Inspection
- Definitions
- Fundamentals
- Equipment
- Checks and Calibrations
- Test Procedures

SPECIFIC THEORY

Application of the Method and use of Codes, Specifications and Procedures, applicable to the company, including the relevant control checks.

PRACTICAL EXAMINATION

Follow written instructions and process the inspection test pieces, record and report defects from know datum markers, carry out pre test calibration checks, post test procedures.

LEVEL 2

GENERAL THEORY

(in addition to the Level 1 Syllabus above)

- Basics of Vision
- Lighting Techniques
- Material Attributes
- Environmental and Physiological Attributes
- Visual Perception
- Equipment
- Employer Applications
- Accept / Reject Criteria
- Recording and Reporting

SPECIFIC THEORY

Application of the Method to the Specific requirements of the company, in particular making reference to those Codes, Specifications and Procedures used by the company, including the relevant control checks.
Product technology of the products for the relevant sector, i.e. welds, castings, forgings, this includes, manufacturing processes, defect formation and detection.

PRACTICAL EXAMINATION

Production of written instruction, determine the best inspection techniques for the individual parts, process the inspection test pieces, record and report defects from know datum markers, carry out pre test calibration checks, post test procedures.



TIME OF FLIGHT DIFFRACTION (TOFD)

Time of Flight Diffraction (TOFD) is becoming one of widely used non-destructive testing method for weld inspection. The main difference of TOFD technique is based on received ultrasonic diffractions which are from tip of imperfections instead of received reflected signals in conventional method.

The basic arrangement of the TOFD technique consists of two probes in the pitch-and-catch configuration, with one probe acting as the transmitter and the second probe as the receiver. Such an arrangement provides a large volume for inspection and provides for unambiguous location of the position and depth of the reflectors.

This advanced ultrasonic technique has special features such as highest probability of defect detection, very accurate sizing of defects (better than 0.2 mm), increased speed of inspection, permanent digital record of the inspection data, efficient detection of defect independent of defect orientation and

highest reliability of inspection quality.

The application of TOFD technique can be classified into areas i.e., pre-service inspections of linear butt welds on vessels, pipeline and plates. In-service inspection which includes corrosion monitoring, cladding measurement and condition monitoring (growth of flaws) on different product sectors like marine engineering, oil & gas, large-sized steel structure, wind power industry, aircraft industry and so on.

PCN MINIMUM WORK EXPERIENCE AND TRAINING HOUR'S REQUIREMENTS FOR TOFD EXAMINATIONS

LEVEL 1

- 40 hours Training
- 3 months Work Experience

LEVEL 2

- 40 hours Training (additional to the 40 hours for Level 1)
- 9 months Work Experience (additional to the 3 months for Level 1)

All Candidates attempting PCN examination must hold BINDT recognised appropriate level of certification in conventional Ultrasonic Weld Testing, issued by a certification body recognised by BINDT. If a candidate wishes to go direct to Level 2 without first taking the Level 1 route, the minimum requirements are the total accumulative requirements of both Level 1 and 2. For example, direct access to Level 2 requires a minimum work experience of 12 months, and the minimum training of 80 hours.

We can provide TOFD training courses and examinations suitable for any of the following certification schemes

- PCN / EN 473 / ISO 9712 Levels 1, 2 and 3
- SNT-TC-1A in accordance with your company written practice



TIME OF FLIGHT DIFFRACTION (TOFD)

LEVEL 1

GENERAL THEORY

- Principles of TOFD
- Equipment
- Testing Techniques
- Calibration of Testing Systems

SPECIFIC THEORY

- Detectability of Defects
- Factors Affecting the Performance of the Time of Flight Diffraction
- Equipment Installation and Adjustment
- Codes of Practice and Standards
- Basic Software Introduction
- Conducting and Recording the Test

PRACTICAL EXAMINATION

Follow the written instructions and perform the inspection on given welded test pieces, record and report defects from known datum markers, carry out pre-test calibration checks, post test procedures; process and analyse the standard scanning records.

LEVEL 2

GENERAL THEORY

(in addition to the Level 1 Syllabus above)

- Principles of Testing
- Equipment adjustment and setting
- Testing Techniques
- Calibration of Testing Systems

SPECIFIC THEORY

- Detectability of Defects
- Factors Affecting the Performance of the Time of Flight Diffraction
- Equipment Installation and Adjustment
- Codes of Practice and Standards
- Basic Software Introduction
- Interpretation of Test Results
- Data Analysis and Interpretation

PRACTICAL EXAMINATION

Production of written instructions, determine the best inspection techniques for the individual parts, process the inspection test pieces, record and report defects from known datum markers, interpreting and reporting of data analysis, issuing inspection reports and to prepare written operating instructions.

