



Part of the
Enginuity Group

Qualification Manual

EAL Level 3 Diploma in Advanced Manufacturing and
Engineering – Technical Support Technician
(Development Competence)
Qualification Number: 603/2290/1

Issue D



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1.0 About EAL

For over fifty years, EAL has been the specialist awarding organisation for engineering, manufacturing, building services and related sectors. Developed to the highest technical standards, our qualifications reflect ever-changing industry and regulatory needs. We support the providers of our qualifications with an unparalleled level of service to ensure that learners are well prepared to take the next step in their journeys, whether study, an apprenticeship or work.

Through industry partnerships with EAL centres and training providers, decades of experience supporting our core sectors, and our role as part of the Enginuity Group, we have built unrivalled knowledge and understanding of employer skills needs. As a result, EAL's skills solutions, including apprenticeship End-Point Assessment, External Quality Assurance and qualifications are respected and chosen by employers to deliver real lifelong career benefits for all our learners. That's why in the last ten years, 1.2 million people across the UK have taken EAL qualifications.

1.1 Equal Opportunities and Diversity

EAL expects its centres to enable learners to have equal access to training and assessment for qualifications in line with equalities legislation. Further details can be located in the EAL Equal Opportunities and Diversity Policy:

<http://www.eal.org.uk/centre-support/centre-support/policies-and-important-documents>

1.2 Customer Experience and Feedback

Customer Experience is a fundamental part of EAL's commitment to you. EAL aims to ensure that all customers receive a high-quality efficient service. We are always interested in feedback and if you have any comments or feedback on our qualifications, products or services, please contact the Customer Experience team:

EAL Customer Experience

Tel: +44 (0)1923 652 400

Email: Customer.Experience@eal.org.uk

2.0 Introduction to the Qualification

2.1 Qualification Support Materials

The following assessment support materials are available for this qualification:

- Units of competence

This qualification is made up of a number of units of competence, which EAL has derived from the Employer Units of Competence (EUC) which set out the collective performance and skills requirements and underpinning knowledge requirements. These documents allow both the apprentices and assessor to record the progress through the qualification. The units contain the performance to be assessed, the knowledge to be assessed and the evidence required from the apprentices to demonstrate their skills.

All units in this qualification contain the following information:

- Apprenticeship sector and unit title
- Unit summary
- Performance and skills to be assessed and evidenced
- Underpinning knowledge to be assessed and evidenced.

2.2 Learner's Portfolio Building and Referencing

For guidance to assessment and exemplars on completing documentation including assessment planning documentation refer to EAL centre guidance.

For further information please contact:

EAL Customer
Experience Tel: +44(0)1923 652 400
Email: Customer.Experience@eal.org.uk

2.3 Achievement of the Qualification

The qualification is achieved when all the necessary units have been completed. The centre will then be able to apply for the learner's certificate of achievement. The learners will also receive a certificate of unit credit, listing all the units they have achieved.

This manual must be used in conjunction with the delivery and assessment of any individual units to ensure that assessment requirements and methodologies are consistently applied.

EAL Level 3 Diploma in Advanced Manufacturing and Engineering
– Technical Support Technician (Development Competence)

Apprenticeships covered by this qualification manual are:

- (ST0457) Engineering Technician - Level 3

The apprenticeship standard and the assessment plan for this apprenticeship can be found here:

<https://www.instituteforapprenticeships.org/apprenticeship-standards/?>



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There are various other qualifications which this qualification could relate to. Details on these can be obtained from the EAL website or alternatively contact:

EAL Customer

Experience Tel: +44(0)1923 652 400

Email: Customer.Experience@eal.org.uk

3.0 Qualification Structure

3.1 Rule of Combination

This qualification has **1104** Guided Learning Hours (GLH) and has a Total Qualification Time (TQT) of **1163** hours, the notional time required by the learner to complete the qualification.

The learner must complete the required number of mandatory units of competence, followed by the required number of optional units of competence from one of the following Pathways:

- Engineering Drawing
- Quality Control
- Computer Control Programming
- Operational Technical Support
- Engineering Software Development.

Mandatory Units:

The learner must complete all **three** units:

EAL Code	Unit Title	GLH	Ofqual Code
AUEC3-001	Complying with statutory regulations and organisational safety requirements	13	Y/615/3996
AUEC3-002	Using and interpreting engineering data and documentation	13	D/615/3997
AUEC3-003	Working efficiently and effectively in advanced manufacturing and engineering	42	K/615/3999

Optional Units: Pathway A: Engineering Drawing

The learner must complete **one** unit from the following:

EAL Code	Unit Title	GLH	Ofqual Code
AUEC3-023	Producing mechanical engineering drawings using computer aided techniques	1477	K/615/4005
AUEC3-024	Producing engineering drawings/models using 3D computer aided techniques	1477	M/615/4006
AUEC3-025	Producing electrical engineering drawings using computer aided techniques	1477	T/615/4007
AUEC3-026	Producing electronic engineering drawings using computer aided techniques	1477	A/615/4008
AUEC3-027	Producing fabrication/structural engineering drawings using computer aided techniques	1477	F/615/4009
AUEC3-028	Producing fluid power engineering drawings using computer aided techniques	1477	T/615/4010
AUEC3-029	Producing engineering systems/services drawings using computer aided techniques	1477	A/615/4011

Optional Units: Pathway B: Quality Control

The learner must complete **one** unit from the following:

EAL Code	Unit Title	GLH	Ofqual Code
AUEC3-030	Inspecting mechanical products	1400	L/615/4014
AUEC3-031	Inspecting components using co-ordinate measuring machines (CMM)	1379	D/615/4017
AUEC3-032	Inspecting fabricated components and structures	1400	K/615/4022
AUEC3-033	Carrying out visual inspection of welded fabrications	1400	K/615/4019
AUEC3-034	Inspecting and testing electrical products	1400	M/615/4023
AUEC3-035	Inspecting and testing electronic products	1400	T/615/4024
AUEC3-036	Checking and calibrating mechanical inspection equipment	1372	A/615/4025
AUEC3-037	Checking and calibrating electrical and electronic test equipment	1372	F/615/4026
AUEC3-038	Checking and calibrating process control instrumentation	1372	J/615/4027

Optional Units: Pathway C: Computer Control Programming

The learner must complete **one** unit from the following:

EAL Code	Unit Title	GLH	Ofqual Code
AUEC3-042	Providing operational support for computer control programs	518	R/615/4032
AUEC3-043	Loading and proving computer control programs	217	Y/615/4033

Plus **one** more unit from the following:

AUEC3-020	Producing off-line programs for programmable logic controller equipment	819	D/615/4003
AUEC3-021	Producing operating programs for industrial robots	819	H/615/4004
AUEC3-044	Producing operating programs for co-ordinate measuring machines (CMM)	819	D/615/4034
AUEC3-045	Producing off-line programs for CNC laser profiling machines	819	K/615/4036
AUEC3-046	Producing off-line programs for CNC fabrication machines	819	T/615/4038
AUEC3-047	Producing off-line programs for CNC turning machines	819	A/615/4039
AUEC3-048	Producing off-line programs for CNC milling machines	819	M/615/4040
AUEC3-049	Producing off-line programs for CNC grinding machines	819	T/615/4041

AUEC3-050	Producing off-line programs for CNC gear cutting machines	819	A/615/4042
AUEC3-051	Producing off-line programs for CNC electro-discharge machining	819	F/615/4043
AUEC3-052	Producing off-line programs for CNC boring machines	819	L/615/4045
AUEC3-053	Producing off-line programs for CNC machining centres	819	R/615/4046

Optional Units: Pathway D: Operational Technical Support

The learner must complete the following unit:

EAL Code	Unit Title	GLH	Ofqual Code
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AUEC3-054	Resolving engineering or manufacturing support problems	378	Y/615/4047
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Plus **three** more units of which one must be from Group **A**

Group **A** units:

AUEC3-014	Carrying out condition monitoring of plant and equipment	371	R/615/4001
AUEC3-055	Planning engineering activities	378	M/615/4054
AUEC3-056	Implementing engineering activities	378	A/615/4056
AUEC3-057	Monitoring engineering activities	378	Y/615/4064
AUEC3-058	Producing technical information for engineering activities	378	D/615/4065
AUEC3-059	Obtaining resources for engineering activities	378	H/615/4066
AUEC3-060	Obtaining and controlling materials for engineering activities	378	K/615/4067
AUEC3-061	Providing technical sales and marketing support for engineering activities	378	M/615/4068
AUEC3-062	Implementing quality control systems and procedures in an engineering environment	378	T/615/4069
AUEC3-063	Scheduling engineering activities	378	K/615/4070
AUEC3-064	Determining engineering requirements for the supply of products or services	378	M/615/4071
AUEC3-065	Carrying out fault diagnosis on engineering plant and equipment	476	T/615/4072
AUEC3-066	Supporting logistics operations in an engineering manufacturing environment	378	Y/615/4078

Group **B** units:

AUEC3-067	Providing technical advice and guidance on engineering activities	378	F/615/4091
AUEC3-068	Carrying out project management of engineering activities	378	T/615/4119
AUEC3-069	Developing and maintaining effective customer relationships	182	F/615/4124
AUEC3-070	Handing over and exchanging responsibility for control of engineering activities	182	D/615/4129

AUEC3-071	Carrying out health and safety risk assessments on engineering activities	378	Y/615/4145
AUEC3-072	Producing contractual arrangements to supply or procure goods or services for engineering activities	378	J/615/4173
AUEC3-073	Using and maintaining business procedures and protocols in an engineering environment	378	Y/615/4176
AUEC3-147	Installing mechanical equipment	1162	M/615/4104
AUEC3-148	Installing electrical/electronic equipment	1162	H/615/4102
AUEC3-149	Installing equipment to produce an engineered system	1221	D/615/4101
AUEC3-150	Commissioning mechanical equipment and systems	1162	Y/615/4100
AUEC3-151	Commissioning electrical/electronic equipment and systems	1162	J/615/4092
AUEC3-152	Commissioning engineered systems	1221	A/615/4090

Optional Units: Pathway E: Engineering Software Development

The learner must complete **all** the units from the following:

EAL Code	Unit Title	GLH	Ofqual Code
AUEC3-251	Determining engineering software requirements	378	Y/616/2259
AUEC3-252	Producing engineering software design	476	L/616/2260
AUEC3-253	Producing engineering software implementation	378	T/616/2253
AUEC3-254	Testing engineering software	476	J/616/2256

Plus **one** more unit from the following:

AUEC3-255	Performing engineering software analysis techniques	476	H/616/2250
AUEC3-256	Measuring engineering software quality	378	D/616/2246
AUEC3-257	Performing engineering software configuration management	476	H/616/2247
AUEC3-258	Performing engineering software acquisition	378	L/616/2243
AUEC3-259	Performing engineering software safety assessments	378	R/616/2244
AUEC3-260	Performing low level programming for engineering software	476	J/616/2239
AUEC3-261	Performing low level programming for engineering software	378	F/616/2241



4.0 Centre and Qualification Approval

Centres wishing to run this qualification will need to comply with this qualification manual and EAL's centre approval criteria for the qualification. Centres must also put in place the appropriate physical and human resources and administration systems to deliver the qualification effectively.

For **existing** EAL centres to put this qualification on your centre remit:
Create and complete a qualification approval application form in Smarter Touch and submit to EAL.

For non EAL centres to gain centre approval to run this qualification, EAL Customer Experience will be happy to help. Please contact them on:

EAL Customer
Experience Tel: +44(0)1923 652 400
Email: Customer.Experience@eal.org.uk

5.0 Profiles and Requirements

5.1 Staff Responsible for Registering and Certification of Learners

Centres are required to appoint a suitable member of staff who can take responsibility for registering learners onto qualifications, submitting entries for assessments to EAL, and taking receipt of external assessment procedures (if appropriate). They may also be responsible for applying to EAL for learner certificates. The role may be undertaken by the same person who undertakes quality assurance.

5.2 Learners

The Level 3 units have been designed to cover those learners who are either:

- Individuals need to acquire Technical Support Technician competencies for the engineering sectors.
- Individuals employed in the Technical Support Technician engineering sectors but require additional competencies as part of an existing job role or to enable career progression.

There are no formal entry requirements for this qualification. Learners must have been initially assessed to ensure they have both the potential and opportunity to achieve the assessment criteria set out in the qualification units and gain evidence from the workplace.

If the qualification is used to support implementation and delivery of an apprenticeship standard, the formal entry requirements will be listed within the standard assessment plan.

Learners are required to obtain evidence against each assessment criteria when competence has been proven.

Performance, Skills and Knowledge evidence must be sufficiently covered and recorded in the Evidence Reference boxes contained within the units, to ensure all criteria has been met.

5.3 Assessors

Assessment must be carried out by competent assessors who, as a minimum, must hold the Level 3 Award in Assessing Competence in the Work Environment. Current and operational Assessors that hold units D32 and/or D33 or A1 and/or A2 as appropriate to the assessment being carried out, will not be required to achieve the Level 3 Award as they are still appropriate for the assessment requirements set out in this Unit Assessment Strategy. However, they 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 assessment to the most up to date Employer Units of Competence (EUC).

Assessor technical requirements

Assessors must be able to demonstrate that they have verifiable, relevant and sufficient technical competence to evaluate and judge performance and knowledge evidence requirements as set out in the relevant outcomes in the Employer Units of Competence.

This will be demonstrated either by holding a relevant technical qualification or by proven industrial experience of the technical areas to be assessed. The assessor's competence must, at the very least, be at the same level as that required of the Apprentice in the units being assessed.

Assessors must also be:

Be fully conversant with the Awarding Organisation's assessment recording documentation used for the Employer Units of Competence, against which the assessments and verification are to be carried out, plus any other relevant documentation and system and procedures to support the QA process.

5.4 Internal Quality Assurers

Internal quality assurance (IQA) must be carried out by competent IQA's that as a minimum must hold the Level 4 Award in the Internal Quality Assurance of Assessment Processes and Practices. Current and operational IQA that hold internal verification units V1 or D34 will not be required to achieve the Level 4 Award as they are still appropriate for the verification requirements set out in this Unit Assessment Strategy.

Internal quality assurers 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 (verification) of Assessment Processes and Practices to the most up to date Employer Units of Competence.

Internal quality assurers will also be expected to be fully conversant with the terminology used in the Employer Units of Competence against which the assessments and verification are to be carried out, the appropriate Regulatory Body's systems and procedures and the relevant Awarding Organisation's documentation, systems and procedures within which the assessment and verification is taking place.

Specific technical requirements for persons undertaking the role of external quality assurance

Internal and external quality assurers for the Employer Units of Competence must be able to demonstrate that have verifiable, sufficient and relevant industrial experience, and must have a working knowledge of the processes, techniques and procedures that are used in the engineering industry.

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

Technical requirements for Assessors and 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 Assurance (IQA)	Quality Assurance skills	Assessment knowledge	Technical understanding of the areas covered by the qualification
External Quality Assurance (EQA)	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 verifier, 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 assurance			
External quality assurance			

6.0 Assessment

6.1 Assessment Environment

Assessment of all learners in the Technical Support Technician engineering related occupations, against the Employer Units of Competence (EUC) developed by the employers in the engineering sector, will be undertaken in accordance with the following criteria: -

- Evidence of occupational competence should be generated and collected through real work activities in a real working environment.
- Real work activities are those undertaken to provide a secure product or service under typical business conditions.
- A real working environment is one that reflects typical employment conditions relevant to the work activities being assessed.
- The evidence collected under these conditions should also be as naturally occurring as possible.

Taking account of the above, it is not acceptable to undertake assessments in a classroom, or similar environment that has been set up specifically for training. Where opportunities for evidence collection are not available at the workplace, simulation is permitted, in accordance with the criteria listed in section 6.3 below.

6.2 Access to Assessment

16 is the minimum age limit required by learners to undertake the units unless this is a legal requirement of the process or the environment. Assessment is open to any learner who has the potential to achieve the criteria set out in the units.

When used as part of an apprenticeship standard apprentices must have achieved the requirements of the foundation phase of the apprenticeship in line with the apprenticeship standard they are working towards.

Aids or appliances, which are designed to alleviate disability, may be used during assessment, providing they do not compromise the standard required.

6.3 Carrying Out Assessment

The EAL Level 3 Diploma in Advanced Manufacturing Engineering – Technical Support Technician (Development Competence) units have been specifically developed to cover a wide range of activities.

The evidence produced for the units will, therefore, depend on the learner's choice of "bulleted items" listed in the unit performance criteria. Where the performance criteria gives a choice of bulleted items (for example '**any three from five**'), assessors should note that learners do not need to provide evidence of the other items to complete the unit (in this example above, two items) particularly where these additional items may relate to other activities or methods that are not part of the learners' normal workplace activity or area of expertise.

Performance evidence must be:

- Products of the learners' work, such as items that have been produced or worked on, plans, charts, reports, standard operating procedures, documents produced as part of a work activity, records, or photographs of the completed activity.

Together with:

- Evidence of the way the learners carried out the activities, such as witness testimonies, assessor observations or authenticated learner reports of the activity undertaken.

Competence performance is more than just carrying out a series of individual set tasks. Many of the units contain statements that require the learner to provide evidence that proves they are capable of combining various features and techniques. Where this is the case, separate fragments of evidence would not provide this combination of features and techniques and, therefore, will not be acceptable as demonstrating competent performance.

Simulation

Direct evidence produced through normal performance in the workplace is the primary source for meeting the evidence requirements of this qualification.

If the learner cannot meet all assessment criteria under naturally occurring activities in their workplace and need to simulate a specific task, please refer to the guidance notes "Centre Guidance for Developing Assessments for Simulation/Replication" in smarter touch.

Assessing knowledge and understanding

Knowledge and understanding are key components of competent performance, but it is unlikely that performance evidence alone will provide enough evidence in this area. Where the learner's knowledge and understanding (and the handling of contingency situations) is not apparent from performance evidence, it must be assessed by other means and be supported by suitable evidence.

EAL expects oral questioning and practical demonstrations to be used, as these are considered the most appropriate for these units. Assessors should ask enough questions to make sure that the learner has an appropriate level of knowledge and understanding, as required by the unit. EAL may choose other methods, which must be supported by a suitable rationale.

The achievement of the specific knowledge and understanding requirements of the units cannot simply be inferred by the results of tests or assignments from other units, qualifications, or training programmes. Where evidence is submitted from these sources, the assessor must, as with any assessment, make sure the evidence is valid, reliable, authentic, directly attributable to the learner, and meets the full knowledge and understanding requirements of the unit.

Where oral questioning is used the assessor must retain a record of the questions asked, together with the learner's answers.

Please note: Knowledge and understanding can be demonstrated in a number of different ways.

Witness testimony

Where 'observation' is used to obtain performance evidence, this must be carried out against the unit assessment criteria. Best practice would require that such observation is carried out by a qualified assessor. If this is not practicable, then alternative sources of evidence may be used.

For example, the observation may be carried out against the assessment criteria by someone else that is in close contact with the learner. This could be a team leader, supervisor, mentor or line manager who may be regarded as a suitable witness to the learner's competency. However, the witness must be technically competent in the process or skills that they are providing testimony for, to at least the same level of expertise as that required of the apprentice. It will be the responsibility of the assessor to make sure that any witness testimonies accepted as evidence of the learner's competency are reliable, auditable and technically valid.

7.0 Quality Control of Assessments

General

There are two major points where EAL interacts with the Centre in relation to the external quality control of assessment for a qualification and these are:

- Approval - when a Centre take on new qualifications, EAL, normally through an external verifier ensures that the Centre is suitably equipped and prepared to deliver the new qualification.
- Monitoring - throughout the ongoing delivery of the qualification EAL, through external verification monitoring and other mechanisms must maintain and the quality and consistency of assessment of the qualification.

Approval

In granting approval, EAL, normally through its external verifiers must ensure that the prospective Centre:

- Meets any procedural requirements specified by EAL
- Has sufficient and appropriate physical and staff resources
- Meets relevant health and safety and/or equality and access requirements
- Has a robust plan for the delivery, assessment and quality assurance for the qualification/units.

EAL may decide to visit a Centre to view evidence or may undertake this via other means and there must be a clear rationale for the method(s) deployed.

Monitoring

EAL, through external monitoring and other mechanisms will ensure:

- That a strategy is developed and deployed for the ongoing EAL monitoring of the Centre. This strategy must be based on an active risk assessment of the Centre. In particular, the strategy must identify the apprentice, assessor, and internal verifier sampling strategy to be deployed and the rationale behind this:
- That the Centre's internal quality assurance processes are effective in assessment,
- That sanctions are applied to a Centre where necessary and that corrective actions are taken by the Centre and monitored by the EAL external quality assurer (EQA),
- That reviews of EAL's external auditing arrangements are undertaken.



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Appendix 1: Unit Summaries

All AUCE3 unit summaries are available in the Qualification Specification AUCE3 unit summaries document. For more information, please visit the [EAL Qualification Website](#)



Appendix 2: Learner Registration and Certification

Learners must be registered with EAL on a code which relates to the qualification, this must be completed prior to assessment. Both learner registration and certification can be completed online at the [EAL website](#). For paper-based registration and certification use the appropriate forms. These are located on the EAL Website, for guidance on registration and certification please refer to the Registration and Certification User Guide.

To register the learner on the chosen qualification/pathway code:

Qualification Title:	Code:
Level 3 Diploma in Advanced Manufacturing and Engineering – Technical Support Technician (Development Competence)	603/2290/1



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Published by:

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