

Non-Destructive Testing (NDT) Operator – On-Programme Competency Development



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Requirements and responsibilities for all those involved in the Non-Destructive Testing (NDT) Operator Apprenticeship



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Overview of the Apprenticeship Scheme

Non-Destructive Testing (NDT) Operator		
Recommended On-Programme Content	Gateway	End-Point Assessment <small>(carried out by the independent assessment organisation)</small>
<p>NDT Training Provider Assessment</p> <ul style="list-style-type: none"> Basic NDT awareness and principles Product technology Health & safety Knowledge of one NDT method Skills required for one NDT method Specific supplementary and aligned knowledge associated with the NDT method 	<p>Employer's Final Review</p> <ul style="list-style-type: none"> Determine that the NDT Level 2 qualification has been completed Determine that the knowledge requirements stipulated in the standard have been met Determine that the skills requirements stipulated in the standard have been met Determine that the behaviour requirements stipulated in the standard have been met 	<p>Review of Portfolio of Evidence and Achievements</p> <p>Carry out a review of all evidence and achievements, including mapping the outcomes to the requirements of the apprenticeship standard. Review course attendance, end-of-course test, examination results, log book of on-the-job training, CPD, awards, certificates and employer's reports and assessments. The review of the portfolio of evidence and achievements will be tested at the observational interview (professional discussion).</p>
<p>Employer's Briefing and Review</p> <ul style="list-style-type: none"> Codes of conduct, behaviours and company methodology Employer to create and assign an NDT project Quarterly checks on progress 		<p>Observational Interview (Professional Discussion)</p> <p>Carry out a synoptic interview to ensure that the apprentice has achieved all aspects of the apprenticeship standard. This will include all technical requirements, behaviours and health & safety. Challenge the evidence provided in the 'Review of Evidence and Achievements'.</p>
<p>Key:</p> <ul style="list-style-type: none"> Lead Provider Assessment Employer Assessment End-Point Assessment 	<p>Project Showcase – Presentation of NDT Project</p> <p>The apprentice will give a comprehensive presentation of the NDT project. The presentation will establish that the project, which has been designed to encompass as many requirements of the apprenticeship standard as possible, has been completed and that the requisite knowledge and skills have been achieved.</p>	

1. Introduction

This document explains the rationale for the development of the Non-Destructive Testing (NDT) Operator apprenticeship. It describes the process of how the scheme has been developed and, most importantly, it defines the responsibilities for those participating in the scheme.

Non-destructive testing (NDT) is a mechanism used by engineers to detect defects in materials and structures, either during manufacturing or while in service. Typically, the methods used are ultrasonic, radiography, magnetic particle, eddy current, dye penetrant, infrared thermography and visual methods. These methods are available when the employer chooses which method to include within the apprentice's programme.

2. Apprenticeship Rationale

Every day, more than 25,000 inspections are carried out in factories and on-site in the UK to detect defects and damage in a huge range of products, plant and structures; it is estimated that there are more than 120,000 NDT inspectors operating worldwide.

Historically, the career path to becoming an NDT Operator was by transferring from another industry sector, in some cases from a related engineering discipline, or from a completely unrelated industry. Rarely did people join the NDT sector straight from school and a recent study in Europe suggested there was an alarming reliance on inspectors over the age of 50.

Because NDT certification is personally achieved and NDT skills are easily transferable between different companies, there was a reluctance on the part of employers to spend significant amounts of money on training their NDT inspectors. This resulted in a narrow focus of training in just the basic NDT skills without considering the wider context whereby an NDT inspector would become far more competent if they benefitted from wider engineering knowledge, health & safety and behavioural skills.

The new Trailblazer apprenticeship scheme seeks to address some of the historical anomalies by:

- Setting a high mandatory standard at the beginning of the apprenticeship, which includes wide ranging engineering, health & safety and behaviour knowledge and skills
- Offering considerable assistance with funding for training and examinations
- Providing incentives for taking prospective apprentices straight from school at the age of 18+ or out of school at the age of 16+.

3. Apprenticeship Development Process

In terms of the process, the apprenticeship is split into three distinct sections: development of the 'NDT Standard' (Ref: 4), development of the 'Assessment Plan' (Ref: 5) and managing an apprentice through the apprenticeship scheme.

3.1 NDT Operator Apprenticeship Standard

The NDT operator apprenticeship standard is a mandatory concept document that has been approved by the Minister of State for the Department of Business, Innovation & Skills and the Department for Education. The standard contains details of the knowledge, skills and behaviours that must be achieved during the apprenticeship. Also implicit within the standard is that knowledge, skills and behaviours omitted from the standard cannot be made mandatory and are unlikely to be funded. The NDT operator apprenticeship standard has been developed by a Development Group, which includes 40 to 50 leaders in the NDT industry.

3.2 Assessment Plan

The NDT operator assessment plan is a mandatory document that has been approved by the Minister of State for the Department of Business, Innovation & Skills and the Department for Education. The assessment plan details 'what', 'by whom' and 'how' the output from the apprenticeship will be assessed. The assessment is split between three separate activities, which are weighted to reflect their importance:

- Document review, which will assess the portfolio of evidence (course attendance, test results, examination results, certificates and employer's reports), log book of experience, project report, CPD compliance, BINDT membership and anything else that is applicable to the success of the apprenticeship. 15% maximum.
- Project showcase presentation, a presentation by the apprentice on the NDT project detailing a step-by-step approach to completing the project successfully. 60% maximum.
- End-point interview, which covers technical considerations not covered by the project showcase presentation, health & safety and behaviours. 25% maximum.

Although the scoring is weighted between these three activities, it will be necessary to achieve the desired minimum percentage in each of these categories. The required mark to gain a 'pass' in the apprenticeship scheme is 70%, whereas to gain a 'distinction' it will be 80%.

3.3 Managing the Apprenticeship

Unlike the development of the apprenticeship standard and the assessment plan, managing the apprentice throughout the apprenticeship is not documented elsewhere and is left entirely to the employer. Within this document, guidance is given to the employer, together with contact details of where further advice may be obtained.

4. Apprentice's Responsibilities

4.1 Preparation

Affiliate Membership of BINDT – The apprentice should register online as an Affiliate Member of the British Institute of NDT (membership is free of charge). This will bring considerable benefits to the apprentice in terms of information and learning materials. In addition to the information provided online, the apprentice will be sent two of the Institute's monthly periodicals, *Insight* and *NDT News*. Being an Affiliate Member of BINDT is highly recommended.

Continuing Professional Development (CPD) – At the same time as registering online to become an Affiliate Member of BINDT, the apprentice should also register to create and maintain a CPD record online. This will enable the apprentice to maintain an employment/training/qualification paper trail, which is a requirement of the Engineering Council. Registering online for CPD is highly recommended.

Log book – It will be necessary for the apprentice to keep an up-to-date log book for logging NDT experience (defined as supervised practice). The log book should be filled in on a daily basis and counter-signed by the apprentice's supervisor. Log books will be provided by the professional body, the British Institute of NDT. Maintaining a log book of supervised practice is a mandatory requirement.

The requirements for on-the-job training (supervised practice) are mandated in national and international standards, such as EN ISO 9712 (Ref: 1) and EN 4179 (Ref: 2). This is a requirement of the certification body (EN ISO 9712) and employer (EN 4179) and certificates or letters of approval will not be issued until this requirement is met.

The person carrying out the supervision needs to be suitably experienced and qualified in the application of the NDT method(s) undertaken. The end-point assessment will review the extent of experience gained for each NDT method during the apprenticeship. For the purpose of this apprenticeship, experience may include:

- Carrying out the method(s) under supervision
- Working closely with a suitably experienced inspector who is inspecting a weld, component or material, etc
- Working within a team carrying out the method(s)
- Fast-tracked training at a training centre
- Supervised practice at a training school
- Calibrating equipment
- Checking the parameters of equipment, such as probe angles, beam spread or magnetic flux, etc
- Carrying out any other activities of the method identified in the syllabus.

The supervisor of on-the-job training (experience) will ensure that the apprentice keeps a daily log of experience and initials each entry to authenticate compliance.

Evidence Portfolio – It will be necessary for the apprentice to maintain an evidence portfolio for collating attendance certificates, examination results and other documents. Maintaining a portfolio of evidence is a mandatory requirement.

Apprenticeship Guidance Document – This document has been prepared by the NDT Trailblazer Development Group and is intended to offer guidance to the apprentice and the employer regarding the choice of NDT method that needs to be undertaken during the apprenticeship. The Apprenticeship Guidance Document (Ref: 6) can be found on the BINDT website in the apprenticeship document download section.

Engineering Council's Documentation – The successful apprentice will have met the academic requirements for Engineering Council EngTech registration. If the apprentice has accumulated at least eighteen months of NDT experience prior to the commencement of the apprenticeship, then the apprentice would be eligible for EngTech registration at the end of the apprenticeship. However, if the apprentice is new to NDT at the beginning of the apprenticeship, then the apprentice will fall short of the necessary experience. It is recommended that the apprentice familiarises him/herself with the contents of the UK-SPEC: UK Standard for Professional Engineering Competence (Ref: 3), particularly the EngTech registration section, because once the experience has been achieved, the apprentice will be eligible for registration.

Codes of Conduct – The apprentice will need to understand and conform to the BINDT and UK-SPEC codes of conduct (Ref: 9). Both of these documents can be downloaded from the BINDT website in the apprenticeship section.

Employer's Units of Competence – These documents are Appendices 1 to 12 of this document but are filed individually for ease of use. The purpose of the Employer's Units of Competence (Ref: 8) is to provide guidance as to what each NDT method and other related activities include in terms of competency requirements. These documents can be downloaded from the BINDT website in the apprenticeship section.

Gantt Chart (work plan) – At the beginning of the apprenticeship, working with the employer, the apprentice should prepare a simple Gantt chart (work plan) of the intended apprenticeship programme. The work plan will detail what training and examinations will take place and when they will occur, as well as any other training modules. The work plan can be flexible and modifiable but needs to take into account the necessity of experience associated with the NDT Level 2 method. Preparing a Gantt chart at the beginning of the apprenticeship is highly recommended.

4.2 On-Programme Development

During the apprenticeship, which will last for around eighteen months, the apprentice is expected to gain a basic understanding of the knowledge, skills and behaviours requirements and will cover the NDT method, product technology, health & safety and behaviours. The apprentice, under the direction of the employer, will choose one of the NDT methods that he/she will undertake during the apprenticeship.

During the apprenticeship, if the apprentice is a new recruit, he/she will also be involved in company employment processes, such as inductions, registrations, issue of documentation and issue of personal protective equipment (PPE), etc.

The apprentice must complete all aspects of the apprenticeship before he/she will be allowed to progress to the development stage.

The apprentice will be given an NDT project to undertake during the apprenticeship by the employer, which must be completed before the end of the apprenticeship. The apprentice will prepare an NDT project report, which will be included in the documentation that is sent to the independent assessment organisation. The apprentice will also create an NDT project showcase presentation, which he/she will present to the independent assessment panel.

4.2.1 NDT Project

The NDT project will be a start-to-finish project that requires the apprentice to carry out some research, determine the inspection methodology, prepare an NDT technique sheet, carry out the inspection and report the findings. The NDT project should include as many of the knowledge and skills requirements identified in the standard as reasonably practicable.

The apprentice needs to prepare a project final report of at least 5000 words (pictures and tables can be included) and a project presentation, both of which will be included in the end-point assessment. The apprentice will give his presentation on appropriate presentation software, such as Microsoft PowerPoint.

An example of an NDT project might be: 'Given a weld configuration, casting, forging or other material, determine what steps are needed to fully inspect the component'.

Aspects to consider:

- What type of NDT procedure and technique sheets need to be created?
- Which inspection authority is mandating the inspection?
- Which national or international codes have to be complied with?
- What equipment is required?
- What defects are being sought?
- What material(s) is the component made of?
- Does the specification require surface inspection, volumetric inspection or both?
- What method would you select to undertake the inspection?
- Are there any limitations of testing?
- Are there any special NDT processes required, such as techniques, consumables or probes?
- What are the reporting requirements?

The final activity of the project is to carry out the inspections and report on the findings. The project will be assessed on preparation, planning, methodology, project tasks, inspection and project completion.

4.2.2 Knowledge and Skills

The main thrust of the apprenticeship is to obtain sufficient knowledge and skills that enable the apprentice to meet the requirements of the NDT Operator Standard.

A summary of the knowledge and skills required for the NDT Operator apprenticeship are listed below; you should refer to the apprenticeship standard for the full and accurate version of requirements.

- Health & safety knowledge pertinent to the specific requirements of the relevant NDT method
- In-depth knowledge of one NDT method, to include its capabilities and limitations. An awareness of other NDT methods of inspection and their general capabilities/limitations
- The knowledge required for the assessment of defects against acceptance/rejection criteria (required by standards)
- Relevant sector-specific technology, quality aspects and working practices, such as inductions and confidentiality
- Material and product technology associated with the specific industry sector
- Develop an understanding of the consequences of failure and the risk to life
- Demonstrate health & safety competencies pertinent to the relevant NDT method, such as working at heights, in confined spaces and in restricted zones
- Carry out inspections using one NDT method, which would include:
 - Revealing defects present on the external surface of the test item/component
 - Using minimum levels of interpretation, usually by visual assessment only
 - Referring the inspection results to more skilled or qualified personnel to continue with the inspection process, assessment and interpretation
 - Safe operation of the equipment within its capabilities and limitations
 - Working effectively within the limitations of standard tests and measurements relevant to their field of activity
 - Performing NDT inspections in accordance with written NDT work instructions
 - Escalating concerns over the frequency of types of defect to his/her supervisor, in addition to confirming results and accurately recording the findings

- Clearly marking defective areas for other follow-up validation by supervisory staff, such as NDT Engineering Technicians
- Preparing and submitting clear and concise NDT inspection reports detailing the inspection findings
- Reading technical drawings to assist in the inspection process.
- Work under technical supervision and report regularly on progress
- Ask the supervisor for advice and guidance where appropriate
- Demonstrate a disciplined approach relating to industry standard operations and processes
- Exhibit environmental awareness and undertake safe working practices for self and others
- Have good practical ability, including hand/eye coordination, in order to apply NDT
- Achieve good time management and a disciplined approach.

4.2.3 Experience (Supervised Practice) On-the-Job Training

It is important to understand what is meant by experience in terms of acquiring NDT certification. Experience is mandatory and is defined in the national and international standards as ‘supervised practice’. The person carrying out the supervision needs to be certificated and suitably experienced in the application of the NDT method. For the purpose of this apprenticeship, it has been agreed what the definition of experience should be (see 4.1 Log Book).

The minimum duration of experience to achieve NDT Level 2 for a single method is given in the Table below. If you attempt NDT Level 1 followed by NDT Level 2, then the sum total of your experience is the same as that given in the Table below.

Table 1. Minimum duration of experience

NDT method	Experience (months)*
Ultrasonic testing (UT)	12
Radiographic testing (RT)	12
Eddy current testing (ET)	12
Visual testing (VT)	4
Magnetic particle testing (MT)	4
Penetrant testing (PT)	4

*Work experience in months is based on a nominal 40 hours/week or the legal week of work. When an individual is working in excess of 40 hours per week, he/she may be credited with experience based on the total number of hours, but he/she will be required to produce evidence of this experience. Regardless of the required experience, the apprenticeship duration remains at 18 months, which will allow the apprentice to gain the additional knowledge and skills identified in the apprenticeship standard.

4.2.4 Behaviours

Behaviours and human factors are just as important as knowledge and skills as they often impact on the outcome of an apprentice’s performance.

Once employed, the apprentice is expected to:

- Be a good timekeeper, whether at work or at an off-site training provider
- Conform to the behaviours set out in the apprenticeship standard at the earliest opportunity
- Be respectful to the employer and others involved with the apprenticeship
- Ensure pre-apprenticeship obligations are fulfilled, such as joining the professional body (BINDT) as an Affiliate Member (free of charge), registering with BINDT for continuing professional development (CPD) and receive an apprenticeship pack from the professional body, through the employer

- Seek advice when there is any aspect of the apprenticeship that is not understood
- Work hard to meet the deadlines set out in the Gantt chart (work plan).

The mandatory **behaviours** requirements are:

Communication – to communicate effectively with senior NDT staff, such as NDT Engineering Technicians, in order to facilitate timely accurate completion of the inspection programmes.

Teamwork – to work effectively in a team and to support others where appropriate.

Delivery – to consistently see things through to timely completion.

Common sense – to consistently apply knowledge and experience with balance.

Influence – have a positive impact without relying on others.

Ethics – to act with maturity, honesty, integrity and responsibility.

Behaviours will be assessed in the workplace by the employer and at the end-point assessment by the independent assessment organisation.

4.2.5 Activities to be carried out before completing the apprenticeship

The following activities will be carried out prior to completing the apprenticeship:

- Complete the project and prepare the project report
- Create a project showcase presentation (normally PowerPoint) to present to the independent assessment organisation. The project showcase presentation will demonstrate how the apprentice has achieved many of the knowledge, skills and behaviours identified in the NDT Operator standard
- Familiarisation with the Engineering Council's UK-SPEC EngTech registration and checklist, as contained in Appendix 16
- Complete the log book of supervised experience
- Assemble the portfolio of evidence, which will include, but not be limited to: the project report, training records, examination results notices, certificates of competence, certificates of attendance and any other useful information about achievements during the apprenticeship.

4.3 Preparing for the End-Point Assessment

Once the apprentice has completed the apprenticeship, the employer should send the log book, portfolio of evidence and the completion certificate (Appendix 15) to the independent assessment organisation. Once the portfolio of evidence has been received, the independent assessment organisation will offer an assessment date to the apprentice.

The format of the end-point assessment will be:

- Review of the portfolio of evidence (apprentice not present)
- Project showcase presentation by the apprentice
- Synoptic interview, which will cover all aspects of the apprenticeship not covered by the project showcase presentation, including the NDT method, the other knowledge and skills requirements identified in the standard, the NDT project and CPD behaviours.

Note: to be absolutely clear, every aspect of the apprenticeship standard is subject to scrutiny and questioning at the synoptic interview even though the apprentice may have passed examinations and received certificates during the apprenticeship.

5. Employer's Responsibilities

This section explains the legal and technical responsibilities of the employer when employing an apprentice.

5.1 Pay and Conditions

There are minimum and in some cases mandatory requirements for determining the pay and conditions of the apprentice.

5.1.1 Paying the Apprentice

You must pay apprentices at least the minimum wage rate. The national minimum wage calculator, which you can access online at <https://www.gov.uk/take-on-an-apprentice/pay-and-conditions-for-apprentices>, works out the exact amount that you have to pay an employee.

5.1.2 Conditions

Apprentices usually work for at least 30 paid hours a week and must work more than 16. You must pay your apprentice for time spent training or studying for a relevant qualification, whether while at work or at a college or training organisation. You must offer apprentices the same conditions as other employees working at similar grades or in similar roles. This includes:

- Paid holidays
- Sick pay
- Any benefits you offer, for example childcare voucher schemes
- Any support you offer, for example coaching or mentoring.

5.1.3 Apprentices and Redundancy

You cannot usually make an apprentice redundant simply because you cannot afford to pay them, for example if your company runs out of work. This is because you have a contract to train them. You should get legal advice if you think you might have to make an apprentice redundant or want to end the apprenticeship early for another reason. If you have to make an apprentice redundant, then you are expected to make every effort to find another employer to take over the apprenticeship; BINDT, the professional body, will assist you in achieving this. If you are unsure whether you can commit to a full apprenticeship but would still like to hire an apprentice, you can use an apprenticeship training agency.

5.1.4 Making an Apprenticeship Agreement

You must sign an apprenticeship agreement with your apprentice. This gives details of what you agree to do for the apprentice, including:

- How long the apprenticeship is planned for
- The training you will give them
- Their working conditions
- The qualifications they are working towards
- Employer's company rules and disciplinary procedures.

You can write your own apprenticeship agreement or download an apprenticeship agreement template, accessed at <https://www.gov.uk/take-on-an-apprentice/apprenticeship-agreement>

5.1.5 Apprenticeship Training Agencies

You may use an apprenticeship training agency to find an apprentice to work for you. This means that you:

- Are not the apprentice's employer
- Can stop employing the apprentice more easily if you need to
- Pay a fee to the agency for the apprentice to work for you.

Apprenticeship training agency fees are usually the minimum wage for the apprentice plus a management fee. The agency supervises the apprentice's learning, including their training and assessment. If you end the apprenticeship early (for example, you cannot afford to carry on employing the apprentice), the agency will find them another work placement. Contact the National Apprenticeship Service for more information on using an apprentice training agency (National Apprenticeship Service – Tel: 0800 015 0600).

5.2 *Managing the Apprenticeship*

The apprenticeship is an eighteen-month period whereby the apprentice will be focused on learning, training and qualification without deviating onto other activities, such as work or administration duties. Assuming you do not employ the apprentice through a training agency, you will need to manage the apprenticeship in the following manner.

5.2.1 **Starting an Apprenticeship**

In order to start an apprenticeship, you will need to comply with the following steps:

- Check the apprenticeships website for an apprenticeship in your industry and at a suitable level
- Register your interest in employing an apprentice with the National Apprenticeship Service or simply follow your company's own procedures for recruiting new staff
- Find a training organisation who will manage apprenticeships for your industry and liaise with the lead provider – they will handle your apprentice's training, qualification and assessment
- Check your eligibility for a grant and apply (this grant refers to employing an apprentice between the ages of 16 and 18 years inclusive)
- Advertise your apprenticeship – your training organisation will do this for you through apprenticeship vacancies. You can track your vacancies by registering as an employer. You may also wish to advertise your apprenticeship on the BINDT website and/or in one of its publications
- After selecting your apprentice, make an apprenticeship agreement with them.

5.2.2 **Identification of Key People**

Before the commencement of the apprenticeship there will be a need to identify and share contact details of key personnel. As a minimum, the list of key personnel will include:

- Employer's representative
- Lead provider's representative
- Independent assessment body's representative
- Professional body's representative
- Apprentice's mentor
- Apprentice's supervisor for on-the-job training
- Apprentice.

5.2.3 **Initial Considerations**

Before the apprentice begins the apprenticeship, you should fulfil the following requirements:

- Conduct relevant eyesight, colour vision and medical tests
- Carry out company inductions, enrolments and processes
- Issue personal protective equipment (PPE)
- For each apprentice, apply for an apprenticeship start-up pack from the British Institute of NDT (the professional body), which will include:
 - Log book for supervised practice
 - Apprentices' guidance document
 - Engineering Council UK-SPEC
 - Information sheet: How to join BINDT as an Affiliate Member
 - Information sheet: How to register for online CPD

- Select a lead provider
- Select an NDT training provider
- Through the lead provider, select an end-point assessment organisation
- Select an NDT method
- Prepare an apprenticeship Gantt chart or work plan.

5.2.4 Ongoing Activities and Commitments

If some of the following requirements are difficult to achieve, particularly if you are an SME, then consult your lead provider, NDT training provider and/or BINDT:

- Ensure that the apprentice has joined BINDT as an Affiliate Member
- Ensure that the apprentice registers for online CPD
- Facilitate courses and examinations throughout the apprenticeship
- Provide tuition to achieve English and maths qualifications, if required
- Carry out quarterly (three-monthly) appraisals and complete the appropriate check sheet (Appendix 17)
- Require corrective actions if the appraisals raise any non-compliance
- Three months before the end of the apprenticeship, determine that the apprentice has completed the NDT project and is on course to meet all other requirements stipulated in the NDT Operator apprenticeship standard
- At the end of the apprenticeship (eighteen months), determine that the apprentice has prepared the NDT project presentation, has completed all of the requirements of the NDT Operator standard, has completed the log book of supervised practice, has collated the portfolio of evidence, has completed the apprenticeship completion certificate and has kept the online CPD up-to-date.

In a supportive way, you should also consider providing or facilitating:

- On-the-job coaching and learning
- Off-the-job learning
- Online learning and support
- Workbooks
- Mentoring and line management support
- Specific training for individuals.

5.2.5 Preparing for the End-Point Assessment

You need to ensure that the apprentice has completed the following list of activities and that all appropriate documents are sent to the independent assessment organisation:

- The apprentice has achieved all of the knowledge, skills and behaviours identified in the standard
- The apprentice has achieved a minimum of 70% in each module of the NDT Level 1 certification for the complex method (if applicable)
- The apprentice has achieved a minimum of 70% for each module of the NDT Level 2 method
- The apprentice has familiarised him/herself with the UK-SPEC
- The apprentice has completed the apprenticeship completion document
- The apprentice and supervisor for on-the-job training have completed the log book
- The apprentice has collated the portfolio of evidence.

6. The Mentor

A mentor is a person or friend who guides a less experienced person by building trust and modelling positive behaviours. An effective mentor understands that his or her role is to be dependable, engaged, authentic and tuned in to the needs of the apprentice.

The concept of mentoring is simple, but successful implementation can be challenging. Characteristics of effective mentoring include the ability and willingness to:

- Value the apprentice as a person
- Develop mutual trust and respect
- Maintain confidentiality
- Listen both to what is being said and how it is being said
- Help the apprentice solve his or her own problem, rather than give direction
- Focus on the apprentice's development and resist the urge to produce a clone.

7. The Lead Provider and NDT Training Provider

A lead provider is an organisation that has been approved by the Skills Funding Agency (SFA) and has a funding allocation to provide or facilitate training for apprenticeships. Lead providers will ensure that suitable training has been provided to the apprentice in order for them to pass their apprenticeship. In the case of NDT training and certification (qualification), training providers must be approved as authorised training organisations (ATOs) for training, or as authorised qualifying bodies (AQBs) for certification (qualification) by the certification body. In the case of BS EN ISO 9712 and BS EN 4179, the certification body is the British Institute of Non-Destructive Testing. In most cases, lead providers will sub-contract the NDT and other technical requirements to ATOs and AQBs.

Most employers work in partnership with lead providers and NDT training providers to deliver their apprenticeship programme. If you so wish, a lead provider and/or the NDT training provider will help you:

- Identify the right apprenticeship for your business requirements
- Recruit an apprentice
- Develop a training plan that reflects the apprentice's and your needs
- Review and test the progress of an apprentice and provide feedback
- Provide training to support the apprentice with off-the-job learning and the knowledge elements of the programme.

A lead provider usually holds the apprenticeship delivery contract, which is managed by the Skills Funding Agency (SFA). When you embark on an apprenticeship for an apprentice or a number of apprentices, you must select a lead provider from the Register of Training Providers; the NDT training provider will help you with this requirement.

You can find the most suitable lead provider for your business by thinking about:

- Your business area and job role of the programme (and potential frameworks and levels)
- The size and scope of the programme (numbers, geography and age groups)
- Whether you will integrate your in-house training materials into the programme.

8. The Independent Assessment Organisation

A register of apprentice assessment organisations has been created for employers to select an independent assessment organisation. The following considerations apply to the use of the register:

- The register is a list of organisations that have been assessed as being suitable to conduct the independent end-point assessment of apprentices and be in receipt of public funds
- An apprentice is unable to complete and achieve an apprenticeship without taking and passing the end-point assessment
- Organisations can only be selected to undertake the independent end-point assessment of apprentices if they are listed on the register

- The register has been created to help employers
- Employers will use the register to select an organisation to undertake the independent end-point assessment of apprentices
- Employers will determine the process for selection
- The lead training provider will then contact the end-point assessment organisation, on behalf of the employer
- The register is always open to new applications at the Bravo Solution portal
- Applicants to the register must be legal entities.

The independent assessment organisation will have had no involvement in the development of the apprentice. The end-point assessment shall be conducted by two suitably qualified and trained interviewers (assessors). They shall be Engineering Council registrants at IEng or above and shall have substantial experience in non-destructive testing. The independent assessment organisation shall take all reasonable steps in their selection of interviewers to ensure that potential conflicts of interest are avoided.

The independent assessment organisation will assess the apprentice's outcomes at the end of the apprenticeship by:

- Carrying out a portfolio of evidence assessment
- Reviewing a project showcase presentation by the apprentice on the NDT project outcomes
- Carrying out a synoptic assessment interview of all of the knowledge, skills and behaviour outcomes, including matching the outcomes to the UK-SPEC. This last item is to prepare the apprentice in all aspects of engineering registration other than the requirement to gain a total of three years' experience.

Every aspect of the standard is subject to scrutiny and questioning at the synoptic assessment interview, even though the apprentice may have passed examinations and received certificates during their apprenticeship.

Further details of the portfolio of evidence assessment, project showcase presentation and synoptic interview can be seen in the assessment plan.

After the documentation review, the project showcase presentation and the synoptic assessment interview, the independent assessment organisation will make a decision as to whether the apprentice has passed the apprenticeship (and is therefore EngTech ready, subject to gaining the commensurate amount of experience) and, if so, whether to award a 'pass' or a 'distinction'. The criteria for awarding a 'pass' is to achieve an overall apprenticeship score of a minimum of 70% but less than 80%, whereas the criteria for awarding a distinction is to achieve an overall apprenticeship score of a minimum of 80%.

Note: Although an apprentice may have achieved a minimum score of 70+% or 80+%, there is also a mandatory requirement to achieve a minimum of 70% in each module of each NDT method attempted.

9. The Professional Body

The professional body for non-destructive testing (NDT), condition monitoring (CM), diagnostic engineering and all other materials and quality testing disciplines in the UK is the British Institute of Non-Destructive Testing (BINDT).

BINDT will offer support and advice to all those involved in NDT apprenticeship schemes, including the apprentice, the employer, the lead provider and the independent assessment body. Some useful email addresses are listed below.

Information and advice on:

Apprenticeships – apprenticeships@bindt.org

Website, CPD and publications – info@bindt.org

BINDT membership – membership@bindt.org

Training and certification – pcn@bindt.org

General advice – info@bindt.org

The contact telephone number for BINDT is: +44 (0)1604 438300.

BINDT will issue apprentices with an apprenticeship pack at the beginning of the apprenticeship.

10. Quality Assurance Assessors

Quality assurance needs to be independent of those who lead on the design and the delivery of assessments. BINDT has proposed a professional body-led system, which is currently under review. In the proposal, it has been specific about who will quality assure the end-point assessment, how they will do it and the approach to ensuring quality of assessment over time and across different locations.

In addition to the external quality assurance arrangements, the independent assessment organisation needs to carry out internal audits to ensure that they are in compliance with the NDT Operator apprenticeship standard and assessment plan.

11. Occupational Competence of Key Officers

It is recommended that anyone involved in the assessment of vocational achievement undergoes training. An example of this training is 'Level 3 Certificate in Assessing Vocational Achievement' (<http://thebigteacher.com/index.php/courses/assessor-courses/42-level-3-certificate-in-assessing-vocational-achievement>).

The assessors and advisors referred to in this section include:

- The independent assessment organisation interviewers (assessors)
- The professional body
- The lead providers
- The employer
- The mentor
- The supervisor of on-the-job training (supervised practice)
- Company internal audit assessors
- Independent assessment organisation internal audit assessors.

Assessment must be carried out by competent assessors that, as a minimum, must have demonstrable knowledge and experience of non-destructive testing or the technical module they are assessing.

Personnel and organisations involved in the NDT Operator apprenticeship are: the independent assessment organisation, the professional institute, the employer, lead providers, the mentor, the supervisor of on-the-job training (supervised practice) and quality assurance assessors.

11.1 *Independent Assessment Organisations*

Independent assessment organisation interviewers (assessors) must be trained interviewers and have knowledge of NDT technical competence. This will be demonstrated by a relevant certificate of competence, technical qualification or by proven industrial experience of the technical areas to be assessed. Two assessors forming the judging panel will be registered with the Engineering Council at IEng level or above. The assessors must include someone with the knowledge, skills and experience of the modules being undertaken by the apprentice.

Assessors must also be fully conversant with the independent assessment organisation's assessment recording documentation used for scoring the portfolio of evidence, the project showcase presentation and the synoptic interview, together with the UK-SPEC and any other relevant documentation.

11.2 *The Professional Body (BINDT)*

The professional body is in a position to provide an extensive amount of information for further learning, online CPD, membership at Affiliate grade and Engineering Council registration through its PEI Committee. BINDT staff involved with the apprenticeship programme will be competent to offer advice and guidance.

11.3 *Lead Providers*

Lead providers must be on the SFA-approved training provider database.

11.4 *NDT training providers*

Training organisations providing non-destructive testing (NDT) training and/or certification, including employer-based training, must be approved by the professional body (BINDT) as an ATO and, where applicable, as an AQB.

11.5 *Employers*

Employers must be familiar with quality plans, including Gantt charts (work plan), and the process by which you monitor progress and assign corrective actions. Employers must prepare an apprenticeship Gantt chart (work plan) that demonstrates how the apprentice will complete the apprenticeship in the given time. Employers must also provide resources and allocate time for on-site and off-site training.

11.6 *Mentors*

Mentors need not have any specific qualifications; the role requires more of a friendly face, prepared to listen and to offer advice. It is advised that the mentor does not have any other role within the apprenticeship. It is also advised that the mentor undertakes a one-day mentor's training course.

11.7 *Supervisor of On-the-Job Training (Supervised Practice)*

The supervisor of on-the-job training must be certificated to a minimum of NDT Level 2 in the method they are supervising. The supervisor needs to confirm that the on-the-job training has been carried out in a correct manner and the hours booked against supervised practice is an accurate record.

Independent assessment organisations, employers and lead providers will use the Employer's Units of Competence (EUCs), identified as Appendices 1 to 12, as a guide to the knowledge and experience required by the competence. To avoid making this document overly long and unwieldy, the 13 EUCs (Appendices 1 to 12 – including 7a and 7b) are filed as separate documents in the apprenticeship area of the BINDT website.

11.8 *Company Internal Audit*

Internal quality assurance (the internal audit) relates to measures put in place by the employer to verify that the processes and activities of the apprenticeship scheme are being carried out correctly and in a timely fashion.

An internal audit must be carried out by a competent auditor selected by the employer. The employer has overall responsibility for the internal audit.

11.9 *Independent Assessment Organisation's Internal Audit Assessors*

The independent assessment organisation's internal audit will be carried out by competent auditors.

Independent assessment organisation internal auditors must be independent of the part of the organisation carrying out the assessment of the apprentices.

Internal auditors will be expected to regularly review their skills, knowledge and understanding and, where applicable, undertake continuing professional development to ensure that they are carrying out workplace quality assurance (internal audit) of assessment processes and practices to the most up-to-date procedures and standards.

Internal auditors will be expected to be fully conversant with the terminology used in the Employer's Units of Competence, NDT documentation and the UK-SPEC, against which the assessments and audits are to be carried out.

12. Glossary

In addition to the acronyms mentioned in this document, other acronyms have been added to provide the reader with useful information they may come across when reading other NDT documentation.

AQB	Authorised qualifying body
ATO	Approved training organisation
BINDT	British Institute of Non-Destructive Testing
CAD	Computer-aided design
CCNSG	Client/Contractor National Safety Group
CEng	Engineering Council, Chartered Engineer registration grade
CPD	Continuing professional development
CSD	BINDT Certification Services Division
ECITB	Engineering Construction Industry Training Board
EngTech	Engineering Council, Engineering Technician registration grade
EngTech-ready	This describes the situation whereby the apprentice has fulfilled all of the requirements for EngTech registration, including passing the professional review interview
Gantt	An illustration of a project schedule that was devised by Henry Gantt in 1910
IEng	Engineering Council, Incorporated Engineer registration grade
IOSH	Institute of Occupational Safety and Health
NDT	Non-destructive testing
PEI	Professional engineering institute
SFA	Skills Funding Agency
UKAS	United Kingdom Accreditation Service
UK-SPEC	The UK Standard for Professional Engineering Competence

13. References

- Ref: 1** BS EN ISO 9712:2012 – Non-destructive testing – Qualification and certification of NDT personnel
- Ref: 2** BS EN 4179:2009 – Aerospace series – Qualification and approval of personnel for non-destructive testing
- Ref: 3** UK-SPEC – The UK Standard for Professional Engineering Competence
- Ref: 4** Non-Destructive Testing (NDT) Operator Apprenticeship Standard
- Ref: 5** Non-Destructive Testing (NDT) Operator Apprenticeship Assessment Plan
- Ref: 6** Apprentice’s Guidance document (located on the British Institute of NDT website at www.bindt.org)
- Ref: 7** On-Programme Competency Development document (located on the British Institute of NDT website at www.bindt.org) this document
- Ref: 8** Employer’s Units of Competence documents
- Ref: 9** BINDT and UK-SPEC codes of conduct

14. Appendices

Appendix 1	Employer’s Unit of Competence – Visual Testing NDT Level 2 (<i>see separate document</i>)
Appendix 2	Employer’s Unit of Competence – Penetrant Testing NDT Level 2 (<i>see separate document</i>)
Appendix 3	Employer’s Unit of Competence – Magnetic Particle Testing NDT Level 2 (<i>see separate document</i>)
Appendix 4	Employer’s Unit of Competence – Ultrasonic Testing NDT Level 2 (<i>see separate document</i>)
Appendix 5	Employer’s Unit of Competence – Radiographic Testing NDT Level 2 (<i>see separate document</i>)
Appendix 6	Employer’s Unit of Competence – Eddy Current Testing NDT Level 2 (<i>see separate document</i>)
Appendix 7a	Employer’s Unit of Competence – Thermography Testing (Passive) NDT Level 2 (<i>see separate document</i>)
Appendix 7b	Employer’s Unit of Competence – Thermography Testing (Active) NDT Level 2 (<i>see separate document</i>)
Appendix 8	Employer’s Unit of Competence – Behaviours (<i>see separate document</i>)
Appendix 9	Employer’s Unit of Competence – Product Technology (<i>see separate document</i>)
Appendix 10	Employer’s Unit of Competence – Health & Safety (<i>see separate document</i>)
Appendix 11	Employer’s Unit of Competence – Quality Assurance and Audit & Surveillance (<i>see separate document</i>)
Appendix 12	Employer’s Unit of Competence – Project Management with a focus on NDT (<i>see separate document</i>)
Appendix 13	Description of NDT Methods
Appendix 14	A list of other Technical and Safety Modules
Appendix 15	Apprenticeship Completion Checklist
Appendix 16	UK-SPEC Competency Matching Form – EngTech Registration
Appendix 17	Employer’s Appraisal Checklist

Appendix 13

Description of NDT Methods

The apprentice will undertake safety-critical and complex training, both in a classroom environment and on-site, which will include NDT Level 2 training in one method. Available methods are described briefly below:

- **Visual testing:** Visual inspection, with or without optical aids, is the original method of NDT. Many defects are surface-breaking and can be detected by careful direct visual inspection. Optical aids include low-power magnifiers, microscopes, telescopes and also specialised devices such as borescopes, endoscopes and other fibre-optic devices for the inspection of restricted access areas. These devices can also be used with television camera systems. Much of the success of visual inspection depends on the surface condition and the lighting arrangements. Surface preparation such as cleaning and etching is often used.
- **Ultrasonic testing:** Ultrasonic methods of NDT use beams of mechanical waves (vibrations) of short wavelength and high-frequency, transmitted from a small probe and detected by the same or other probes. Such mechanical waves can travel large distances in fine-grain metal, in the form of a divergent wave with progressive attenuation. The frequency is in the range of 0.1 to 20 MHz and the wavelength in the range of 1 to 10 mm. The velocity depends on the material and is in the range of 1000-6000 m/s. The technique detects internal, hidden discontinuities that may be deep below the surface. Transducers and coupling wedges are available to generate waves of several types, including longitudinal, shear and surface waves. Applications range from thickness measurements of thin steel plate to internal testing of large turbine rotors.
- **Radiographic testing:** Radiography uses X-rays or gamma rays to produce an image of an object on film. The image is usually natural-size. X-rays and gamma rays are very short wavelength electromagnetic radiation that can pass through solid material, being partly absorbed during transmission. Thus, if an X-ray source is placed on one side of a specimen and a photographic film on the other, an image is obtained on the film of the thickness variations in the specimen, whether these are surface or internal. This is a well-established technique that gives a permanent record and is widely used to detect internal flaws in weldments and castings and to check for misconstructions in assemblies. The source of radiation is either an X-ray tube or a pellet of radioactive material emitting gamma radiation.

- **Eddy current testing:** In eddy current testing, a coil carrying an AC current is placed close to the specimen surface or around the specimen. The current in the coil generates circulating eddy currents in the specimen close to the surface and these in turn affect the current in the coil by mutual induction. Flaws and material variations in the specimen affect the strength of the eddy currents. The presence of flaws and so on is therefore measured by electrical changes in the exciting coil. Both voltage and phase changes can be measured, but some simpler instruments measure only the voltage changes. The strength of the eddy currents produced depends on the electrical conductivity of the specimen, the magnetic permeability (for a ferromagnetic specimen), the stand-off distance between the specimen and coil, the AC frequency used in the exciting coil and the dimensions of the coil and specimen.
- **Magnetic particle testing:** This method is used for the detection of surface and near-surface flaws in ferromagnetic materials and is primarily used for crack detection. The specimen is magnetised either locally or overall and, if the material is sound, the magnetic flux is predominantly inside the material. If, however, there is a surface-breaking flaw, the magnetic field is distorted, causing local magnetic flux leakage around the flaw. This leakage flux is displayed by covering the surface with very fine iron particles applied either dry or suspended in a liquid. The particles accumulate at the regions of flux leakage, producing a build-up that can be seen visually, even when the crack opening is very narrow. Thus, a crack is indicated as a line of iron powder particles on the surface.
- **Penetrant testing:** This is a simple, low-cost method of detecting surface-breaking flaws such as cracks, laps, porosity, etc. To be detected, the flaw must reach the surface to be tested. Penetrant testing is one step up from visual inspection and offers many advantages, such as speed, large-area coverage and cheapness. It is usually a six-stage process:
 - surface cleaning (degreasing, etc)
 - application of a penetrant liquid (dipping, spray, brush)
 - removal of excess penetrant (solvent, water)
 - application of developer
 - inspection of the test surface (visual, television camera)
 - post-inspection cleaning (anti-corrosion solutions).
- **Infrared thermography testing:** Thermography is a technique of obtaining an image of the heat distribution over the surface of an object. The usual method is to use a special television camera with an infrared sensitive detector and a lens that transmits infrared radiation. Such cameras can operate at normal video rates. Temperature variations in the subject are then displayed as shades of grey or can be converted into a pseudo-colour image. Temperature variations as small as 0.1°C can be detected. The two main fields of application are:
 - to look at the heat distribution in hot specimens, such as furnace walls, insulated structures, electronic circuits, etc, in a steady-state – generally known as passive thermography;
 - to provide a pulsed source of heat on one side of a specimen and examine the other side for non-uniformities in infrared emission that would correspond to internal inhomogeneities or large flaws – generally known as active thermography.

Appendix 14

A list of other Technical and Safety Modules

A list of other NDT modules and health & safety modules that could be attempted during the apprenticeship are listed below. This list is not exhaustive and provided that modules not listed are conceptually included in the standard, then they can be used as part of the requirement. The key thing when choosing modules from the list below is that you can demonstrate that you have met the requirements of the standard.

Technical

- Oxide thickness measurement
- Corrosion under insulation
- Detection of hydrogen cracking (induced cold cracking associated with welding)
- Detection of hydrogen cracking (associated with operating environments)
- Identification of dissimilar metals using XRF portable equipment
- Detection of delaminating bonded joints
- Critical defect sizing
- Introduction to time-of-flight diffraction (TOFD)
- Introduction to phased array
- Introduction to thermal imaging
- Product technology (materials, defects and failure mechanisms)
- Bolt/shaft testing – the effects of mode conversion
- Understanding of condition monitoring
- Introduction to welding processes
- Introduction to material science
- Introduction to materials replication
- Introduction to CAD
- Manufacturing with engineering materials
- Principles of solid mechanics and dynamics
- Engineering polymers and ceramics
- Materials selection, processes and failure investigation
- Project
- Management and individual project
- Microstructural engineering of materials
- Degradation and evaluation
- Level 3 certificate in assessing vocational achievement
- Hardness testing using portable equipment
- Remote visual testing using borescopes, video probes and other remote visual systems
- Effective communication and presentation skills
- Introduction to budgetary control.

Health & Safety

- IOSH Managing Safely course
- Training in working at heights
- Training in confined space working
- Training in chemical handling
- Training in basic electrical safety
- Training in manual handling of objects
- Preparing risk assessments
- Preparing method statements
- Training in machinery safety
- First aid training
- Rope access training
- Working in a nuclear environment
- Defensive driving
- Basic radiation safety
- Safety awareness of using hazardous NDT consumables
- Personal Track Safety (PTS).

Appendix 15

Apprenticeship Completion Checklist

Apprentice/Apprenticeship details		
Apprentice's name:		
Apprentice's employer:		
Apprentice's PCN or EN 4179 number:		
BINDT membership number:		
Apprenticeship standard title:		
Apprenticeship assessment plan title:		
Date apprenticeship commenced:		
Date apprenticeship finished:		
Statement	Answer Yes/No	Supporting details – Where to find the evidence
I have completed the NDT method and passed all examinations		
I have gained all of the knowledge requirements identified in the standard		
I have acquired all of the skills requirements identified in the standard		
I have acquired all of the behaviours requirements identified in the standard		
I have fully completed the log book		
I have collated my portfolio of evidence		
I have completed my UK-SPEC matching form		
I have kept my online CPD up-to-date		
I have completed my project report		
I have prepared my project showcase presentation		
I have conformed to the BINDT and UK-SPEC codes of conduct		
I am ready for my end-point assessment		
Apprentice name:	Date:	Signature:
Employer:	Date:	Signature:

Appendix 16

UK-SPEC Competency Matching Form for EngTech Registration

<p>The Competence and Commitment Standard for Engineering Technicians.</p> <p><i>Engineering technicians must be competent throughout their working life, by virtue of their education, training and experience, to:</i></p>	<p>The examples given below are intended to help you identify activities you might quote to demonstrate the required competence and commitment for EngTech registration. These are not exhaustive. Moreover, you are not required to give multiple examples to demonstrate competence and commitment.</p> <p><i>Tell us about your career, education and training. Explain how the experience you have gained has made you more competent.</i></p>	<p>Fill in the boxes below with your own self-assessment.</p>
<p>A Use engineering knowledge and understanding to apply technical and practical skills.</p> <p><i>This includes the ability to:</i></p>	<p>The reviewers will be looking for evidence that you have the know-how to do the job and were able to go beyond the immediate requirements and use your initiative and experience to solve a problem or improve a process.</p>	
<p>A1 Review and select appropriate techniques, procedures and methods to undertake tasks.</p>	<p>Describe:</p> <p>an example of work you did that went well, the choices you made and the outcome or something in your work that you were involved in which didn't quite work and explain why or a technique, procedure or method you improved upon and explain why.</p>	
<p>A2 Use appropriate scientific, technical or engineering principles.</p>	<p>Drawing from your direct experience, this might be an explanation of how a piece of equipment, system or mechanism works.</p>	
<p>B Contribute to the design, development, manufacture, construction, commissioning, operation or maintenance of products, equipment, processes, systems or services.</p> <p><i>In this context, this includes the ability to:</i></p>	<p>Explain how you contribute to one or more of these activities.</p>	
<p>B1 Identify problems and apply appropriate methods to identify causes and achieve satisfactory solutions.</p>	<p>Show an example of how you have used measurement, monitoring and assessment to:</p> <p>identify the source of a problem or to identify an opportunity or to propose a solution.</p>	

<p>B2 Identify, organise and use resources effectively to complete tasks, with consideration for cost, quality, safety, security and environmental impact.</p>	<p>Illustrate how you make decisions about: what information, material, component, people or plant to use or how to introduce a new method of working or what precautions you took. Describe how you have contributed to best practice methods of continuous improvement, for example ISO 9000.</p>	
<p>C Accept and exercise personal responsibility.</p> <p><i>This includes the ability to:</i></p>	<p>Describe an experience or instance where you have had to accept personal responsibility for seeing a process through to completion within agreed targets.</p>	
<p>C1 Work reliably and effectively without close supervision, to the appropriate codes of practice.</p>	<p>Your evidence should show how you identified and agreed what had to be done and to what standards on a typical project.</p>	
<p>C2 Accept responsibility for the work of self or others.</p>	<p>Your evidence could include: minutes of meetings; site notes and instructions; variation orders; programmes of work; specifications, drawing and reports; or appraisals.</p>	
<p>C3 Accept, allocate and supervise technical and other tasks.</p>	<p>Activity not associated with your job can contribute to evidence.</p>	
<p>D Use effective communication and interpersonal skills.</p> <p><i>This includes the ability to:</i></p>	<p>You will need to show you can: contribute to discussions; make a presentation; read and synthesise information; or write different types of documents.</p>	
<p>D1 Use oral, written and electronic methods for the communication in English of technical and other information.</p>	<p>Your evidence could include: letters; reports; drawings; emails; minutes, including of progress meetings; appraisals; work instructions; and other task-planning and organising documents. Your application itself will be relevant.</p>	
<p>D2 Work effectively with colleagues, clients, suppliers or the public, and be aware of the needs and concerns of others, especially where related to diversity and equality.</p>	<p>Show examples of how this has occurred and your role at the time. Describe your role as part of a team. Describe a situation where you put your awareness into practice.</p>	
<p>E Make a personal commitment to an appropriate code of professional conduct, recognising obligations to society, the profession and the environment.</p>	<p>Your commitment will be to become part of the profession and uphold the standards to which all members subscribe. You need to show that you have read and understood your institution's code of conduct.</p>	
<p>E1 Comply with the code of conduct of your institution.</p>	<p>The professional review involves demonstration of, or discussion of, your position on typical ethical challenges.</p>	

<p>E2 Manage and apply safe systems of work.</p>	<p>Provide evidence of applying current safety requirements, such as risk assessment and other examples of good practice you adopt in your work. You will need to show that you have received a formal safety instruction relating to your workplace (such as a CSCS safety test in the UK), or an update on statutory regulations. In the UK an example would be COSHH requirements.</p>	
<p>E3 Undertake engineering work in a way that contributes to sustainable development. <i>This could include an ability to:</i> Operate and act responsibly, taking account of the need to progress environmental, social and economic outcomes simultaneously.</p>	<p>Show examples of methodical assessment of risk in specific projects; actions taken to minimise risk to society or the environment.</p>	
<p>E4 Carry out and record CPD necessary to maintain and enhance competence in own area of practice, including: Undertake reviews of own development needs Plan how to meet personal and organisational objectives Carry out planned (and unplanned) CPD activities Maintain evidence of competence development Evaluate CPD outcomes against any plans made Assist others with their own CPD.</p>	<p>This means demonstrating that you have actively sought to keep yourself up-to-date, perhaps by studying new standards or techniques, or made use of magazines, lectures organised by professional engineering institutions and other opportunities to network in order to keep abreast of change.</p>	
<p>E5 Exercise responsibilities in an ethical manner.</p>	<p>Give an example of where you have applied ethical principles as described in the statement of ethical principles on page 33 of the UK-SPEC. Give an example of where you have applied/upheld ethical principles as defined by your organisation or company, which may be in its company or brand values.</p>	

Appendix 17

Employer's Appraisal Checklist

Apprentice being appraised:		
Question	Answer Yes/No	Comment
<i>Is this the:</i>		
Three month appraisal?		
Six to 33 month appraisal?		If Yes, please specify:
End of apprenticeship appraisal?		
Is the apprentice making satisfactory progress with the NDT method?		
Is the apprentice making satisfactory progress attaining technical knowledge?		
Is the apprentice making satisfactory progress acquiring the skills?		
Is the apprentice making satisfactory progress understanding and demonstrating the behaviours?		
Is the apprentice making satisfactory progress attaining knowledge of health & safety?		
Is the apprentice's progress at the right point on the Gantt chart?		
Is the apprentice's log book up-to-date?		
Is the apprentice maintaining a CPD record online?		
Please record any other comments you wish to make:		
Employer's name:		
Employer's company:		
Date:		
Signature:		

Notes

Notes

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