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**Assessment Strategy**

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| **Sector** | **Engineering** |
| **Qualification Title(s)** | **Diploma in Engineering at SCQF Level 7** |
| **Developed by** | **Enginuity (on behalf of the Engineering Qualification Design Group)** |
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**Specific Assessment Strategy Appendix for Diploma in Engineering at SCQF Level 7**

**Produced by: Enginuity on behalf of Skills Development Scotland**

**Contents**

[1. Purpose and use 4](#_Toc120105772)

[2. Requirements for the Diploma in Engineering at SCQF level 7 4](#_Toc120105773)

[2.1 Quality assurance requirements 4](#_Toc120105774)

[Workplace Assessment 4](#_Toc120105775)

[Holistic Assessment 5](#_Toc120105776)

[Simulation in a Realistic Working Environment 5](#_Toc120105778)

 [Additional assessment guidance for specific units 6](#_Toc120105779)

[Unit - Performing core engineering activities 6](#_Toc120105780)

Unit - Understanding the importance of environmental good practice and sustainability………………6

[Unit - Applying methods and principles in project management 6](#_Toc120105781)

 Unit - Providing effective Leadership……………………………………………………………………………………………..6

[2.2 Occupational expertise and qualification requirements for those assessing or undertaking quality assurance of assessment 6](#_Toc120105782)

[3. Guidance on meta-skills 7](#_Toc120105783)

# 1. Purpose and use

This specific Assessment Strategy Appendix for the Diploma in Engineering at SCQF Level 7sets out the assessment and quality assurance requirements that are specific to this qualification. This assessment strategy appendix must be used alongside the Overarching Assessment Strategy for competence-based qualifications.

This assessment strategy has been agreed with relevant awarding bodies and other stakeholders as part of the qualification design process.

The Diploma in Engineering at SCQF Level 7 is designed to recognise the competence of engineering operatives and technicians across a range of engineering environments. This requires the learner to be employed in a relevant engineering role. Workplace learning should be aligned to and assessed against the performance, knowledge and understanding requirements in the qualification structure and pathways including the meta-skills requirements. Workplace learning is a partnership between learner, employer and learning provider and all learners must have the support of an employer in undertaking this qualification.

# 2. Requirements for the Diploma in Engineering at SCQF level 7

## 2.1 Quality assurance requirements

This qualification is quality assured as set out in the Overarching Assessment Strategy for competence-based qualifications section 2. There are no further requirements specific to this qualification.

## Workplace Assessment

Workplace assessment in this qualification is set out in the Overarching Assessment Strategy for competence-based qualifications section 2.

This is the environment in which the learner will engage in engineering activities. It is also the environment in which the learner will most easily engage with the products and services provided by the employer. It is critical to the validity of this competence-based qualification that performance is assessed in the workplace. Therefore, learners must be in a relevant job role throughout the period they undertake the qualification.

Learners are expected to demonstrate that they have met the performance, knowledge and understanding requirements of this qualification and are competent in an engineering operative or technician role. A key aspect of this qualification is the expectation that learners develop meta-skills and become aware of the importance of these skills – both in their role of an engineering operative or technician and for their personal and career development.

It is a general requirement that awarding body arrangements ensure competence can be demonstrated over a period of time, rather than simply for the purposes of a single assessment. It is unlikely that performance evidence alone will provide enough evidence of competence in these specific areas. In particular, where the learner’s knowledge and understanding are not apparent from performance evidence, it must be assessed by other methods and be supported by suitable evidence.

## Holistic Assessment

Holistic approaches to assessment are encouraged so larger pieces of work are used to evidence a number of performance requirements rather than the process of finding separate evidence for each performance requirement. In this qualification, learners undertaking Unit SDS 0321 Maintaining engineering assets could likely provide assessment opportunities for Unit SDS 0326 Repairing engineering assets and/or Unit SDS 0327 Replacing engineering assets.

It is suggested that the most appropriate performance methods of assessment for this qualification are direct observation of practical demonstration, expert witness testimonies, product evidence and reflective accounts. Knowledge and understanding requirements can be demonstrated in a number of different ways, including questioning and professional discussion. Where the learner’s knowledge and understanding are not apparent from performance evidence, it must be assessed by other means and be supported by suitable evidence. Assessors should ask enough questions to be able to determine the learner has an appropriate level of knowledge and understanding as required by the units and context in which they are undertaken.

## Simulation in a Realistic Working Environment

Simulation guidance is set out in the Overarching Assessment Strategy for competence-based qualifications. In these circumstances, assessment must be carried out in a realistic work environment and under conditions which replicate those of the workplace. Assessors must ensure that competence is fully transferable to the workplace. Minimal simulation is permitted in this qualification as learners need to demonstrate they can perform consistently in the workplace over a period of time.

Where simulation is used an Awarding Body EQA should be consulted and agreement reached on what is suitable.

The performance requirements set out in this qualification describe routinely performed aspects of the role and there is no need to allow more than a minimal element of simulation in the assessment.

**The following table indicates the unit and performance requirements where simulation is permitted.**

|  |  |
| --- | --- |
| **Unit Titles** | **Performance References** |
| SDS 0323 - Performing core engineering activities  | Performance requirements 4 & 5 See further specific unit and simulation guidance in this section  |

For the relevant performance requirements, specified above, simulation is permissible only when the learner is unable to provide sufficient evidence of workplace performance due to the various working practices of different organisations or job roles.

# Additional assessment guidance for specific units

## Unit SDS 0323 - Performing core engineering activities

This unit is designed to provide learners with a range of core engineering knowledge and competences to enable them to perform all work-related engineering activity safely, and develop an understanding of the key engineering knowledge that should be applied consistently when undertaking any engineering based activity. The evidence for this unit is likely to come from specific performance and application of knowledge from other units. However, as the critical nature of certain aspects of this unit which relate to safety, PPE and other critical engineering factors, a significant proportion of the knowledge may need to be provided in advance of the learner undertaking other work activities.

**Unit SDS 0329 -** **Understanding the importance of environmental good practice and sustainability**

This unit is knowledge based and is designed to enhance the learners understanding and importance of environmental good practice and sustainability in engineering and to benefit the engineering communities and society as whole. Evidence for this unit may be obtained from learners’ direct exposure through other units where environmental good practice and sustainability knowledge and activities are already incorporated and applied within business; learners may be able to highlight any evidence through a cross referencing approach in a detailed portfolio of evidence. Where gaps exist, this knowledge may be explicitly taught. Specific subject sessions, self-directed learning materials or other relevant methods may be used, assessment of evidence for these approaches should align to knowledge delivery methodology, for example oral or written questions. Centre produced and marked examination papers may be appropriate. Learners will be expected to confirm their understanding as part of their recorded evidence.

## Unit SDS 007 - Applying methods and principles in project management.

## Unit SDS 0188 - Providing effective leadership.

Tasks and activities for these above units should correlate with and be in the context of engineering and manufacturing.

## 2.2 Occupational expertise and qualification requirements for those assessing or undertaking quality assurance of assessment

The requirements of assessors, internal verifiers and external verifiers are set out in section 2.2 of the Overarching Assessment Strategy for competence-based qualifications. There are no further requirements specific to this qualification, however the table in Appendix 2 provides further expansion and guidance on those requirements. However, awarding bodies should consider whether there is a requirement in some cases for more than one assessor to be used in a single unit being undertaken by a learner dependent on the context in which the unit is undertaken. For example, a learner undertaking the unit SDS 0326 Repair engineering assets may generate evidence that relates to both mechanical and electrical asset repairs, in this circumstance there may be a need for a competent assessor in mechanical repair and a competent assessor in electrical repair to be engaged in the assessment process.

## 3. Guidance on meta-skills

The Overarching Assessment Strategy for competence-based qualifications introduces meta-skills. Meta-skills sit alongside and complement technical knowledge, skills, behaviours and competence. As technology, society and the way we work changes at an ever-increasing pace, meta-skills are the over-arching and future-focused attributes that enable other skills to be developed through consideration, reflection and implementation. Meta-skills support improved performance and productivity, greater adaptability and resilience to change. For learners, meta-skills are a critical asset, supporting their ability to cope and excel in the face of change. There are three categories, each with four meta-skills. (See Overarching Assessment Strategy for competence-based qualifications)

The following meta-skills examples and profile below were identified by employees working in engineering roles. These examples are not exhaustive, merely provided to help learners to understand the meaning of meta-skills in an engineering context.

**Managing Yourself**

A clear **focus** is required to work carefully and correctly and to avoid distraction, it’s essential for complex tasks, and critical when using dangerous equipment or machinery and when fault finding and analysing data; **integrity**, being honest and trustworthy, true to your work and company values is essential for open and honest analysis when challenging an issue with colleagues or managers and dealing with customers; **Initiative,** thinking for yourself and working proactively within the limits of your own responsibility and competence is key when looking to deliver improvements; and when an unexpected problem or challenge arises as well as taking forward self-development and learning.

 **Connecting with Others**

Clear and concise **communication** is crucial for safety and effective delivery of service and products to customer and colleagues, being able to share information and instructions with others but also listening and relationship building with colleagues and stakeholders; **collaboration**, working effectively with colleagues to get a job done to standard and on time is vital for complex tasks or when faced with technical problems as well as when working with customers and contractors and working collaboratively through helping and supporting newercolleagues or apprentices and by taking responsibility for tasks where appropriate.

 **Interacting with Change**

A keen sense of **curiosity** is a critical asset when learning new things and better ways of doing things and important for career development as well as when problem solving; **creativity** is required when dealing with new challenges or working to improve processes; **sense-making** is key when interpreting complex instructions or technical drawings as well as analysing data and root cause analysis, it allows the breaking down tasks into simpler, manageable steps and pattern spotting; **critical thinking** is key when undertaking diagnostics and coming up with solutions when fault finding and requires self-awareness and reflection to challenge systems and procedures

The unit US 0194 Developing meta-skills and personal practice is included in the Diploma in Engineering at SCQF Level 7. This specifically requires learners to be able to achieve the following learning outcome:

* To develop meta-skills and personal practice through reflective practice, goal setting and active learning to improve own performance in line with organisational requirements.

It is intended that the assessment of this unit will draw holistically on the assessment evidence from the other units within the qualification as learners carry out their normal day to day work activities, solve problems and work with others to achieve their objectives.

The process of self-assessment, reflection and evaluation of practice are central to the development of an individuals’ job specific skills and their meta-skills. This involves learners taking ownership of their learning by reviewing their work and reflecting on their progress. Accordingly, most organisational performance management processes involve setting clear objectives, agreeing development activities, conducting regular progress reviews and feedback. This enables evidence of the development of individuals job specific skills and meta-skills to be generated naturally as part of the performance management process.

In summary, the meta-skills unit is integrated with the other units of the qualification rather than being viewed as a standalone unit. The associated performance and knowledge and understanding requirements are generated through the other units and assessed through the performance management process.

Furthermore, assessment of the meta-skills should focus on the nature and quality of the self-reflective practices and self-evaluation activities being undertaken, rather than the achievement of specific meta-skills. However, supporting evidence that examples meta-skills development referred to in the self-reflective and self-evaluation practices should be provided.

Section 3 of the Overarching assessment strategy for competence-based qualifications provides guidance on the assessment of meta-skills to be used in conjunction with this assessment strategy appendix. Therefore, flexible approaches may be used and adapted to ensure assessment is relevant to individuals working in different organisations. Examples of meta- skills for engineering are provided in the above profile.

In relation to meta-skills, the minimum requirement for this qualification is that:

* reflective discussion on skills developed/ to be developed takes place on a minimum of four occasions, and
* these discussions include at least one meta-skill from each of the three categories and a minimum of six meta-skills in total (see [here](https://www.skillsdevelopmentscotland.co.uk/what-we-do/skills-planning/skills4-0/) for more detail on meta-skills and categories).

Skills Development Scotland have additionally produced a range of tools which may be used to support assessment. Meta-skills self-profiling tool

* Meta-skills self-assessment tool
* Meta-skills development plan

The meta-skills tools are available from Skills Development Scotland by request to apprenticeshipdevelopment@sds.co.uk

**Appendix 1- Specific terms within the Unit Specifications**

Below is glossary of terms set out within the unit specifications.

* **Engineering asset** - is any part, component or system associated with engineering plant and equipment, engineering assets can be mechanical, electrical, electronic, hydraulic or pneumatic Assets can be whole or part thereof.
* **Quality requirements** - specifications, identification of flaws, tolerance, measurement, contamination
* **Resources -** tools, equipment, facilities. finance. materials, people, plant, services
* **Consumables -** includefilters, sealants, lubricants, disposable PPE, fixings
* **Principles -** the ideas, rules, or concepts that need to be kept in mind when solving an engineering problem.
* **Stored energy** **isolation** - The physical prevention of the transmission or release of energy. This includes valves, breakers, switches; blank flanges for piping systems; restraining devices to prevent movement of parts.
* **Digital / Emerging Technologies** – knowledge of advanced engineering solutions, Sensors, AI, IOT, data analytics, Automated and semi-automated systems
* **Coding and Certification schemes** – Coding and certification schemes for welding and fabrication, testing, inspection, fault diagnosis, installing and commissioning
* **Management of Change (MOC)** – may refer to the implementation of new technologies, change in leadership, change in organisational culture, new ways of working or a change of process or procedure.
* **Business and Commercial Considerations** – refer to costs, environmental impact, markets, competitor, ROI
* **Legislation, Regulations, Standards and Guidelines, Safe Systems of Work and Protocols -** organisation policies and procedures, industry specific, international, manufacturer specific, national, statutory bodies, codes of practice
* **Metrology -** science of measurement and its application, validation and verification to pre-defined standards. Applications of metrology may include detectors, energy sources, filters, imagers, lasers, process control systems, sensors, waveguides.

NB: The above provides examples but are nor exhaustive and other examples may be appropriate in meeting the described specific terms

**Appendix 2- Technical Requirements for Assessors and Quality Assurers**

The following tables show the recommended levels of technical competence for assessors, internal and external quality assurers.

|  |  |  |  |
| --- | --- | --- | --- |
| **Position** | **Prime activity requirements** | **Support activity requirements** | **Technical requirements (see notes)** |
| **Assessor** | Assessment skills | Internal Quality Assurance Systems | Technical competence in the areas covered by the units being assessed |
| **Internal Quality Assurer (IQA)** | Internal Quality Assurance skills | Assessment knowledge | Technical understanding of the areas covered by the qualification |
| **External Quality Assurer (EQA)** | External Quality Assurance skills | Assessment understanding | Technical awareness of the areas covered by the qualification |

**Notes:**

1. Technical competence is defined here as a combination of practical skills, knowledge, and the ability to apply both, in familiar and new situations, within a real working environment.
2. Technical understanding is defined here as having a good understanding of the technical activities being assessed, together with knowledge of relevant Health & Safety implications and requirements of the assessments.
3. Technical awareness is defined here as a general overview of the subject area, sufficient to ensure that assessment and evidence are reliable, and that relevant Health and Safety requirements have been complied with.
4. The competence required by the assessor, internal verifier, and external quality assurer, in the occupational area being assessed, is likely to exist at three levels as indicated by the shaded zones in the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Technical competence****Job role** | An ability to **discuss** the general principles of the competences being assessed | An ability to **describe** the practical aspects of the competences being assessed | An ability to **demonstrate** the practical competences being assessed |
| Assessor |  |  |  |
| Internal Quality Assurer |  |  |  |
| External Quality assurer |  |  |  |