BTEC Level 3

BTEC Nationals
Specification

Pearson BTEC Level 3 Diploma and BTEC Level 3 Extended Diploma in Aeronautical Engineering

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Issue 3

ALWAYS LEARNING

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This specification is Issue 3. Key changes are sidelined. We will inform centres of any changes to this issue. The latest issue can be found on the Edexcel website: www.edexcel.com

These qualifications were previously entitled:

Edexcel BTEC Level 3 Diploma in Aeronautical Engineering (QCF)

Edexcel BTEC Level 3 Excluded Diploma in Aeronautical Engineering (QCF)

The QNs remains the same.

References to third party material made in this specification are made in good faith. We not endorse, approve or accept responsibility for the content of materials, which may be subject to change, or any opinions expressed therein. (Material may include textbooks, journals, magazines and other publications and websites.)

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Contents

The units for the BTEC Nationals in Aeronautical Engineering are on the CD ROM contained within the specification pack.

BTEC National qualification titles covered by this specification

Pearson BTEC Level 3 Diploma in Aeronautical Engineering

Pearson BTEC Level 3 Extended Diploma in Aeronautical Engineering

These qualifications have been accredited to the National framework and are eligible for public funding as determined by the Department for Education (DfE) under Sections 96 and 97 of the Learning and Skills Act 2000.

The qualification titles listed above feature in the funding lists published annually by the DfE and the regularly updated website www.dcsf.gov.uk/. The Qualifications Number (QN) should be used by centres when they wish to seek public funding for their learners. Each unit within a qualification will also have a unit code.

The qualification and unit codes will appear on learners' final certification documentation.

The QNs for the qualifications in this publication are:

Pearson BTEC Level 3 Diploma in Aeronautical Engineering	500/7799/5
Pearson BTEC Level 3 Extended Diploma in Aeronautical Engineering	500/7800/8

These qualification titles will appear on learners' certificates. Learners need to be made aware of this when they are recruited by the centre and registered with Pearson.

What are BTEC Nationals?

BTEC National qualifications are undertaken in further education and sixth-form colleges, schools and other training providers, and have been since they were introduced in 1984. Their purpose, approaches to teaching, learning and assessment are established and understood by teaching professionals, employers and learners alike.

The BTEC National qualifications within this specification are:

- Pearson BTEC Level 3 Diploma in Aeronautical Engineering
- Pearson BTEC Level 3 Extended Diploma in Aeronautical Engineering.

But for clarity and continuity they are referred to within this specification and generically as BTEC National qualifications, where appropriate. They maintain the same equivalences, benchmarks and other articulations (for example SCAAT points, UCAS Tariff points) as their predecessor qualifications. The following identifies the titling conventions and variations between the predecessor:

Predecessor BTEC Nationals (accredited 2007)	BTEC Nationals (for delivery from September 2010)
Not applicable	Pearson BTEC Level 3 Certificate
Edexcel Level 3 BTEC National Award	Pearson BTEC Level 3 Subsidiary Diploma
Edexcel Level 3 BTEC National Certificate	Pearson BTEC Level 3 Diploma
Edexcel Level 3 BTEC National Diploma	Pearson BTEC Level 3 Extended Diploma

BTEC Nationals are designed to provide highly specialist work-related qualifications in a range of vocational sectors. They give learners the knowledge, understanding and skills that they need to prepare for employment. The qualifications also provide career development opportunities for those already in work, and through articulation to higher education, degree and professional development programmes provide progression opportunities within the same cognate or related areas of study within universities and other institutions. BTEC Nationals accredit the achievement for courses and programmes of study for full-time or part-time learners in schools, colleges and other training provider organisations.

BTEC Nationals provide much of the underpinning knowledge and understanding for the National Occupational Standards for the sector, where these are appropriate. They are supported by the relevant Sector Skills Councils (SSCs) and/or Standards Setting Bodies (SSBs). Certain BTEC Nationals are recognised as Technical Certificates and form part of the Apprenticeship Framework. They attract UCAS points that equate to similar-sized general qualifications within education institutions within the UK.

On successful completion of a BTEC National qualification, a learner can progress to or within employment and/or continue their study in the same, or related vocational area.

Total Qualification Time

For all regulated qualifications, Pearson specifies a total number of hours that it is expected the average learner will be required to undertake in order to complete and show achievement for the qualification: This is the Total Qualification Time (TQT).

Within this, Pearson will also identify the number of Guided Learning Hours (GLH) that we expect a centre delivering the qualification will need to provide. Guided learning means activities that directly or immediately involve tutors and assessors in teaching, supervising, and invigilating learners, such as lessons, tutorials, online instruction, supervised study giving feedback on performance.

In addition to guided learning, other required learning directed by tutors or assessors will include private study, preparation for assessent and undertaking assessment when not under supervision, such as preparatory reading, revision and independent research.

These qualifications also have a credit value, which is equal to one tenth of TQT. Pearson consults with users of these qualifications in assigning TQT and credit values.

This suite of BTEC Level 3 qualifications is available in the following sizes:

- Diploma – 1200 TQT (120 credits, 720 GLH)
- Extended Diploma – 1800 TQT (180 credits, 1080 GLH)

Pearson BTEC Level 3 Diploma – 120 credits

The 120-credit BTEC Level 3 Diploma broadens and expands the specialist work-related focus from the BTEC Level 3 Subsidiary Diploma.There is potential for the qualification to prepare learners for employment in the appropriate vocational sector and it is suitable for those who have decided that they wish to enter a particular area of work. It is broadly equivalent to two GCE A Levels.

Some learners may wish to gain the qualification in order to enter a specialist area of employment or to progress to a Level 3 programme. Other learners may want to extend the specialism they studied on the BTEC Level 3 Certificate or the BTEC Level 3 Subsidiary Diploma programme.

The predecessor qualification to the BTEC Level 3 Diploma is the Edexcel Level 3 BTEC National Certificate accredited onto the National Qualifications Framework, which has the same equivalences, overall size and focus to the revised qualification.

Pearson BTEC Level 3 Extended Diploma – 180 credits

The 180-credit BTEC Level 3 Extended Diploma extends and deepens the specialist work-related focus from the BTEC Level 3 Diploma.There is potential for the qualification to prepare learners for appropriate direct employment in the vocational sector and it is suitable for those who have decided that they clearly wish to enter a particular specialist area of work. It is broadly equivalent to three GCE A Levels.

Some learners may wish to gain the qualification in order to enter a specialist area of employment or to progress to a higher education foundation degree, HND or other professional development programme. Other learners may want to extend the specialist nature of the subjects they studied on the BTEC Level 3 Diploma or another programme of study.

Key features of the BTEC Nationals in Aeronautical Engineering

The BTEC Nationals in Aeronautical Engineering have been developed in the engineering sector to:

- give education and training for employees in the aeronautical engineering industries
- give opportunities for employees in the aeronautical engineering sector to achieve a nationally recognised Level 3 vocationally-specific qualification
- give full-time learners the opportunity to enter employment in the aeronautical engineering sector or to progress to vocational qualifications such as the Pearson BTEC Higher Nationals in Aerospace Engineering
- give learners the opportunity to develop a range of skills and techniques, personal skills and attributes essential for successful performance in working life

Rationale for the BTEC Nationals in Aeronautical Engineering

The aerospace sector continues to suffer from a skills gap and needs to keep up with rapidly developing technologies. The BTEC Nationals in Aeronautical Engineering have been designed to give new entrants to the aerospace sector the underpinning knowledge and specific skills needed to meet the needs of modern mechanical engineering industries.

Many of the units have strong links to the knowledge and evidence requirements of the SEMTA National Occupational Standards and relevant NVQs at Level 3 and will provide learners with opportunities for progression within and into employment. The qualifications have also been designed so that learners can progress into Higher Education, for example to BTEC Higher Nationals and undergraduate engineering degree qualifications.

The BTEC Nationals in Aeronautical Engineering have been designed with flexible qualification structures and provide a wide range of units so that learners can focus on their chosen career or area of interest. The qualifications provide opportunities for learners who intend progressing into senior technician roles as well as for those who are not yet based in industry and wish to gain a sound understanding of aeronautical engineering.

National Occupational Standards

BTEC Nationals are designed to provide much of the underpinning knowledge and understanding for the National Occupational Standards (NOS), as well as developing practical skills in preparation for work and possible achievement of NVQs in due course. NOS form the basis of National Vocational Qualifications (NVQs). BTEC Nationals do not purport to deliver occupational competence in the sector, which should be demonstrated in a work context.

Each unit in the specification identifies links to elements of the NOS.

The Pearson BTEC Level 3 Nationals in Aeronautical Engineering relates to the following NOS:

- Level 3 NVQ in Aeronautical Engineering
- Level 3 NVQ in Mechanical Manufacturing Engineering
- Level 3 NVQ in Electrical and Electronic Engineering
- Level 3 NVQ in Engineering Maintenance
- Level 3 NVQ in Engineering Leadership
- Level 3 NVQ in Business Improvement Techniques
- Level 3 NVQ in Engineering Technical Support
- Level 3 NVQ in Installation and Commissioning
- Level 3 NVQ in Materials Processing and Finishing
- Level 3 NVQ in Fabrication and Welding.

Rules of combination for Pearson BTEC Level 3 National qualifications

The rules of combination specify the:

- total credit value of the qualification
- the minimum credit to be achieved at the level or above the level of the qualification
- the mandatory unit credit
- the optional unit credit
- the maximum credit that can come from other Level 3 BTEC units in this qualification suite.

When combining units for a BTEC National qualification, it is the centre's responsibility to ensure that the following rules of combination are adhered to.

Pearson BTEC Level 3 Diploma

1 Qualification credit value: a minimum of 120 credits.

2 Minimum credit to be achieved at, or above, the level of the qualification: 90 credits.

3 Mandatory unit credit: 50 credits.

4 Optional unit credit: 70.

5 A maximum of 15 optional credits can come from other Level 3 BTEC units to meet local needs.

Pearson BTEC Level 3 Extended Diploma

1 Qualification credit value: a minimum of 180 credits.

2 Minimum credit to be achieved at, or above, the level of the qualification: 135 credits.

3 Mandatory unit credit: 50 credits.

4 Optional unit credit: 130.

5 A maximum of 30 optional credits can come from other Level 3 BTEC units to meet local needs.

Pearson BTEC Level 3 Diploma in Aeronautical Engineering

The Pearson BTEC Level 3 Diploma in Aeronautical Engineering is 120 credits and has 720 guided learning hours (GLH), it consists of four mandatory units **plus** optional units that provide for a combined total of 120 credits (where at least 90 credits must be at Level 3 or above). A minimum of 40 credits must be chosen from group A. The remaining optional units can be selected from either group A or group B.

The units for the BTEC Nationals in Aeronautical Engineering are on the CD ROM contained within the specification pack.

Pearson BTEC Level 3 Diploma in Aeronautical Engineering			
Unit	**Mandatory units**	**Credit**	**Level**
3	Engineering Project	20	3
4	Mathematics for Engineering Technicians	10	3
66	Theory of Flight	10	3
67	Principles and Applications of Aircraft Mechanical Science	10	3
Unit	**Optional units – group A A minimum of 40 credits must be chosen from group A**		
68	Principles and Applications of Aircraft Physical Science	10	3
69	Aircraft Workshop Principles and Practice	15	3
70	Aircraft Materials and Hardware	15	3
71	Inspection and Repair of Airframe Components and Structures	10	3
72	Aircraft Maintenance Practices	10	3
73	Aircraft Electrical Machines	10	3
74	Aircraft Electrical Devices and Circuits	10	3
75	Aircraft Electronic Devices and Circuits	10	3
76	Aircraft Computers and Electronic Systems	10	3
77	Human Factors in Aircraft Engineering	10	3
78	Aviation Legislation	10	3
79	Airframe Structural Concepts and Construction Methods	10	3
80	Aircraft Hydraulic Systems	10	3
81	Aircraft Propulsion System	10	3
82	Airframe Systems	10	3
83	Aircraft Gas Turbine Engines	10	3
84	Aircraft Electrical Systems	10	3
85	Aircraft Instrument and Indicating Systems	10	3
86	Aircraft Gas Turbine Engine and Propeller Maintenance	10	3
87	Avionic Systems	10	3
88	Aircraft Radio and Radar Principles	10	3
89	Further Aircraft Electronic Circuits and Avionic Systems	20	3
Unit	**Optional units – group B**	**Credit**	**Level**
1	Health and Safety in the Engineering Workplace	10	3
2	Communications for Engineering Technician	10	3

Pearson BTEC Level 3 Diploma in Aeronautical Engineering			
5	Mechanical Principles and Applications	10	3
6	Electrical and Electronic Principles	10	3
7	Business Operations in Engineering	10	3
8	Engineering Design	10	3
12	Applications of Mechanical Systems in Engineering	10	3
28	Further Mathematics for Engineering Technicians	10	3
146	Manufacturing of Advanced Composite Materials	10	3

Pearson BTEC Level 3 Extended Diploma in Aeronautical Engineering

The Pearson BTEC Level 3 Extended Diploma in Aeronautical Engineering is 180 credits and has 1080 guided learning hours (GLH), it consists of four mandatory units **plus** optional units that provide for a combined total of 180 credits (where at least 135 credits must be at Level 3 or above). A minimum of 60 must be selected form optional units group A. The remaining credits can be chosen from either group A or group B.

The units for the BTEC Nationals in Aeronautical Engineering are on the CD ROM contained within the specification pack.

Pearson BTEC Level 3 Extended Diploma in Aeronautical Engineering			
Unit	**Mandatory units**	**Credit**	**Level**
3	Engineering Project	**20**	**3**
4	Mathematics for Engineering Technicians	**10**	**3**
66	Theory of Flight	**10**	**3**
67	Principles and Applications of Aircraft Mechanical Science	**10**	**3**
Unit	**Optional units – group A A minimum of 60 credits must be chosen from group A**		
68	Principles and Applications of Aircraft Physical Science	**10**	**3**
69	Aircraft Workshop Principles and Practice	**15**	**3**
70	Aircraft Materials and Hardware	**15**	**3**
71	Inspection and Repair of Airframe Components and Structures	**10**	**3**
72	Aircraft Maintenance Practices	**10**	**3**
73	Aircraft Electrical Machines	**10**	**3**
74	Aircraft Electrical Devices and Circuits	**10**	**3**
75	Aircraft Electronic Devices and Circuits	**10**	**3**
76	Aircraft Computers and Electronic Systems	**10**	**3**
77	Human Factors in Aircraft Engineering	**10**	**3**
78	Aviation Legislation	**10**	**3**
79	Airframe Structural Concepts and Construction Methods	**10**	**3**
80	Aircraft Hydraulic Systems	**10**	**3**
81	Aircraft Propulsion System	**10**	**3**
82	Airframe Systems	**10**	**3**
83	Aircraft Gas Turbine Engines	**10**	**3**
84	Aircraft Electrical Systems	**10**	**3**
85	Aircraft Instrument and Indicating Systems	**10**	**3**
86	Aircraft Gas Turbine Engine and Propeller Maintenance	**10**	**3**
87	Avionic Systems	**10**	**3**
88	Aircraft Radio and Radar Principles	**10**	**3**
89	Further Aircraft Electronic Circuits and Avionic Systems	**20**	**3**

Pearson BTEC Level 3 Extended Diploma in Aeronautical Engineering			
Unit	**Optional units – group B**	**Credit**	**Level**
1	Health and Safety in the Engineering Workplace	10	3
2	Communications for Engineering Technician	10	3
5	Mechanical Principles and Applications	10	3
6	Electrical and Electronic Principles	10	3
7	Business Operations in Engineering	10	3
8	Engineering Design	10	3
12	Applications of Mechanical Systems in Engineering	10	3
28	Further Mathematics for Engineering Technicians	10	3
146	Manufacturing of Advanced Composite Materials	10	3

Assessment and grading

In BTEC Nationals all units are internally assessed.

All assessment for BTEC Nationals is criterion referenced, based on the achievement of specified learning outcomes. Each unit within the qualification has specified assessment and grading criteria which are to be used for grading purposes. A summative unit grade can be awarded at pass, merit or distinction:

- to achieve a 'pass' a learner must have satisfied **all** the pass assessment criteria
- to achieve a 'merit' a learner must additionally have satisfied **all** the merit grading criteria
- to achieve a 'distinction' a learner must additionally have satisfied **all** the distinction grading criteria.

Learners who complete the unit but who do not meet all the pass criteria are graded 'unclassified'.

Grading domains

The grading criteria are developed in relation to grading domains which are exemplified by a number of indicative characteristics at the level of the qualification.

There are four BTEC National grading domains:

- application of knowledge and understanding
- development of practical and technical skills
- personal development for occupational roles
- application of generic skills.

Please refer to *Annexe B* which shows the merit and distinction indicative characteristics.

Guidance

The purpose of assessment is to ensure that effective learning has taken place to give learners the opportunity to:

- meet the assessment and grading criteria and
- achieve the learning outcomes within the units.

All the assignments created by centres should be reliable and fit for purpose, and should build on the assessment and grading criteria. Assessment tasks and activities should enable learners to produce valid, sufficient and reliable evidence that relates directly to the specified criteria. Centres should enable learners to produce evidence in a variety of different forms, including written reports, graphs and posters, along with projects, performance observation and time-constrained assessments.

Centres are encouraged to emphasise the practical application of the assessment and grading criteria, providing a realistic scenario for learners to adopt, and making maximum use of practical activities and work experience. The creation of assignments that are fit for purpose is vital to achievement and their importance cannot be over-emphasised.

The assessment and grading criteria must be clearly indicated in the fit-for-purpose assignments. This gives learners focus and helps with internal verification and standardisation processes. It will also help to ensure that learner feedback is specific to the assessment and grading criteria.

When looking at the assessment and grading grids and designing assignments, centres are encouraged to identify common topics and themes.

The units include guidance on appropriate assessment methodology. A central feature of vocational assessment is that it allows for assessment to be:

- current, ie to reflect the most recent developments and issues
- local, ie to reflect the employment context of the delivering centre
- flexible to reflect learner needs, ie at a time and in a way that matches the learner's requirements so that they can demonstrate achievement.

Calculation of the qualification grade

Pass qualification grade

Learners who achieve the minimum eligible credit value specified by the rule of combination will achieve the qualification at pass grade (see *Rules of combination for Pearson BTEC Level 3 National qualifications*).

Qualification grades above pass grade

Learners will be awarded a merit or distinction or distinction* qualification grade (or combination of these grades appropriate to the qualification) by the aggregation of points gained through the successful achievement of individual units. The number of points available is dependent on the unit level and grade achieved, and the credit size of the unit (as shown in the 'points available for credits achieved at different levels and unit grades' below).

Points available for credits achieved at different Levels and unit grades

The table below shows the **number of points scored per credit** at the unit level and grade.

Unit level	Points per credit		
	Pass	Merit	Distinction
Level 2	5	6	7
Level 3	**7**	**8**	**9**
Level 4	9	10	11

Learners who achieve the correct number of points within the ranges shown in the 'qualification grade' table will achieve the qualification merit or distinction or distinction* grade (or combinations of these grades appropriate to the qualification).

Qualification grade

BTEC Level 3 Certificate

Points range above pass grade	Grade	
230-249	Merit	M
250-259	Distinction	D
260 and above	Distinction*	D*

BTEC Level 3 Subsidiary Diploma

Points range above pass grade	Grade	
460-499	Merit	M
500-519	Distinction	D
520 and above	Distinction*	D*

BTEC Level 3 Diploma

Points range above pass grade	Grade
880-919	MP
920-959	MM
960-999	DM
1000-1029	DD
1030-1059	DD*
1060 and above	D*D*

BTEC Level 3 Extended Diploma

Points range above pass grade	Grade
1300-1339	MPP
1340-1379	MMP
1380-1419	MMM
1420-1459	DMM
1460-1499	DDM
1500-1529	DDD
1530-1559	DDD*
1560-1589	DD*D*
1590 and above	D*D*D*

Please refer to Annexe G for examples of calculation of qualification grade above pass grade.

Quality assurance of centres

Pearson's qualification specifications set out the standard to be achieved by each learner in order to be awarded the qualification. This is covered in the statement of learning outcomes, and assessment and grading criteria in each unit. Further guidance on delivery and assessment is given in the *Essential guidance for tutors* section in each unit. This section is designed to provide additional guidance and amplification related to the unit to support tutors, deliverers and assessors and to provide for a coherence of understanding and a consistency of delivery and assessment.

Approval

Centres that have not previously offered BTEC qualifications will first need to apply for, and be granted, centre approval before they can apply for approval to offer the programme.

When a centre applies for approval to offer a BTEC qualification they are required to enter into an approvals agreement.

The approvals agreement is a formal commitment by the head or principal of a centre to meet all the requirements of the specification and any linked codes or regulations. Sanctions and tariffs may be applied if centres do not comply with the agreement. Ultimately, this could result in the suspension of certification or withdrawal of approval.

Centres will be allowed 'accelerated approval' for a new programme where the centre already has approval for a programme that is being replaced by the new programme.

The key principles of quality assurance are that:

- a centre delivering BTEC programmes must be an approved centre and must have approval for programmes or groups of programmes that it is operating
- the centre agrees as part of gaining approval to abide by specific terms and conditions around the effective delivery and quality assurance of assessment; it must abide by these conditions throughout the period of delivery
- Pearson makes available to approved centres a range of materials and opportunities intended to exemplify the processes required for effective assessment and examples of effective standards. Approved centres must use the materials and services to ensure that all staff delivering BTEC qualifications keep up to date with the guidance on assessment
- an approved centre must follow agreed protocols for standardisation of assessors and verifiers; planning, monitoring and recording of assessment processes; and for dealing with special circumstances, appeals and malpractice.

The approach of quality assured assessment is made through a partnership between an approved centre and Pearson. Pearson is committed to ensuring that it follows best practice and employs appropriate technology to support quality assurance processes where practicable. Therefore, the specific arrangements for working with centres will vary. Pearson seeks to ensure that the quality assurance processes that it uses do not place undue bureaucratic processes on centres and works to support centres in providing robust quality assurance processes.

Pearson monitors and supports centres in the effective operation of assessment and quality assurance. The methods which it uses to do this for these BTEC First and National programmes include:

- ensuring that all centres have completed appropriate declarations at the time of approval undertaking approval visits to centres where necessary
- requiring all centres to appoint a Lead Internal Verifier for designated groups of programmes and to ensure that this person is trained and supported in carrying out that role
- requiring that the Lead Internal Verifier completes compulsory online standardisation related to assessment and verification decisions for the designated programme
- assessment sampling and verification, through requested samples of assessments, completed assessed learner work and associated documentation
- overarching review and assessment of a centre's strategy for assessing and quality assuring its BTEC programmes.

Pearson Quality Assurance Handbook

Centres should refer to the *Handbook for Quality Assurance for BTEC Qualifications*, issued annually, for detailed guidance.

An approved centre must make certification claims only when authorised by Pearson and strictly in accordance with requirements for reporting.

Centres that do not fully address and maintain rigorous approaches to quality assurance will be prevented from seeking certification for individual programmes or for all BTEC First and National programmes. Centres that do not comply with remedial action plans may have their approval to deliver qualifications removed.

Programme design and delivery

BTEC National qualifications consist of mandatory units and optional units. Optional units are designed to provide a focus to the qualification and give more specialist opportunities in the sector. In BTEC Nationals each unit has a number of *guided learning hours* and centres are advised to take this into account when planning the programme of study associated with this specification.

Mode of delivery

Pearson does not define the mode of study for BTEC Nationals. Centres are free to offer the qualifications using any mode of delivery (such as full time, part time, evening only, distance learning) that meets their learners' needs. Whichever mode of delivery is used, centres must ensure that learners have appropriate access to the resources identified in the specification and to the subject specialists delivering the units. This is particularly important for learners studying for the qualification through open or distance learning.

Learners studying for the qualification on a part-time basis bring with them a wealth of experience that should be utilised to maximum effect by tutors and assessors. The use of assessment evidence drawn from learners' work environments should be encouraged. Those planning the programme should aim to enhance the vocational nature of the qualification by:

- liaising with employers to ensure a course relevant to learners' specific needs
- accessing and using non-confidential data and documents from learners' workplaces
- including sponsoring employers in the delivery of the programme and, where appropriate, in the assessment
- linking with company-based/workplace training programmes
- making full use of the variety of experience of work and life that learners bring to the programme.

Resources

BTEC Nationals are designed to prepare learners for employment in specific occupational sectors. Physical resources need to support the delivery of the programme and the proper assessment of the learning outcomes and should, therefore, normally be of industry standard. Staff delivering programmes and conducting the assessments should be familiar with current practice and standards in the sector concerned. Centres will need to meet any specific resource requirements to gain approval from Pearson.

Where specific resources are required these have been indicated in individual units in the *Essential resources* sections.

Delivery approach

It is important that centres develop an approach to teaching and learning that supports the specialist vocational nature of BTEC National qualifications and the mode of delivery. Specifications give a balance of practical skill development and knowledge requirements, some of which can be theoretical in nature. Tutors and assessors need to ensure that appropriate links are made between theory and practical application and that the knowledge base is applied to the sector. This requires the development of relevant and up-to-date teaching materials that allow learners to apply their learning to actual events and activity within the sector. Maximum use should be made of the learner's experience.

An outline learning plan is included in every unit as guidance which demonstrates one way in planning the delivery and assessment of the unit. The outline learning plan can be used in conjunction with the programme of suggested assignments.

Where the qualification has been designated and approved as a Technical Certificate and forms part of an Apprenticeship scheme, particular care needs to be taken to build strong links between the learning and assessment for the BTEC National qualification and the related NVQs and Functional Skills that also contribute to the scheme.

Meeting local needs

Centres should note that the qualifications set out in this specification have been developed in consultation with centres and employers and the Sector Skills Councils or the Standards Setting Bodies for the relevant sector. Centres should make maximum use of the choice available to them within the optional units to meet the needs of their learners, and local skills and training needs.

In certain circumstances, units in this specification might not allow centres to meet a local need. In this situation, Pearson will ensure that the rule of combination allows centres to make use of units from other BTEC specifications in this suite. Centres are required to ensure that the coherence and purpose of the qualification is retained and to ensure that the vocational focus is not diluted.

Limitations on variations from standard specifications

The flexibility to import standard units from other BTEC Nationals is limited to a total of 25 per cent of the qualification credit value (see *Rules of combination for Pearson BTEC Level 3 National qualifications*).

These units cannot be used at the expense of the mandatory units in any qualification.

Additional and specialist learning

Additional and specialist learning (ASL) consists of accredited qualifications at the same level as, or one level above, the Diploma course of study. The ASL may include BTEC qualifications which are also available to learners not following a Diploma course of study.

Qualifications for ASL must be selected from the ASL catalogue through the National Database of Accredited Qualifications (NDAQ). The catalogue includes qualifications which have the approval of the Diploma Development Partnership (DDP) and will expand over time as more qualifications are approved. To access the catalogue go to www.ndaq.org.uk and select 'Browse Diploma Qualifications'.

Functional Skills

BTEC Nationals give learners opportunities to develop and apply Functional Skills.

Functional Skills are offered as stand-alone qualifications at Level 2. See individual units for opportunities to cover ICT, Mathematics and English Functional Skills.

Personal, learning and thinking skills

Opportunities are available to develop personal, learning and thinking skills (PLTS) within sector-related context. PLTS are identified in brackets after the unit pass criteria to which they are associated and they are also mapped in *Annexe C*. Further opportunities for learners to demonstrate these skills may also be apparent as learners progress throughout their learning.

Access and recruitment

Edexcel's policy regarding access to its qualifications is that:

- they should be available to everyone who is capable of reaching the required standards
- they should be free from any barriers that restrict access and progression
- there should be equal opportunities for all wishing to access the qualifications.

Centres are required to recruit learners to BTEC qualifications with integrity. This will include ensuring that applicants have appropriate information and advice about the qualifications and that the qualification will meet their needs. Centres should take appropriate steps to assess each applicant's potential and make a professional judgement about their ability to successfully complete the programme of study and achieve the qualification. This assessment will need to take account of the support available to the learner within the centre during their programme of study and any specific support that might be necessary to allow the learner to access the assessment for the qualification. Centres should consult Pearson's policy on learners with particular requirements.

Centres will need to review the entry profile of qualifications and/or experience held by applicants, considering whether this profile shows an ability to progress to a Level 4 qualification. For learners who have recently been in education, the profile is likely to include one of the following:

- a BTEC Level 2 qualification in engineering or a related vocational area
- a standard of literacy and numeracy supported by a general education equivalent to four GCSEs at grade A*-C
- other related Level 2 qualifications
- related work experience.

More mature learners may present a more varied profile of achievement that is likely to include experience of paid and/or unpaid employment.

Restrictions on learner entry

Most BTEC National qualifications are for learners aged 16 years and over.

In particular sectors the restrictions on learner entry might also relate to any physical or legal barriers, for example people working in health, care or education are likely to be subject to police checks.

Pearson BTEC Level 3 Nationals are listed on the DfE funding lists under Section 96 and Section 97 of the Learning and Skills Act 2000.

Access arrangements and special considerations

Pearson's policy on access arrangements and special considerations for BTEC and Edexcel NVQ qualifications aims to enhance access to the qualifications for learners with disabilities and other difficulties (as defined by the 1995 Disability Discrimination Act and the amendments to the Act) without compromising the assessment of skills, knowledge, understanding or competence.

Further details are given in the policy *Access Arrangements and Special Considerations for BTEC and Edexcel NVQ Qualifications*, which can be found on the Pearson website. This policy replaces the previous Edexcel policy (Assessment of Vocationally Related Qualification: Regulations and Guidance Relating to Learners with Special Requirements, 2002) concerning learners with particular requirements.

Recognition of Prior Learning

Recognition of Prior Learning (RPL) is a method of assessment (leading to the award of credit) that considers whether a learner can demonstrate that they can meet the assessment requirements for a unit through knowledge, understanding or skills they already possess and so do not need to develop through a course of learning.

Pearson encourages centres to recognise learners' previous achievements and experiences whether at work, home and at leisure, as well as in the classroom. RPL provides a route for the recognition of the achievements resulting from continuous learning.

RPL enables recognition of achievement from a range of activities using any valid assessment methodology. Provided that the assessment requirements of a given unit or qualification have been met, the use of RPL is acceptable for accrediting a unit, units or a whole qualification. Evidence of learning must be valid and reliable.

Unit format

All units in Pearson BTEC Level 3 National qualifications have a standard format. The unit format is designed to give guidance on the requirements of the qualification for learners, tutors, assessors and those responsible for monitoring national standards.

Each unit has the following sections.

Unit title

The unit title will appear on the learner's Notification of Performance (NOP).

Level

All units and qualifications have a level assigned to them, which represents the level of achievement. There are nine levels of achievement, from Entry Level to Level 8. The level of the unit has been informed by the level descriptors and, where appropriate, the National Occupational Standards (NOS) and/or other sector/professional benchmarks.

Credit value

Each unit in BTEC National qualifications has a credit value; learners will be awarded credits for the successful completion of whole units.

A credit value specifies the number of credits that will be awarded to a learner who has achieved all the learning outcomes of the unit.

Guided learning hours

Guided learning hours for the unit as defined on page 3.

Aim and purpose

The aim provides a clear summary of the purpose of the unit and is a succinct statement that summarises the learning outcomes of the unit.

Unit introduction

The unit introduction gives the reader an appreciation of the unit in the vocational setting of the qualification, as well as highlighting the focus of the unit. It gives the reader a snapshot of the unit and the key knowledge, skills and understanding gained while studying the unit. The unit introduction also highlights any links to the appropriate vocational sector by describing how the unit relates to that sector.

Learning outcomes

Learning outcomes state exactly what a learner should 'know, understand or be able to do' as a result of completing the unit.

Unit content

The unit content identifies the breadth of knowledge, skills and understanding needed to design and deliver a programme of learning to achieve each of the learning outcomes. This is informed by the underpinning knowledge and understanding requirements of the related NOS. The content provides the range of subject material for the programme of learning and specifies the skills, knowledge and understanding required for achievement of the pass, merit and distinction grading criteria.

Each learning outcome is stated in full and then the key phrases or concepts related to that learning outcome are listed in italics followed by the subsequent range of related topics.

Relationship between content and assessment criteria

The learner must have the opportunity within the delivery of the unit to cover all of the unit content.

It is not a requirement of the unit specification that all of the content is assessed. However, the indicative content will need to be covered in a programme of learning in order for learners to be able to meet the standard determined in the assessment and grading criteria. The merit and distinction grading criteria enable the learner to achieve higher levels of performance in acquisition of knowledge, understanding and skills.

Content structure and terminology

The information below shows how unit content is structured and gives the terminology used to explain the different components within the content.

- Learning outcome: this is given and in bold at the beginning of each section of content.
- Italicised sub-heading: it contains a key phrase or concept. This is content which must be covered in the delivery of the unit. Colons mark the end of an italicised sub-heading.
- Elements of content: the elements are in plain text and amplify the sub-heading. The elements must also be covered in the delivery of the unit. Semi-colons mark the end of an element.
- Brackets contain amplification of elements of content which must be covered in the delivery of the unit.
- 'eg' is a list of examples used for indicative amplification of an element (that is, the content specified in this amplification that could be covered or that could be replaced by other, similar material).

Assessment and grading grid

Each grading grid gives the assessment and grading criteria used to determine the evidence that each learner must produce in order to receive a pass, merit or distinction grade. It is important to note that the merit and distinction grading criteria require a qualitative improvement in a learner's evidence and not simply the production of more evidence at the same level.

Essential guidance for tutors

This section gives tutors additional guidance and amplification to aid understanding and a consistent level of delivery and assessment. It is divided into the following sections.

- *Delivery* – explains the content's relationship with the learning outcomes and offers guidance about possible approaches to delivery. This section is based on the more usual delivery modes but is not intended to rule out alternative approaches.
- *Outline learning plan* – the outline learning plan has been included in every unit as guidance and demonstrates one way in planning the delivery and assessment of a unit. The outline learning plan can be used in conjunction with the programme of suggested assignments.
- *Assessment* – gives amplification about the nature and type of evidence that learners need to produce in order to pass the unit or achieve the higher grades. This section should be read in conjunction with the grading criteria.
- *Suggested programme of assignments* – the table shows how the suggested assignments match and cover the assessment grading criteria.
- *Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications* – sets out links with other units within the qualification. These links can be used to ensure that learners make connections between units, resulting in a coherent programme of learning. The links show opportunities for integration of learning, delivery and assessment.
- *Essential resources* – identifies any specialist resources needed to allow learners to generate the evidence required for each unit. The centre will be asked to ensure that any requirements are in place when it seeks approval from Pearson to offer the qualification.
- *Employer engagement and vocational contexts* – provides a short list of agencies, networks and other useful contacts for employer engagement and for sources of vocational contexts.
- *Indicative reading for learners* – gives a short list of learner resource material that benchmarks the level of study.

Further information

For further information please call Customer Services on 020 7010 2188 (calls may be recorded for training purposes) or email TeachingEngineering@pesrson.com.

Useful publications

Further copies of this document and related publications can be obtained by contacting us:

Telephone: 0845 172 0205
Email: publications@linney.com

Related information and publications include:

- Functional Skills publications – specifications, tutor support materials and question papers
- the current publications catalogue and update catalogue.

Edexcel publications concerning the Quality Assurance System and the internal and external verification of vocationally related programmes can be found on the Pearson website and in the Edexcel publications catalogue.

NB: Most of our publications are priced. There is also a charge for postage and packing. Please check the cost when you order.

How to obtain National Occupational Standards

The National Occupational Standards for engineering are available from:

SEMTA
14 Upton Road
Watford WD18 0JT

Telephone: 01923 238441
Website: www.semta.org.uk

Professional development and training

Pearson supports UK and international customers with training related to BTEC qualifications. This support is available through a choice of training options offered in our published training directory or through customised training at your centre.

The support we offer focuses on a range of issues including:

- planning for the delivery of a new programme
- planning for assessment and grading
- developing effective assignments
- building your team and teamwork skills
- developing student-centred learning and teaching approaches
- building Functional Skills into your programme
- building in effective and efficient quality assurance systems.

The national programme of training we offer can be viewed on our website. You can request customised training through the website or by contacting one of our advisers in the Training from Pearson UK to discuss your training needs.

The training we provide:

- is active – ideas are developed and applied
- is designed to be supportive and thought provoking
- builds on best practice.

Our training is underpinned by the LLUK standards for those preparing to teach and for those seeking evidence for their continuing professional development.

Annexe A

The Pearson BTEC qualification framework for the Engineering sector

Progression opportunities within the framework.

Level	General qualifications	BTEC full vocationally-related qualifications	BTEC Short Courses	NVQ/occupational
8				
7				
6				
5		HND in Manufacturing Engineering HND in Mechanical Engineering HND in Operations Engineering HND in Electrical/Electronic Engineering		
4		HNC in Manufacturing Engineering HNC in Mechanical Engineering HNC in Operations Engineering HNC in Electrical/Electronic Engineering		

Level	General qualifications		BTEC full vocationally-related qualifications	BTEC Short Courses	NVQ/occupational
3			Pearson BTEC Level 3 Diploma and Extended Diploma in Mechanical Engineering Pearson BTEC Level 3 Diploma and Extended Diploma in Manufacturing Engineering Pearson BTEC Level 3 Diploma and Extended Diploma in Engineering Pearson BTEC Level 3 Diploma and Extended Diploma in Operations and Maintenance Engineering Pearson BTEC Level 3 Diploma and Extended Diploma in Electrical/ Electronic Engineering Pearson BTEC Level 3 Diploma and Extended Diploma in Aeronautical Engineering		
2	GCSE Engineering GCSE Manufacturing		Pearson BTEC Level 2 Certificate, Extended Certificate and Diploma in Engineering		Level 2 NVQ in Performing Engineering Operations Level 2 NVQ in Performing Manufacturing Operations Level 2 NVQ in Business Improvement Techniques
1			Introductory Certificate and Diploma in Engineering		Level 1 NVQ in Performing Engineering Operations Level 1 NVQ in Performing Manufacturing Operations
Entry					

Annexe B

Grading domains: BTEC Level 3 generic grading domains

Grading domain 1	Indicative characteristics – merit	Indicative characteristics – distinction
Application of knowledge and understanding (Learning outcome stem *understand* or *know*)	• Shows depth of knowledge and development of understanding in familiar and unfamiliar situations (for example explain why, makes judgements based on analysis). • Applies and/or selects concepts showing comprehension of often complex theories. • Applies knowledge in often familiar and unfamiliar contexts. • Applies knowledge to non-routine contexts (eg assessor selection). • Makes reasoned analytical judgements. • Shows relationships between pass criteria.	• Synthesises knowledge and understanding across pass/merit criteria. • Evaluates complex concepts/ideas/ actions and makes reasoned and confident judgements. • Uses analysis, research and evaluation to make recommendations and influence proposals. • Analyses implications of application of knowledge/understanding. • Accesses and evaluates knowledge and understanding to advance complex activities/contexts. • Shows relationships with p/m criteria. • Responds positively to evaluation.
Grading domain 2	**Indicative characteristics – merit**	**Indicative characteristics – distinction**
Development of practical and technical skills (Learning outcome stem *be able to*)	• Deploys appropriate advanced techniques/processes/skills. • Applies technical skill to advance non-routine activities. • Advances practical activities within resource constraints. • Produces varied solutions (including non-routine). • Modifies techniques/processes to situations. • Shows relationship between p criteria.	• Demonstrates creativity/originality/ own ideas. • Applies skill(s) to achieve higher order outcome. • Selects and uses successfully from a range of advanced techniques/ processes/skills. • Reflects on skill acquisition and application. • Justifies application of skills/methods. • Makes judgements about risks and limitations of techniques/processes. • Innovates or generates new techniques/processes for new situations. • Shows relationship with p and m criteria.

Grading domain 3	Indicative characteristics – merit	Indicative characteristics – distinction
Personal development for occupational roles (Any learning outcome stem)	• Takes responsibility in planning and undertaking activities. • Reviews own development needs. • Finds and uses relevant information sources. • Acts within a given work-related context showing understanding of responsibilities. • Identifies responsibilities of employers to the community and the environment. • Applies qualities related to the vocational sector. • Internalises skills/attributes (creating confidence).	• Manages self to achieve outcomes successfully. • Plans for own learning and development through the activities. • Analyses and manipulates information to draw conclusions. • Applies initiative appropriately. • Assesses how different work-related contexts or constraints would change performance. • Reacts positively to changing work-related contexts • Operates ethically in work-related environments. • Takes decisions related to work contexts. • Applies divergent and lateral thinking in work-related contexts. • Understands interdependence.
Grading domain 4	**Indicative characteristics – merit**	**Indicative characteristics – distinction**
Application of generic skills (Any learning outcome stem)	• Communicates effectively using appropriate behavioural and language registers. • Communicates with clarity and influence. • Makes judgements in contexts with explanations. • Explains how to contribute within a team. • Demonstrates positive contribution to team(s). • Makes adjustments to meet the needs/ expectations of others (negotiation skills). • Selects and justifies solutions for specified problems.	• Presents self and communicates information to meet the needs of a variety of audience. • Identifies strategies for communication. • Shows innovative approaches to dealing with individuals and groups. • Takes decisions in contexts with justifications. • Produces outputs subject to time/ resource constraints. • Reflects on own contribution to working within a team. • Generates new or alternative solutions to specified problems. • Explores entrepreneurial attributes.

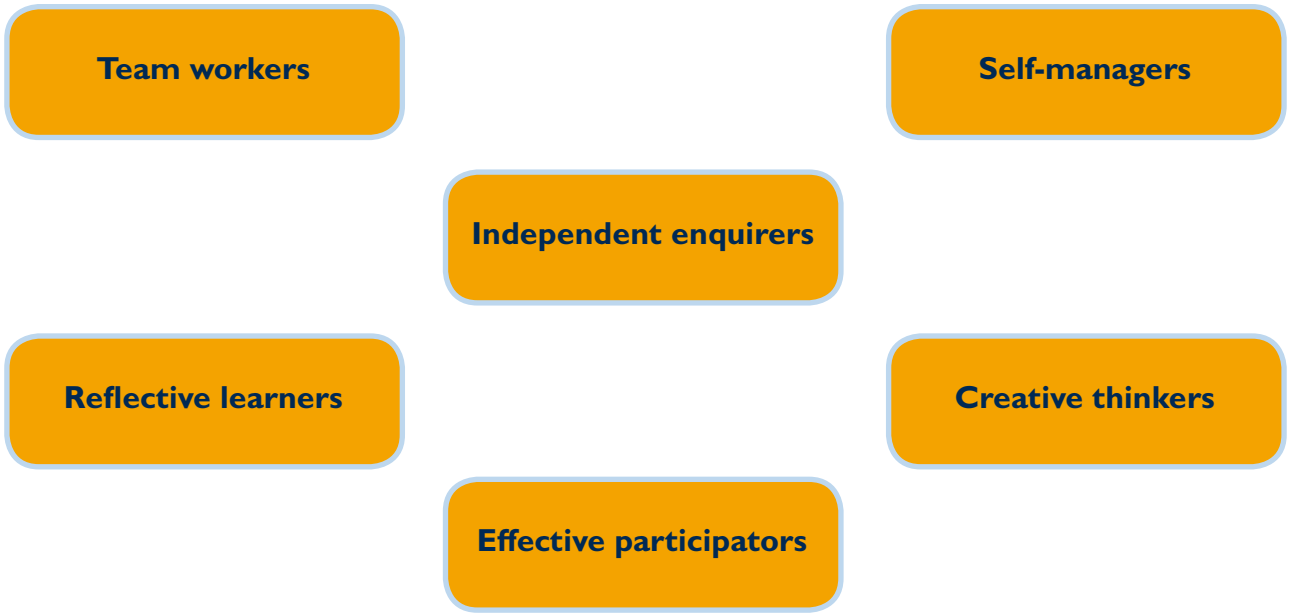
Annexe C

Personal, learning and thinking skills

A FRAMEWORK OF PERSONAL, LEARNING AND THINKING SKILLS 11–19 IN ENGLAND

The framework comprises six groups of skills that, together with the Functional Skills of English, mathematics and ICT, are essential to success in learning, life and work. In essence the framework captures the essential skills of: managing self; managing relationships with others; and managing own learning, performance and work. It is these skills that will enable young people to enter work and adult life confident and capable.

The titles of the six groups of skills are set out below.



For each group there is a focus statement that sums up the range of skills. This is followed by a set of outcome statements that are indicative of the skills, behaviours and personal qualities associated with each group.

Each group is distinctive and coherent. The groups are also inter-connected. Young people are likely to encounter skills from several groups in any one learning experience. For example an independent enquirer would set goals for their research with clear success criteria (reflective learner) and organise and manage their time and resources effectively to achieve these (self-manager). In order to acquire and develop fundamental concepts such as organising oneself, managing change, taking responsibility and perseverance, learners will need to apply skills from all six groups in a wide range of learning contexts 11-19.

The Skills

Independent enquirers

Focus:

Young people process and evaluate information in their investigations, planning what to do and how to go about it. They take informed and well-reasoned decisions, recognising that others have different beliefs and attitudes.

Young people:

- identify questions to answer and problems to resolve
- plan and carry out research, appreciating the consequences of decisions
- explore issues, events or problems from different perspectives
- analyse and evaluate information, judging its relevance and value
- consider the influence of circumstances, beliefs and feelings on decisions and events
- support conclusions, using reasoned arguments and evidence.

Creative thinkers

Focus:

Young people think creatively by generating and exploring ideas, making original connections. They try different ways to tackle a problem, working with others to find imaginative solutions and outcomes that are of value.

Young people:

- generate ideas and explore possibilities
- ask questions to extend their thinking
- connect their own and others' ideas and experiences in inventive ways
- question their own and others' assumptions
- try out alternatives or new solutions and follow ideas through
- adapt ideas as circumstances change.

Reflective learners

Focus:

Young people evaluate their strengths and limitations, setting themselves realistic goals with criteria for success. They monitor their own performance and progress, inviting feedback from others and making changes to further their learning.

Young people:

- assess themselves and others, identifying opportunities and achievements
- set goals with success criteria for their development and work
- review progress, acting on the outcomes
- invite feedback and deal positively with praise, setbacks and criticism
- evaluate experiences and learning to inform future progress
- communicate their learning in relevant ways for different audiences.

Team workers

Focus:

Young people work confidently with others, adapting to different contexts and taking responsibility for their own part. They listen to and take account of different views. They form collaborative relationships, resolving issues to reach agreed outcomes.

Young people:

- collaborate with others to work towards common goals
- reach agreements, managing discussions to achieve results
- adapt behaviour to suit different roles and situations, including leadership role
- show fairness and consideration to others
- take responsibility, showing confidence in themselves and their contribution
- provide constructive support and feedback to others.

Self-managers

Focus:

Young people organise themselves, showing personal responsibility, initiative, creativity and enterprise with a commitment to learning and self-improvement. They actively embrace change, responding positively to new priorities, coping with challenges and looking for opportunities.

Young people:

- seek out challenges or new responsibilities and show flexibility when priorities change
- work towards goals, showing initiative, commitment and perseverance
- organise time and resources, prioritising actions
- anticipate, take and manage risks
- deal with competing pressures, including personal and work-related demands
- respond positively to change, seeking advice and support when needed
- manage their emotions, and build and maintain relationships.

Effective participators

Focus:

Young people actively engage with issues that affect them and those around them. They play a full part in the life of their school, college, workplace or wider community by taking responsible action to bring improvements for others as well as themselves.

Young people:

- discuss issues of concern, seeking resolution where needed
- present a persuasive case for action
- propose practical ways forward, breaking these down into manageable steps
- identify improvements that would benefit others as well as themselves
- try to influence others, negotiating and balancing diverse views to reach workable solutions
- act as an advocate for views and beliefs that may differ from their own.

PLTS performance indicator (suggested recording sheet)

Name:	Date:				
	Level of success 1 = low, 5 = high				
Independent enquirers					
Identify questions to answer and problems to resolve	1	2	3	4	5
Plan and carry out research, appreciating the consequences of decisions	1	2	3	4	5
Explore issues, events or problems from different perspectives	1	2	3	4	5
Analyse and evaluate information, judging its relevance and value	1	2	3	4	5
Consider the influence of circumstances, beliefs and feelings on decisions and events	1	2	3	4	5
Support conclusions, using reasoned arguments and evidence	1	2	3	4	5
Creative thinkers					
Generate ideas and explore possibilities	1	2	3	4	5
Ask questions to extend their thinking	1	2	3	4	5
Connect their own and others' ideas and experiences in inventive ways	1	2	3	4	5
Question their own and others' assumptions	1	2	3	4	5
Try out alternatives or new solutions and follow ideas through	1	2	3	4	5
Adapt ideas as circumstances change	1	2	3	4	5
Reflective learners					
Assess themselves and others, identifying opportunities and achievements	1	2	3	4	5
Set goals with success criteria for their development and work	1	2	3	4	5
Review progress, acting on the outcomes	1	2	3	4	5
Invite feedback and deal positively with praise, setbacks and criticism	1	2	3	4	5
Evaluate experiences and learning to inform future progress	1	2	3	4	5
Communicate their learning in relevant ways for different audiences	1	2	3	4	5

Team workers					
Collaborate with others to work towards common goals	1	2	3	4	5
Reach agreements, managing discussions to achieve results	1	2	3	4	5
Adapt behaviour to suit different roles and situations, including leadership roles	1	2	3	4	5
Show fairness and consideration to others	1	2	3	4	5
Take responsibility, showing confidence in themselves and their contribution	1	2	3	4	5
Provide constructive support and feedback to others	1	2	3	4	5
Self-managers					
Seek out challenges or new responsibilities and show flexibility when priorities change	1	2	3	4	5
Work towards goals, showing initiative, commitment and perseverance	1	2	3	4	5
Organise time and resources, prioritising actions	1	2	3	4	5
Anticipate, take and manage risks	1	2	3	4	5
Deal with competing pressures, including personal and work-related demands	1	2	3	4	5
Respond positively to change, seeking advice and support when needed	1	2	3	4	5
Manage their emotions, and build and maintain relationships.	1	2	3	4	5
Effective participators					
Discuss issues of concern, seeking resolution where needed	1	2	3	4	5
Present a persuasive case for action	1	2	3	4	5
Propose practical ways forward, breaking these down into manageable steps	1	2	3	4	5
Identify improvements that would benefit others as well as themselves	1	2	3	4	5
Try to influence others, negotiating and balancing diverse views to reach workable solutions	1	2	3	4	5
Act as an advocate for views and beliefs that may differ from their own	1	2	3	4	5

Note to learner: The circled number represents an indication of your PLTS performance so far.

Note to tutor: Indicate the level of success by circling the appropriate number during your feedback with the learner.

Summary of the PLTS coverage throughout the programme

Personal, learning and thinking skills	Unit									
	3	4	66	67	68	69	70	71	72	73
Independent enquirers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Creative thinkers	✓									
Reflective learners	✓									
Team workers	✓									
Self-managers	✓					✓	✓	✓	✓	✓
Effective participators	✓									
✓ – opportunities for development										

Personal, learning and thinking skills	Unit									
	74	75	76	77	78	79	80	81	82	83
Independent enquirers	✓	✓	✓	✓	✓	✓	✓	✓		✓
Creative thinkers										
Reflective learners										
Team workers										
Self-managers									✓	
Effective participators										
✓ – opportunities for development										

Personal, learning and thinking skills	Unit							
	84	85	86	87	88	89	1	2
Independent enquirers	✓	✓	✓	✓	✓	✓	✓	✓
Creative thinkers							✓	✓
Reflective learners								
Team workers			✓					
Self-managers	✓		✓				✓	
Effective participators							✓	
✓ – opportunities for development								

Personal, learning and thinking skills	Unit					
	5	6	7	8	12	28
Independent enquirers	✓	✓	✓	✓	✓	✓
Creative thinkers				✓		✓
Reflective learners						
Team workers						
Self-managers		✓	✓			
Effective participators						
✓ – opportunities for development						

Annexe D

Wider curriculum mapping

Study of the Pearson BTEC Level 3 Nationals in Aeronautical Engineering gives learners opportunities to develop an understanding of spiritual, moral, ethical, social and cultural issues as well as an awareness of citizenship, environmental issues, European developments, health and safety considerations and equal opportunities issues.

The Pearson BTEC Level 3 Nationals in Aeronautical Engineering makes a positive contribution to wider curricular areas as appropriate.

Spiritual, moral, ethical, social and cultural issues

The qualification contributes to an understanding of moral and ethical issues, for example when learners are dealing with colleagues and customers.

Citizenship issues

Learners undertaking the Pearson BTEC Level 3 Nationals in Aeronautical Engineering will have the opportunity to develop their understanding of citizenship issues, for example in terms of their rights and responsibilities in the engineering workplace.

Environmental issues

Learners undertaking the Pearson BTEC Level 3 Nationals in Aeronautical Engineering will have the opportunity to develop their understanding of environmental issues for example by considering the influence that aeronautical engineering can have on the environment and the ways that this impact can be reduced.

European developments

Much of the content of the Pearson BTEC Level 3 Nationals in Aeronautical Engineering applies throughout Europe even though delivery is in a UK context.

Health and safety considerations

The Pearson BTEC Level 3 Nationals in Aeronautical Engineering are practically based and health and safety issues are encountered throughout the units.

Equal opportunities issues

Equal opportunities issues are implicit throughout the Pearson BTEC Level 3 Nationals in Aeronautical Engineering.

Wider curriculum mapping

Level 3

	Unit 3	Unit 4	Unit 66	Unit 67	Unit 68	Unit 69	Unit 70
Spiritual							
Moral and ethical							
Social and cultural							
Citizenship issues							
Environmental issues	✓					✓	✓
European developments	✓						
Health and safety considerations	✓					✓	✓
Equal opportunities issues	✓	✓	✓	✓	✓	✓	✓

	Unit 71	Unit 72	Unit 73	Unit 74	Unit 75	Unit 76	Unit 77
Spiritual							
Moral and ethical							✓
Social and cultural							✓
Citizenship issues							✓
Environmental issues		✓					
European developments		✓					
Health and safety considerations	✓	✓	✓	✓	✓	✓	✓
Equal opportunities issues	✓	✓	✓	✓	✓	✓	✓

	Unit 78	Unit 79	Unit 80	Unit 81	Unit 82	Unit 83	Unit 84
Spiritual							
Moral and ethical							
Social and cultural							
Citizenship issues							
Environmental issues							
European developments	✓						
Health and safety considerations	✓	✓	✓	✓			
Equal opportunities issues	✓	✓	✓	✓	✓	✓	✓

	Unit 85	Unit 86	Unit 87	Unit 88	Unit 89
Spiritual					
Moral and ethical					
Social and cultural					
Citizenship issues					
Environmental issues					
European developments			✓		
Health and safety considerations	✓	✓	✓	✓	
Equal opportunities issues	✓	✓	✓	✓	✓

	Unit 1	Unit 2	Unit 5	Unit 6	Unit 7	Unit 8	Unit 12	Unit 28
Spiritual								
Moral and ethical	✓	✓			✓			
Social and cultural	✓	✓			✓			
Citizenship issues	✓	✓			✓			
Environmental issues	✓				✓			
European developments	✓				✓	✓		
Health and safety considerations	✓				✓			
Equal opportunities issues	✓	✓	✓	✓	✓	✓	✓	✓

Annexe E

National Occupational Standards/mapping with NVQs

The grid below maps the knowledge covered in the Pearson BTEC Level 3 Diploma and Extended Diploma in Aeronautical Engineering against the underpinning knowledge of the Level 3 NVQ in Aeronautical Engineering, SEMTA SSC National Occupational Standards.

KEY

Relevant NVQ units are listed where the BTEC unit provides partial coverage of the underpinning knowledge and understanding.

A blank space indicates no coverage of the underpinning knowledge.

	Units									
NVQs	**3**	**4**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**
Level 3 NVQ in Aeronautical Engineering						Unit 8, 12, 13, 62	Unit 8, 12, 13, 62	Unit 13, 14, 151, 173, 326, 327, 329	Unit 301, 302, 303, 304	Unit 134
Level 3 NVQ in Engineering Leadership	Unit 4, 5, 7									

	Units									
NVQs	**74**	**75**	**76**	**77**	**78**	**79**	**80**	**81**	**82**	**83**
Level 3 NVQ in Aeronautical Engineering	Unit 120 134,	Unit 120, 133	Unit 122, 129, 174			Unit 10, 11, 13, 14, 151, 173, 202, 326, 327	Unit 41, 146, 169, 313, 316, 331	Unit 153, 154, 155, 310, 314	Unit 43, 44, 45, 55, 56, 57, 147, 148, 150, 155	

	Units							
NVQs	**84**	**85**	**86**	**87**	**88**	**89**	**1**	**2**
Level 3 NVQ in Aeronautical Engineering	Unit 76	Unit 63, 73, 85	Unit 153, 331	79, 80, 81		Unit 73		
Level 3 NVQ in Mechanical Manufacturing Engineering							Unit 1	Unit 2
Level 3 NVQ in Business Improvement Techniques							Unit 1	Unit 2
Level 3 NVQ in Engineering Leadership							Unit 1	

	Units					
NVQs	**5**	**6**	**7**	**8**	**12**	**28**
Level 3 NVQ in Business Improvement Techniques			Unit 1			
Level 3 NVQ in Electrical and Electronic Engineering		Units 15, 17, 18, 24, 25, 26, 27, 28, 30, 31, 32, 33				
Level 3 NVQ in Engineering Technical Support				Units 2, 47, 58		

Annexe F

Unit mapping overview

BTEC National in Aerospace legacy (specification end date 31/08/2010)/new versions of the BTEC National qualifications in Aeronautical Engineering (specification start date 01/09/2010) – the BTEC Level 3 Diploma in Aeronautical Engineering and the BTEC Level 3 Extended Diploma in Aeronautical Engineering.

Old units / New units	Unit 3	Unit 4	Unit 71	Unit 72	Unit 69	Unit 70	Unit 74	Unit 75	Unit 76	Unit 85
Unit 3	F									
Unit 4		F								
Unit 66			F							
Unit 67				F						
Unit 68					F					
Unit 69						F				
Unit 70							P	P		
Unit 71										
Unit 72									F	
Unit 73										F

Old units / New units	Unit 107	Unit 108	Unit 73	Unit 77	Unit 78	Unit 79	Unit 83	Unit 84	Unit 88	Unit 80
Unit 74	F									
Unit 75		F								
Unit 76										
Unit 77			F							
Unit 78										
Unit 79										
Unit 80				F						
Unit 81					F					
Unit 82						F				
Unit 83							F			
Unit 84								F		
Unit 85									F	
Unit 86										
Unit 87										F

Old units / New units	Unit 86	Unit 119	Unit 120	Unit 7	Unit 2	Unit 6	Unit 5	Unit 1	Unit 8	Unit 12	Unit 28
Unit 88	F										
Unit 89											
Unit 1				F							
Unit 2					F						
Unit 5						F					
Unit 6							F				
Unit 7								F			
Unit 8									F		
Unit 12										F	
Unit 28											F

KEY

P – Partial mapping (some topics from the old unit appear in the new unit)

F – Full mapping (topics in old unit match new unit exactly or almost exactly)

X – Full mapping + new (all the topics from the old unit appear in the new unit, but new unit also contains new topic(s))

Unit mapping in depth

BTEC National in Aerospace Engineering legacy (specification end date 31/08/2010)/new versions of the BTEC National qualifications in Aeronautical Engineering (specification start date 01/09/2010) – the BTEC Level 3 Diploma in Aeronautical Engineering and the BTEC Level 3 Extended Diploma in Aeronautical Engineering.

New units		Old units		Mapping/comments (new topics in italics)
Number	**Name**	**Number**	**Name**	
Unit 3	Engineering Project	**Unit 3**	Engineering Project	Full coverage
Unit 4	Mathematics for Engineering Technicians	**Unit 4**	Mathematics for Technicians	Full coverage
Unit 66	Theory of Flight	**Unit 71**	Theory of Flight	Full coverage
Unit 67	Principles and Applications of Aircraft Mechanical Science	**Unit 72**	Principles and Applications of Aircraft Mechanical Science	Full coverage
Unit 68	Principles and Applications of Aircraft Physical Science	**Unit 69**	Principles and Applications of Aircraft Physical Science	Full coverage
Unit 69	Aircraft Workshop Principles and Practice	**Unit 70**	Aircraft Workshop Principles and Practice	Full coverage
Unit 70	Aircraft Materials and Hardware	**Unit 74**	Metallic Aircraft Materials, Structures and Repair	Partial coverage – properties of ferrous and no-ferrous aircraft materials covered. Larger unit now also covers *non-metallic aircraft materials, aircraft fasteners and general hardware and aircraft electrical cables and connectors.*
		Unit 75	Non-metallic Aircraft Materials, Manufacture and Repair	Partial coverage – properties of non-metallic aircraft materials covered. Larger unit now also covers ferrous and no-ferrous aircraft materials, aircraft fasteners and general hardware and aircraft electrical cables and connectors.
Unit 71	Inspection and Repair of Airframe Components and Structures			New unit

New units		Old units		Mapping/comments (new topics in italics)
Number	**Name**	**Number**	**Name**	
Unit 72	Aircraft Maintenance Practices	**Unit 76**	Aircraft Maintenance Practices	Full coverage
Unit 73	Aircraft Electrical Machines	**Unit 85**	Aircraft Electrical Machines	Full coverage
Unit 74	Aircraft Electrical Devices and Circuits	**Unit 107**	Aircraft Electrical Devices and Circuits	Full coverage
Unit 75	Aircraft Electronic Devices and Circuits	**Unit 108**	Aircraft Electronic Devices and Circuits	Full coverage
Unit 76	Aircraft Computers and Electronic Systems			New unit
Unit 77	Human Factors in Aircraft Engineering	**Unit 73**	Human Factors in Aerospace Engineering	Full coverage
Unit 78	Aviation Legislation			New unit
Unit 79	Airframe Structural Concepts and Construction Methods			New unit
Unit 80	Aircraft Hydraulic Systems	**Unit 77**	Aircraft Hydraulic Systems	Full coverage
Unit 81	Aircraft Propulsion System	**Unit 78**	Aircraft Propulsion System	Full coverage
Unit 82	Airframe Systems	**Unit 79**	Airframe Systems	Full coverage
Unit 83	Aircraft Gas Turbine Engines	**Unit 83**	Aircraft Gas Turbine Engines	Full coverage
Unit 84	Aircraft Electrical Systems	**Unit 84**	Aircraft Electrical Systems	Full coverage
Unit 85	Aircraft Instrument and Indicating Systems	**Unit 88**	Aircraft Instrument and Indicating Systems	Full coverage
Unit 86	Aircraft Gas Turbine Engine Propeller Maintenance			New unit

New units		Old units		Mapping/comments (new topics in italics)
Number	**Name**	**Number**	**Name**	
Unit 87	Avionic Systems	**Unit 80**	Avionic Systems	Full coverage
Unit 88	Aircraft Radio and Radar Principles	**Unit 86**	Aircraft Radio and Radar Principles	Full coverage
Unit 89	Further Aircraft Electronic Circuits and Avionic Systems			New unit
Unit 1	Health and Safety in the Engineering Workplace	**Unit 7**	Health, Safety, Risk Assessment and Welfare in the Engineering Workplace	Full coverage
Unit 2	Communications for Engineering Technicians	**Unit 2**	Communications for Technicians	Full coverage
Unit 5	Mechanical Principles and Applications	**Unit 6**	Mechanical Principles and Applications	Full coverage
Unit 6	Electrical and Electronic Principles	**Unit 5**	Electrical and Electronic Principles	Full coverage
Unit 7	Business Operations in Engineering	**Unit 1**	Business Systems for Technicians	Full coverage
Unit 8	Engineering Design	**Unit 8**	Engineering Design	Full coverage
Unit 12	Applications of Mechanical Systems in Engineering	**Unit 12**	Applications of Mechanical Systems in Engineering	Full coverage
Unit 28	Further Mathematics for Engineering Technicians	**Unit 28**	Further Mathematics for Technicians	Full coverage

Annexe G

Examples of calculation of qualification grade above pass grade

Edexcel will automatically calculate the qualification grade for your learners when your learner unit grades are submitted.

The generic examples below demonstrate how the qualification grade above pass is calculated using the following two tables which are also shown in the section earlier on in the specification *Calculation of the qualification grades above pass grade*.

Points available for credits achieved at different levels and unit grades

The table below shows the **number of points scored per credit** at the unit level and grade.

Unit level	Points per credit		
	Pass	Merit	Distinction
Level 2	5	6	7
Level 3	**7**	**8**	**9**
Level 4	9	10	11

Learners who achieve the correct number of points within the ranges shown in the 'qualification grade' table below will achieve the qualification merit, distinction or distinction* grades (or combinations of these grades appropriate to the qualification).

Qualification grade

BTEC Level 3 Certificate

Points range above pass grade	Grade	
230-249	Merit	M
250-259	Distinction	D
260 and above	Distinction*	D*

BTEC Level 3 Subsidiary Diploma

Points range above pass grade	Grade	
460-499	Merit	M
500-519	Distinction	D
520 and above	Distinction*	D*

BTEC Level 3 Diploma

Points range above pass grade	Grade
880-919	MP
920-959	MM
960-999	DM
1000-1029	DD
1030-1059	DD*
1060 and above	D*D*

BTEC Level 3 Extended Diploma

Points range above pass grade	Grade
1300-1339	MPP
1340-1379	MMP
1380-1419	MMM
1420-1459	DMM
1460-1499	DDM
1500-1529	DDD
1530-1559	DDD*
1560-1589	DD*D*
1590 and above	D*D*D*

Example 1

Achievement of pass qualification grade

A learner completing a 30-credit Pearson BTEC Level 3 Certificate **does not** achieve the points required to gain a merit qualification grade.

	Level	Credit	Grade	Grade points	Points per unit = credit x grade
Unit 1	3	10	Pass	7	10 × 7 = 70
Unit 2	3	10	Pass	7	10 × 7 = 70
Unit 3	3	10	Merit	8	10 × 8 = 80
Qualification grade totals		**30**	**Pass**		**220**

Example 2

Achievement of merit qualification grade

A learner completing a 30-credit Pearson BTEC Level 3 Certificate achieves the points required to gain a merit qualification grade.

	Level	Credit	Grade	Grade points	Points per unit = credit x grade
Unit 1	3	10	Pass	7	10 × 7 = 70
Unit 2	3	10	Merit	8	10 × 8 = 80
Unit 3	3	10	Merit	8	10 × 8 = 80
Qualification grade totals			**Merit**		**230**

Example 3

Achievement of distinction qualification grade

A learner completing a 60-credit Pearson BTEC Level 3 Subsidiary Diploma achieves the points required to gain a distinction qualification grade.

	Level	Credit	Grade	Grade points	Points per unit = credit x grade
Unit 1	3	10	Merit	8	10 × 8 = 80
Unit 2	3	10	Distinction	9	10 × 9 = 90
Unit 3	3	10	Distinction	9	10 × 9 = 90
Unit 5	3	10	Merit	8	10 × 8 = 80
Unit 6	2	10	Distinction	7	10 × 7 = 70
Unit 11	3	10	Distinction	9	10 × 9 = 90
Qualification grade totals		**60**	**Distinction**		**500**

Example 4

Achievement of distinction merit qualification grade

A learner completing a 120-credit Pearson BTEC Level 3 Diploma achieves the points required to gain a distinction merit qualification grade.

	Level	Credit	Grade	Grade points	Points per unit = credit x grade
Unit 1	3	10	Merit	8	10 × 8 = 80
Unit 2	3	10	Distinction	9	10 × 9 = 90
Unit 3	3	10	Distinction	9	10 × 9 = 90
Unit 4	3	10	Merit	8	10 × 8 = 80
Unit 5	3	10	Merit	8	10 × 8 = 80
Unit 6	2	10	Distinction	7	10 × 7 = 70
Unit 11	3	10	Distinction	9	10 × 9 = 90
Unit 15	4	10	Merit	10	10 × 10 = 100
Unit 17	3	10	Pass	7	10 × 7 = 70
Unit 18	3	10	Pass	7	10 × 7 = 70
Unit 25	3	20	Merit	8	20 × 8 = 160
Qualification grade totals		**120**	**Distinction Merit**		**980**

Example 5

Achievement of merit merit merit qualification grade

A learner completing a 180-credit Pearson BTEC Level 3 Extended Diploma achieves the points required to gain a merit merit merit qualification grade.

	Level	Credit	Grade	Grade points	Points per unit = credit x grade
Unit 1	3	10	Merit	8	10 × 8 = 80
Unit 2	3	10	Pass	7	10 × 7 = 70
Unit 3	3	10	Distinction	9	10 × 9 = 90
Unit 4	3	10	Merit	8	10 × 8 = 80
Unit 5	3	10	Pass	7	10 × 7 = 70
Unit 6	2	10	Distinction	7	10 × 7 = 70
Unit 11	3	10	Distinction	9	10 × 9 = 90
Unit 12	3	10	Merit	8	10 × 8 = 80
Unit 15	4	10	Pass	9	10 × 9 = 90
Unit 17	3	10	Pass	7	10 × 7 = 70
Unit 18	3	10	Pass	7	10 × 7 = 70
Unit 20	3	10	Pass	7	10 × 7 = 70
Unit 22	3	10	Merit	8	10 × 8 = 80
Unit 25	3	20	Pass	7	20 × 7 = 140
Unit 35	3	10	Distinction	9	10 × 9 = 90
Unit 36	3	10	Merit	8	10 × 8 = 80
Unit 38	3	10	Distinction	9	10 × 9 = 90
Qualification grade totals		**180**	**Merit Merit Merit**		**1410**

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