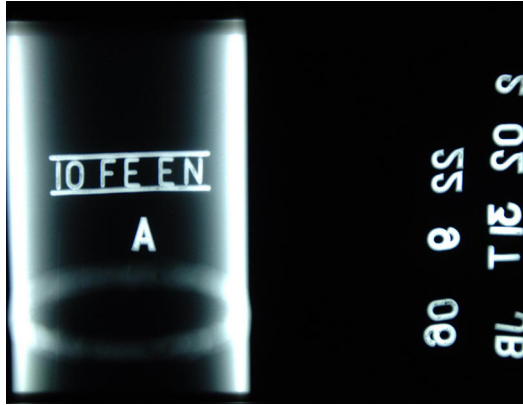
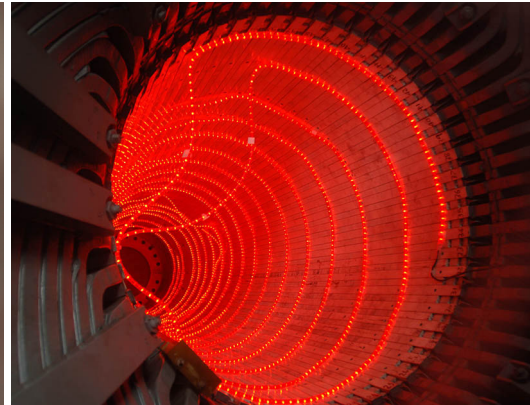
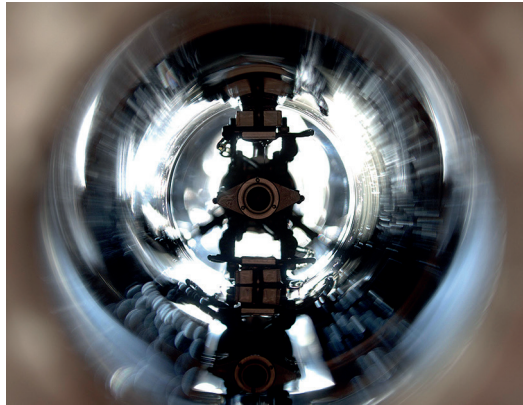


Non-Destructive Testing (NDT) Engineering Technician – Guidance for the end-point assessment/PRI

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1. Preface

The apprenticeship end-point assessment (EPA) does not differ a lot from the procedure used for the assessment of an Engineering Council Incorporated Engineer (technical report route), although the competencies will be at the EngTech level. There are some differences that need to be identified and taken into account, but in terms of duration the NDT Engineering Technician EPA is not likely to take much longer than a technical report route assessment.

Incorporated Engineer (technical report route)

- Review of portfolio of evidence
- Technical report interview
- Professional review interview.

NDT Engineering Technician apprentice

- Review of portfolio of evidence
- Project showcase presentation and interview
- Synoptic assessment interview.

In the case of a combined approach, the project showcase presentation is a substitution for the technical report interview and the synoptic assessment interview (SAI) is merged with the professional review interview (PRI).

Engineering Council activity	Apprenticeship activity	Combined activity
Three assessors review the application	Three assessors review the application	Three assessors review the application
Two assessors review the portfolio of evidence	Two assessors review the portfolio of evidence	Two assessors review the portfolio of evidence
Two assessors conduct the technical report interview	Two assessors conduct the project showcase presentation	Two assessors conduct the project showcase presentation
Two assessors conduct the professional review interview (PRI)	Two assessors conduct the synoptic assessment interview (SAI)	Two assessors conduct the merged PRI and SAI

The time allowed for the EPA/NDT Engineering Technician assessment is half a day off-site (at home) for each assessor to review the portfolio of evidence and prepare questions, half an hour for the project showcase presentation given by the apprentice, followed by one and a half hours for the project showcase interview and two hours for the PRI/SAI.

The project showcase interview and the PRI/SAI will be conducted by two people who are registered with the Engineering Council as Incorporated Engineers (IEng) or Chartered Engineers (CEng), who have been trained as interviewers, who have undergone annual refresher training, who have observed two PRI interviews and who have extensive knowledge of non-destructive testing (NDT). Before the process commences, one of the assessors will be designated as the lead assessor and, in the case of a split decision, the lead assessor will have the casting vote.

The default location for the project showcase presentation, the project interview and the PRI/SAI is the assessment organisation's headquarters; however, by agreement, these activities can be carried out at a mutually agreed location. The interviews will be carried out face to face; Skype or other means of internet communication are not allowed for an apprenticeship end-point assessment.

2. Portfolio of evidence

The independent assessment organisation assessors will review the portfolio of evidence provided by the apprentice and make their own assessment against a formal checklist (templates will be available from the BINDT website). At this stage, the independent assessment organisation assessors may request additional information and/or evidence. The portfolio of

evidence will include certificates of competence, letters of approval, results notices, training attendance certificates, a log book of on-the-job training (experience), employer appraisal reports, the EngTech competency matching form, the apprenticeship completion form and the apprentice's project report. What the assessors are looking for is evidence that the apprentice has undergone formal and on-the-job training that demonstrates that the apprentice has acquired the knowledge, skills and behaviours identified in the apprenticeship standard. To avoid the assessors having to cross-reference another document, the knowledge, skills and behaviours requirements detailed in the apprenticeship standard are listed below.

If the independent assessment organisation assessors are satisfied with the overall evidence, they will arrange the project showcase presentation and the synoptic assessment interview/professional review interview.

The requirements detailed in the apprenticeship standard are:

Knowledge and understanding of:

- a. Supervisory techniques, such as leading and motivating, performance evaluation, mentoring junior staff, organising, planning, delegating and solving routine daily problems
- b. Relevant mathematics, including numerical and data analysis, that is necessary to support the application of technical and practical skills
- c. Three NDT methods, including a complex method such as ultrasonics, eddy current, radiography or infrared thermography, with the responsibility for applying multiple scientific principles to identify flaws obscured by structural or volumetric features that are not necessarily visible on the surface
- d. Formula-based engineering and the scientific principles underpinning relevant current technologies
- e. How to use materials, equipment, tools, processes and products relating to NDT
- f. Preparation of NDT procedures, technique sheets and work instructions for use by NDT Operators
- g. How to use and apply information from technical literature, codes of practice and industry standards
- h. The limitations of standard tests and measurements relevant to the field of activity
- i. Industry-specific product technology, including material types, defect types, defect mechanisms, growth rates, industry-specific NDT applications and R&D opportunities
- j. How to use the results of engineering NDT analysis for the purpose of developing solutions to well-defined engineering problems
- k. The need to gather contextual information prior to the inspection required for the assessment of defects against acceptance/rejection criteria
- l. Health & safety and company-specific requirements, permits to work, inductions, risk assessments, safety passport, working at heights and in confined spaces, chemical handling, radiation safety, restricted zones (gas, nuclear and site radiography) and other requirements
- m. Project management processes and key points
- n. The consequences of failure and the risk to life and the environment.

Skills and practical application:

- a. Demonstrate the ability to manage areas of work that require the coordination and supervision of other staff, such as NDT Operators
- b. Demonstrate NDT competencies relevant to the industry sector and appropriate materials using equipment, tools and processes
- c. The ability to carry out NDT in three methods, including at least one complex method, to appropriate national and international certification standards, such as BS EN ISO 9712 or BS EN 4179, that meet the requirements of Engineering Council EngTech registration
- d. Apply appropriate solutions to well-defined engineering problems using the chosen NDT methods
- e. Select appropriate methods and techniques and understand their limitations
- f. Supervise and project manage areas of work, to include, where appropriate, the work of NDT Operators and reports for compliance and accuracy; achieve good time management

- g. Ability to conduct re-inspection audits of NDT Operators’ work, comparing and evaluating the results and taking appropriate action when necessary
- h. Implement quality control and quality assurance of NDT systems and performance
- i. Operate with good practical ability, including hand/eye coordination, in order to apply NDT
- j. Follow written procedures in order to demonstrate a disciplined approach
- k. Identify problems and apply appropriate NDT methods to identify causes and achieve satisfactory solutions and submit clear and precise NDT reports and instructions
- l. Identify, organise and use resources effectively to complete tasks, with consideration for cost, quality, safety, security and environmental impact
- m. Interpret engineering/CAD drawings, particularly those related to weld/component configuration
- n. Manage a project through to completion.

Behaviours:

- a. Leadership – provide direction, implement plans and motivate people
- b. Teamwork – to effectively manage a team and to support others where appropriate
- c. Courage – willing to make independent decisions and be respected and understood when doing so
- d. Delivery – to consistently manage activities/tasks through to timely completion
- e. Respect – have respect for the abilities of others, particularly those working under your direction
- f. Influence – have a positive impact and be able to proactively influence others in multiple contexts
- g. Compassion – have empathy for the predicaments of others, particularly junior staff
- h. Ethics – to act with maturity, honesty, integrity and responsibility
- i. Clear focus – avoid distractions and be a good communicator
- j. Environmental awareness – undertake safe working practices for self, others and the environment
- k. Personal responsibility – take responsibility as an individual and as a team member.

The NDT project is a key area of the apprenticeship and the employer, with advice from the NDT training provider and the professional body (BINDT), will have designed a project that encompasses as many of the knowledge and skills requirements as is reasonably practicable. The project report, produced in line with the project report guidance template available on the BINDT website, should be included in the portfolio of evidence.

There is a mandatory requirement within the apprenticeship to obtain a pass mark of 70% for each module of each NDT method. Failing to achieve 70% for each module of each NDT method will result in failing the apprenticeship. Failing to provide evidence that this has been achieved will result in delaying the assessment process. The evidence that is required is the ‘results notice’, which provides percentage scores for each module of each NDT method. The results notice is also important at a later stage to determine whether the apprentice has passed with a ‘pass’ level or a ‘distinction’ level.

In addition to the results notice, there is a requirement to obtain a period of on-the-job training (supervised practice) for each method in accordance with the table below. It is only after obtaining a 70% pass mark for each module of each NDT method and fulfilling the requirement for on-the-job training that a certificate or letter of approval will be issued. Where more than one method is attempted at the same time, reductions in the length of supervised experience are allowed (see BS EN ISO 9712 or BS EN 4179).

NDT method	Supervised practice	NDT method	Supervised practice
Ultrasonic testing (UT)	12 months	Visual testing (VT)	4 months
Radiography testing (RT)	12 months	Magnetic particle testing (MT)	4 months
Eddy current testing (ET)	12 months	Penetrant testing (PT)	4 months
Thermography testing (TT)	12 months		

3. Project showcase – presentation of NDT project

During the project presentation and the interview, the assessors will take notes on the template provided, which will assist in the scoring of the project presentation and interview; the notes will become part of the quality records.

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. The project presentation will last about 30 minutes and should include sufficient detail to underpin the requirements and the achievements.

Following the project presentation, the assessors will conduct an interview, allowing them to seek clarification on any aspect of the project presentation that was not clear and also to question the apprentice regarding any aspect of the project that was omitted and/or was not discussed. During the project presentation and interview, it is expected that the assessors will have managed to substantiate that many of the knowledge, skills and behaviour requirements identified in the apprenticeship standard have been met.

4. Professional review interview (PRI)/synoptic assessment interview (SAI)

During the PRI/SAI, the assessors will take notes on the template provided, which will assist in the scoring of the PRI/SAI; the notes will become part of the quality records.

This is the final stage of the apprenticeship assessment process and the Engineering Council registration process. This is a good time to seek clarification on any outstanding omissions or issues but, more importantly, to assess the behaviours and continuing professional development (CPD). CPD should be discussed at length, particularly the CPD forward plan.

Please note: if the independent assessment organisation is not an Engineering Council Professional Engineering Institute (PEI), then it cannot offer the apprentice Engineering Council registration. However, if the apprentice has passed the apprenticeship, he/she will be able to apply for Engineering Council registration through another organisation that is a PEI.

5. Ensuring coverage of all aspects of Engineering Council registration and the apprenticeship end-point assessment

To ensure that all aspects of the apprenticeship end-point assessment and the Engineering Technician registration have been covered, Appendix 1 of this document merges both sets of requirements together. In column 1 there are the mandatory requirements (A-E) of the Engineering Council UK-SPEC Engineering Technician, in column 2 there are examples of how to meet these requirements and in column 3 the knowledge, skills and behaviour requirements listed in the NDT Engineering Technician apprenticeship standard have been aligned as closely as possible.

6. Final analysis

Once the review of the portfolio of evidence, the project presentation and the synoptic assessment interview/professional review interview are complete, the assessors will discuss and agree the outcome of the apprenticeship. The assessors will complete the final score sheet template provided and collate all other documents, such as notes taken during the project presentation and notes taken during the PRI/SAI, to form a quality pack that will demonstrate due process.

7. Scoring

The scoring grades listed below are provided as a method of scoring the individual requirements stipulated in the NDT Engineering Technician apprenticeship standard:

- Code 3: Excellent – very strong.
- Code 2: Good – practice standard.
- Code 1: Reasonable – adequate awareness.
- Code 0: Below standard – little or no evidence.

This is the final scoring process and reflects the combined assessment of both assessors. The final scores are an assessment of the knowledge, skills and behaviours derived from a combination of the project showcase presentation and the synoptic assessment interview (PRI).

To pass the apprenticeship, the apprentice must achieve the minimum scores depicted in the table below. The decision as to whether the apprentice has passed with a ‘pass’ grade or a ‘distinction’ grade is decided by the NDT qualification examination: if the apprentice has passed all of the modules by 70% in each NDT method but does not achieve 80% composite grading in each NDT method, then they will be awarded a ‘pass’; if the apprentice has passed all of the modules by 70% in each NDT method and also achieved 80% composite grading in each NDT method, then they will be awarded a ‘distinction’.

	Knowledge and skills	Evidence		Comment			
		Yes	No				
Documentation and evidence	Core knowledge and skills – NDT*						
	Other knowledge and skills						
	Supervised experience log						
	CPD						
	Training course attendance						
	Employer’s appraisals						
	Competency matching form						
	Apprenticeship completion form						
Documentation and evidence provided – If yes, proceed to project showcase presentation; if no, request more evidence or terminate application				Yes		No	
		Minimum %	Minimum code	Actual achievement			
Project showcase presentation	Core knowledge and skills – NDT*	70% in each module of each NDT method	2				
	Core knowledge and skills – NDT	70% in each module of each NDT method plus 80% composite grade in each NDT method	3				
Synoptic assessment interview (PRI)	Other NDT-related competencies	40%	1				
	Other engineering competencies	40%	1				
	Health & safety	40%	1				
	Behaviours and human factors	40%	1				
<div style="border: 1px solid red; display: inline-block; padding: 2px;">Combined score</div>							

* This area of knowledge and skills is the only show-stopper. If the apprentice does not achieve 70% in each module of each method, they will not progress to the project showcase presentation or the PRI/SAI and they will not pass the apprenticeship.

8. Re-sits

If, at the end of the assessment process, the assessors determine that the apprentice has not met the required competency standard, then the apprentice assessment organisation will inform the employer of the opportunity for the apprentice to re-sit parts of the knowledge, skills and behaviours requirements. Although the NDT qualification examination has its own rules regarding re-sitting NDT modules, only one re-sit for each category will be allowed within the apprenticeship programme.

9. Peer review

Some apprentice assessment organisations have a peer review process, whereby another part of the organisation, such as a committee, will endorse the decision of the assessors. If this is the case, no decision on the success of the apprentice will be made until this procedure has taken place.

10. Notifications

The responsibility for informing the apprentice or the employer rests with the Institute for Apprenticeships (IfA). The apprentice assessment organisation will not notify the apprentice or the employer on the day of the assessment, or at any subsequent time, until they have been authorised to do so by the Institute for Apprenticeships.

11. References

1. Templates (all templates are available on the BINDT website at www.bindt.org).
2. NDT Engineering Technician Apprenticeship Standard – the master copy is on the government website (www.gov.co.uk), with a duplicate identical version available on the BINDT website (www.bindt.org).
3. NDT Engineering Technician Assessment Plan – the master copy is on the government website (www.gov.co.uk), with a duplicate identical version available on the BINDT website (www.bindt.org).
4. BS EN ISO 9712 – Non-Destructive Testing – Qualification and Certification of NDT Personnel.
5. BS EN 4179 – Aerospace series. Qualification and approval of personnel for non-destructive testing.

Appendix 1

Matching the professional review interview with the apprenticeship synoptic assessment interview

<p>This column gives the details of the competencies and the commitments in the UK-SPEC.</p> <p>Engineering Technicians must be competent throughout their working life, by virtue of their education, training and experience, to...</p>	<p>This column gives examples that are intended to help you identify activities you might quote to demonstrate the required competence and commitment for EngTech registration.</p> <ul style="list-style-type: none"> ■ These are not exhaustive. ■ You are not required to give multiple examples to demonstrate competence and commitment. 	<p>This column provides details of what is required by the NDT Engineering Technician Apprenticeship Standard and, where possible, aligns with the requirements of the UK-SPEC.</p>
The Standard	Examples	Apprenticeship Standard
<p>A Use engineering knowledge and understanding to apply technical and practical skills.</p> <p>This includes the ability to:</p>		
<p>A1 Review and select appropriate techniques, procedures and methods to undertake tasks.</p>	<p>Describe:</p> <ul style="list-style-type: none"> ■ 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>Attain Ofqual Level 2 English and maths (GCSE grade A*, A, B or C).</p> <p>A new grading system is being phased in from summer 2017 until 2019 (grades nine, eight and seven are broadly equivalent to an A* and A, grades six, five and four are in line with B and C grades, a three would be broadly similar to a D grade, with two and one taking in grades E, F and G).</p> <p>Three NDT methods, including a complex method, such as ultrasonics, eddy current, radiography or infrared thermography, with the responsibility of applying multiple scientific principles to identify flaws obscured by structural or volumetric features that are not necessarily visible on the surface.</p> <p>The ability to carry out NDT in three methods, including at least one complex method, to appropriate national and international certification standards, such as BS EN ISO 9712 or BSEN 4179, that meet the requirements of Engineering Council EngTech registration.</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>Relevant mathematics, including numerical and data analysis, that is necessary to support the application of technical and practical skills.</p> <p>Demonstrate NDT competencies relevant to the industry sector and appropriate materials using equipment, tools and processes.</p> <p>Formula-based engineering and the scientific principles underpinning relevant current technologies.</p>
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The Standard	Examples	Apprenticeship Standard
<p>B Contribute to the design, development, manufacture, construction, commissioning, operation or maintenance of products, equipment, processes, systems or services.</p> <p>In this context, this includes the ability to:</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> <ul style="list-style-type: none"> ■ Identify the source of a problem; or ■ Identify an opportunity; or ■ Propose a solution. 	<p>How to use the results of engineering NDT analysis for the purpose of developing solutions to well-defined engineering problems.</p> <p>Apply appropriate solutions to well-defined engineering problems using the chosen NDT methods.</p> <p>Identify problems and apply appropriate NDT methods to identify causes and achieve satisfactory solutions and submit clear and precise NDT reports and instructions.</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:</p> <ul style="list-style-type: none"> ■ What information, material, component, people or plant to use; or ■ How to introduce a new method of working; or ■ What precautions to take. <p>Describe how you have contributed to best practice methods of continuous improvement, for example ISO 9000.</p>	<p>How to use materials, equipment, tools, processes and products relating to NDT.</p> <p>The limitations of standard tests and measurements relevant to their field of activity.</p> <p>Industry-specific product technology, including material types, defect types, defect mechanisms, growth rates, industry-specific NDT applications and R&D opportunities.</p> <p>The need to gather contextual information prior to the inspection required for the assessment of defects against acceptance/rejection criteria.</p>

The Standard	Examples	Apprenticeship Standard
C Accept and exercise personal responsibility. This includes the ability to:		
C1 Work reliably and effectively without close supervision, to the appropriate codes of practice.	Your evidence should show how you identified and agreed what had to be done and to what standards on a typical project.	Preparation of NDT procedures, technique sheets and work instructions for use by NDT Operators. Select appropriate methods and techniques and understand their limitations. Follow written procedures in order to demonstrate a disciplined approach. Know how to use and apply information from technical literature, codes of practice and industry standards.
C2 Accept responsibility for work of self or others.	Your evidence could include: <ul style="list-style-type: none"> ■ Minutes of meetings; ■ Site notes and instructions; ■ Variation orders; ■ Programmes of work; ■ Specifications, drawing and reports; or ■ Appraisals. Activity not associated with your job can contribute evidence.	Project management processes and key points. Manage a project through to completion. Supervise and project manage areas of work, to include, where appropriate, the work of NDT Operators and reports for compliance and accuracy; achieve good time management. Leadership – provide direction, implement plans and motivate people. Personal responsibility – take responsibility as an individual and as a team member.
C3 Accept, allocate and supervise technical and other tasks.	Your evidence could include: <ul style="list-style-type: none"> ■ Minutes of meetings; ■ Site notes and instructions; ■ Variation orders; ■ Programmes of work; ■ Specifications, drawing and reports; or ■ Appraisals. Activity not associated with your job can contribute evidence.	Supervisory techniques, such as leading and motivating, performance evaluation, mentoring junior staff, organising, planning, delegating and solving routine daily problems. Demonstrate the ability to manage areas of work that require the coordination and supervision of other staff, such as NDT Operators. Delivery – to consistently manage activities/tasks through to timely completion.

The Standard	Examples	Apprenticeship Standard
D Use effective communication and interpersonal skills. This includes the ability to:		
D1 Use oral, written and electronic methods for the communication in English of technical and other information.	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.	Interpret engineering/CAD drawings, particularly those related to weld/component configuration. Clear focus – avoid distractions and be a good communicator. Courage – willing to make independent decisions and be respected and understood when doing so.
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.	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.	Identify, organise and use resources effectively to complete tasks, with consideration for cost, quality, safety, security and environmental impact. Ability to conduct re-inspection audits of NDT Operators' work, comparing and evaluating the results and taking appropriate action when necessary. Teamwork – to effectively manage a team and to support others where appropriate.

The Standard	Examples	Apprenticeship Standard
E Make a personal commitment to an appropriate code of professional conduct, recognising obligations to society, the profession and the environment.		
E1 Comply with the Code of Conduct of your institution.	The professional review involves a demonstration of, or discussion of, your position on typical ethical challenges.	Health & safety and company-specific requirements, permits to work, inductions, risk assessments, safety passport, working at heights and in confined spaces, chemical handling, radiation safety, restricted zones (gas, nuclear and site radiography) and other requirements. The consequences of failure and the risk to life and the environment.
E2 Manage and apply safe systems of work.	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.	Implement quality control and quality assurance of NDT systems and performance. Operate with good practical ability, including hand/eye coordination, in order to apply NDT.

<p>E3 Undertake engineering work in a way that contributes to sustainable development.</p> <p>This could include an ability to:</p> <ul style="list-style-type: none"> ■ Operate and act responsibly, taking account of the need to progress environmental, social and economic outcomes simultaneously. 	<p>Show examples of methodical assessment of risk in specific projects and actions taken to minimise risk to society or the environment.</p>	<p>Environmental awareness – undertake safe working practices for self, others and the environment.</p> <p>Influence – have a positive impact and be able to proactively influence others in multiple contexts.</p>
<p>E4 Carry out and record CPD necessary to maintain and enhance competence in your own area of practice, including:</p> <ul style="list-style-type: none"> ■ 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>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>Carry out and record CPD necessary to maintain and enhance competence in your own area of practice.</p> <p>Record details of your employment, education and training, professional experience, future work activities and personal interests and ambitions.</p> <p>Develop a forward plan that identifies future knowledge, skills and development opportunities.</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 in the UK-SPEC on page 33.</p> <p>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>	<p>Ethics – to act with maturity, honesty, integrity and responsibility.</p> <p>Compassion – have empathy for the predicaments of others, particularly junior staff.</p> <p>Respect – have respect for the abilities of others, particularly those working under your direction.</p>

