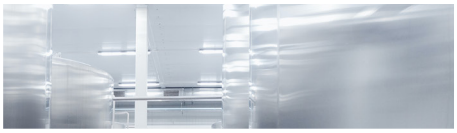
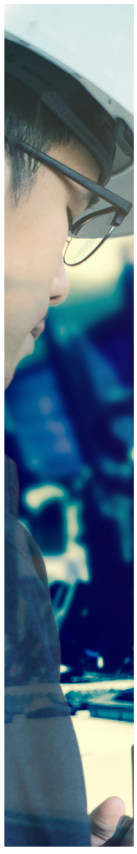
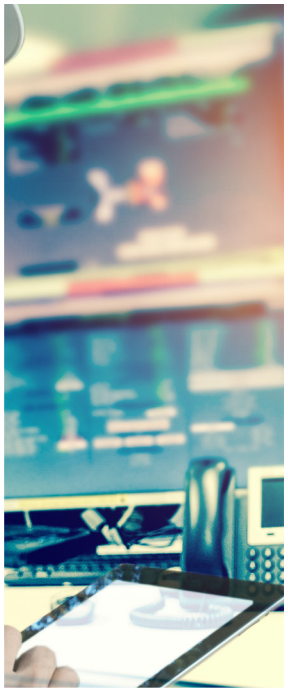
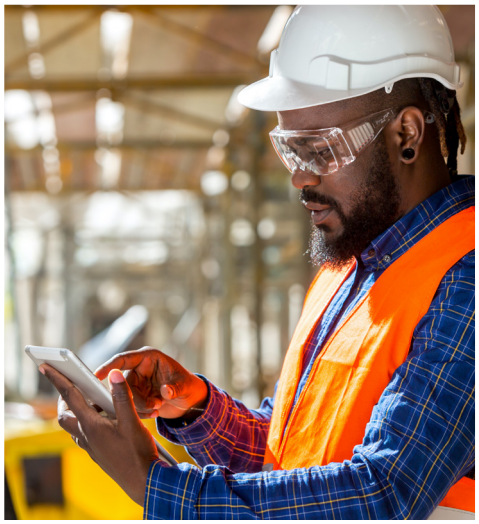
IChemE ADVANCING CHEMICAL ENGINEERING WORLDWIDE

Approval of EngTech training programmes, qualifications or apprenticeships

A guide for programme providers and assessors









Preface

IChemE's mission is to advance chemical engineering for societal benefit, worldwide. Through its conduct of programme approval, IChemE aims to recognise and share good practice in the education and development of the individuals who are working in the chemical engineering field and are proficient in the relevant skills and techniques, with a relatively practical understanding of the theoretical chemical engineering principles.

Approval serves two purposes: (i) recognition of programmes against IChemE standards; and (ii) linkage to IChemE's suite of professional engineering registrations.

Through the strengths of its standards and quality of its process, IChemE is licenced by the UK Engineering Council, a Signatory of the International Engineering Alliance, to approve EngTech programmes, apprenticeships and qualifications against defined criteria set out in UK-SPEC*.

Application and supporting documents

Application documents available at **www.icheme.org/engtech-approval** include: assessment questionnaires, report forms; safety, health and environment (SH&E) covering notes.

The supplementary documents available at the above link include: Assessor Code of Conduct; Appeals procedure.

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*UK Standard for Professional Engineering Competence, available from **www.engc.org.uk/ukspec**

See also the *Approval of Qualifications and Apprenticeships Handbook* available from **www.engc.org.uk/aaqa**

Document control

Version	Date issued	Changes
V1.3	January 2023	Adjustments to section 2.6, Appendix A and Appendix C, following updates to Engineering Council guidelines
V1.2	December 2022	Adjustment to language
V1.1	April 2021	Adjustments to design, language and web links
V1.0	November 2018	New document

Content

1. Introduction

All those participating in engineering education and training deserve world-class provision that helps them to develop industry-relevant skills and behaviours. Such skills and behaviours are defined in the Engineering Council's standards of competence and commitment that individuals must demonstrate in order to achieve professional registration, and which are set out in **The UK Standard for Professional Engineering Competence (UK-SPEC)**.

Training programmes, apprenticeships (see Appendix A) and qualifications (see **Appendix B**) that meet the high standards set by the Engineering Council may be 'approved'. These guidelines relate to the approval of qualifications, training programmes and apprenticeships for the purposes of professional registration as an Engineering Technician (EngTech). It sets out the learning outcomes that must be met, the requirements for approval and the evidence that IChemE is seeking in order to confer approved status.

1.1 What is approval?

The approval process is one of peer review. It is applied to qualifications and apprenticeships, and to other integrated training programmes.

According to the *Regulations for Registration*, approval attests to overall design, the depth and range of coverage, and the validity and reliability of the assessment of the learner. Approval is used to recognise the underpinning knowledge and understanding covered by a programme, and can also be used to recognise the development of competence.

1.2 Why approve?

Approval by IChemE is a mark of assurance that the provision meets the standards set by the UK engineering profession. As such, It provides clear and transparent evidence to employers, learners, apprenticeships and others that the provision delivers some, or all, of the knowledge and understanding and/or competence required for professionally registered engineers and technicians.

The approval provides a structured mechanism by which IChemE assess, evaluate and improve the quality of provision through an independent peer review process, and offers IChemE the opportunity for continuing dialogue between providers and the profession.

The qualification, training programme or apprenticeship will count towards professional registration, attracting prospective trainees and employers.

Approval is accepted as a rigorous process by several international accords, allowing international recognition of approved qualifications, training programmes and apprenticeships.

1.3 What does the approval mean to an individual?

Individuals successfully completing an approved qualification, training programme or apprenticeship will find the process for the EngTech registration more straightforward. This is referred to as a 'standard route' professional registration (**see Section 2.7**).

Individuals must be a member of IChemE in order for us to assess their competence and commitment for registration as an Engineering Technician (EngTech).

EngTech is an international professional title and provides:

- **EngTech post-nominal letters as a registered Engineering Technician through the Engineering Council;**
- **independent validation of their expertise;**
- **enhanced status and influence in the workplace;**
- **better career prospects, including the option to work towards engineer level.**

2. Approval standards and the link to professional registration

2.1 Introduction

Placing the emphasis on outcomes rather than inputs enables the development of a variety of diverse and innovation provision, without losing sight of the required skills, knowledge and understanding that tomorrow's engineers and technicians will need.

In the UK, these programmes or apprenticeships may focus on:

- **education (ie the underpinning knowledge and understanding);**
- **the development of competence; or**
- **both of these.**

IChemE may consider for approval nationally-available apprenticeships and qualifications, as well as those operated through a company training programme.

Approved apprenticeships include knowledge, understanding, and the development of competence and a range of behaviours. Apprenticeships and training programmes may or may not include some formal qualifications. Regardless of which of these types it is, approved provision must contribute to the development of an individual to undertake EngTech roles.

A qualification, training programme or apprenticeship that demonstrates the knowledge, understanding and skills to meet or partly meet the requirements for registration in a particular category, is known as an exemplifying qualification or apprenticeship.

2.2 Approval pathways

IChemE can approve the following three types of programme:

1. Training programmes or apprenticeships that map against the UK-SPEC (EngTech) competence statements and the trainees either enter the scheme having an approved qualification (at level 3 or above or Dublin Accord) or they gain the approved qualification during the time that they are on the scheme.
2. Training programmes or apprenticeships that map their programme against the UK-SPEC (EngTech) competence statements and also against the appropriate learning outcomes (experiential learning).
3. Qualifications that meet in full the academic requirements for Engineering Technician.

Pathway	Education base	Initial Professional Development (IPD)
1	Trainees join scheme with an existing qualification (at level 3 or above) approved by IChemE or covered by the Dublin Accord	IChemE approves the development of competencies through an IChemE approved training scheme
2	IChemE approves the work-based (experiential) learning via an IChemE approved training scheme	IChemE approves the development of competencies through an IChemE approved training scheme
3	IChemE approves the qualification (level 3 or above) which meets the full academic requirements for Engineering Technician (EngTech)	

2.3 General learning outcomes

Trainees graduating from an approved programme must have the general abilities listed below:

Knowledge and understanding: They must be able to demonstrate their knowledge and understanding of essential facts, concepts, theories and principles of chemical engineering and its underpinning mathematics and sciences. They must have an appreciation of the wider engineering context. They must appreciate the social, environmental, legal, safety, economic and commercial considerations affecting the exercise of their engineering judgement.

Practical skills: They must possess relevant practical skills acquired through laboratory work, individual and group project work, in design, and use of software resources. Evidence of group working and of participation in a project is required.

General transferable skills. They must have developed and demonstrate ability to integrate transferable skills (such as communications, time management, team working, inter-personal, effective use of IT) that will be of value in a wide range of situations

Awareness: They must have general familiarity bounded by the needs of chemical engineering.

2.4 Learning outcomes in a chemical engineering context

The minimum threshold at which IChemE requires outputs to be delivered at, are:

- **level 3 of the Regulated Qualifications Framework (RQF) in England and Northern Ireland; or**
- **level 6 of the Scottish Credit and Qualifications Framework (SCQF); or**
- **level 3 of the Credit and Qualification Framework for Wales (CQFW).**

You can find and compare national Qualifications Frameworks by using the links below:

Compare national qualifications frameworks across Europe.

Contact the UK National Academic Recognition Information Centre (UK NARIC) to compare a UK qualification with any non-UK qualification (there is a fee for this).

See Appendix B for more information.

For qualifications and apprenticeships, the key areas of learning are as follows:

A. Science and mathematics

B. Engineering analysis

C. Design and innovation

D. The engineer and society

E. Engineering practice

See Appendix C for more information.

2.5 What does approval involve?

The approval process is one of peer review. IChemE ensures that:

- **the provision under consideration meets and exceeds the learning outcomes threshold standard set by the Engineering Council (Appendix C);**
- **the provision under consideration meets or exceeds the threshold level in the UK's frameworks for qualifications and credit, or if it lies outside these frameworks, is demonstrably at a comparable level;**
- **there are clearly defined outcomes;**

- the technical content is appropriate, which is demonstrated by mapping to the Engineering Council's output standards for technician qualifications and apprenticeships, IChemE competence and commitment statements, or both (Appendix D);
- the quality assurance arrangements are satisfactory.

2.6 What evidence should be sought?

A submission for the approval of a qualification or an apprenticeship is likely to include some, or all, of the components listed below - as applicable for the type of programme and recognition:

- name of the programme;
- unique identifier for the programme (where available);
- name and contact details for the provider applying for approval;
- confirmation of whether the programme has already been approved (if it has, the record number on the Engineering Council database must be included);
- level of the programme on the appropriate qualifications framework and the title or the threshold which approval is against;
- whether the approval is sought for:
  - knowledge and understanding only;
  - knowledge, understanding and competence; or
  - competence only;
- the learning outcomes of the programme;
- evidence to support appropriate technical depth and range of coverage;
- evidence of mapping to appropriate learning outcomes and/or competences;
- the assessment methods employed;
- quality assurance arrangements, such as third party accreditation and regulations.

IChemE may request an initial brief submission covering basic details that it will use to determine if the provision being put forward is likely to meet its requirements for approval. Once satisfied of this IChemE will appoint an assessor panel.

2.7 'Standard route' professional registration

Applicants applying for professional registration as an Engineering Technician (EngTech) need to provide evidence of competency, through the application of knowledge and understanding, and adequate demonstration of professional experience.

Individuals successfully completing an approved qualification, training programme or apprenticeship will find the process for registration more straightforward. This is referred to as a 'standard route' professional registration.

Approved training programmes or apprenticeships are expected to provide to their trainees the required knowledge and understanding and all the opportunities to develop their professional experience. When the trainees are ready to graduate from an approved programme, they should be able to fully complete their Competence and Commitment (C&C) Report and apply for Engineering Technician (EngTech) registration. IChemE recognises the benefit of someone having the C&C report completed while they are still in the programme, therefore as part of the approval process it is required all the trainees to have their C&C report complete before the programmes final assessment. All the trainees who will successfully pass the final assessment and graduate the programme, if they wish, they will be able to submit their application for EngTech registration to IChemE immediately after their graduation. A successful graduation from the programme though, does not guarantee a successful application for EngTech registration.

Also, applicants for EngTech registration who have graduated from an approved programme won't be required to go through the peer review interview process.

3. Design and assessment of the programmes for approval

3.1 Introduction

Decisions on whether a qualification, training programme or apprenticeship is approved will be taken solely on the basis of evidence of achievement of learning outcomes against defined standards and against the UK-SPEC output standards. Approved programmes may have various titles, content or duration and could be delivered in a wide range of learning environments and formats (eg full-time, part-time, industry-based, etc).

IChemE specifies that learning outcomes must be delivered across the broad areas of learning defined in **Section 2.4** and the supporting **Appendix C**. The UK-SPEC output standards are defined in **Appendix D**.

3.2 Taught delivery methods

Various methods can be used to deliver a programme satisfying the learning outcomes, depending on the style of teaching appropriate to the organisation and the trainees, the number of trainees taught and the varied nature of content.

The methods used could include lectures; laboratory and workshop sessions; problem-centred learning; distance learning; computer-aided learning or on-the-job training.

3.3 Trainee assessment

The purpose of assessment is to confirm that individual trainees have attained the necessary learning outcomes and at the appropriate level and/or that they have developed the required competencies. How the assessment is conducted is for the organisation to decide.

It is expected that the organisation will have its own formal procedures for assessment and maintain a robust quality assurance process to ensure that outcome standards are consistent and fair. The procedure should include safeguards against academic dishonesty (eg plagiarism and other forms of cheating).

3.4 Evidence of achievement of learning outcomes

IChemE will look for evidence that trainees have attained the learning outcomes in each of the areas outlined in **Section 2.4** (also see **Appendix C**).

Typical examples of direct evidence include:

- **examination papers, together with model answers and marked scripts;**
- **project papers;**
- **laboratory reports;**
- **design project reports;**
- **industrial placement reports.**

Typical examples of indirect evidence include:

- **external examiner's reports;**
- **internal and eternal audits;**
- **quality assurance reports external to the department.**

3.5 Evidence of development of the competence and commitment requirements

IChemE will look for evidence that trainees have developed their competencies in each of the areas outlined in **Appendix D**.

Typical examples of evidence include:

- activities undertaken;
- training courses attended;
- planned assignments of suitable length for trainees to acquire experience and competencies in technical and 'soft' skills;
- on-the-job training;
- reports and oral presentations.

3.6 Safety, health & environment culture and practice

In addition to formally taught process safety, IChemE insists that students on approved programmes must be instilled with appropriate attitudes to safety, health and environment (SH&E). Although IChemE recognises the difficulty of assessing process safety remotely, the demonstration or otherwise of an effective safety culture within the programme will form part of the IChemE assessment.

Evidence of effective SH&E culture includes:

- leadership - senior management take an active part in SH&E;
- legislative compliance - there is a sound understanding of, and compliance with, applicable SH&E legislation. Regular audits of the programme provider's health and safety conducted by an external auditor;
- risk assessment and management - risk assessment and permit to work systems are in place; those who use them are fully conversant with their roles and responsibilities;
- accident reporting and actions taken following an incident;
- process safety training - training provided to staff members or trainees (this is not teaching process safety as part of the curriculum);
- visible evidence of a financial investment in health and safety.

3.7 Ethics culture

Codes of conduct, an important part of engineering ethics, are the framework for professional behaviour. IChemE, like other professional engineering institutions, has a code of conduct specific to the chemical engineering profession which its members are required to follow; comparable codes exist in other countries (eg Australia and Ireland), though these are usually more general to the engineering profession as a whole. IChemE recognises that different codes of conduct have many common features and expects all approved programmes to develop a strong ethos of professional behaviour and its implications.

Ethics learning outcomes should be related to the four basic principles outlined by the Engineering Council and the Royal Academy of Engineering:

- accuracy and rigour (eg act with competence presenting and reviewing engineering competence; identify and evaluate possible risks);
- honesty and integrity (eg be aware of how own behaviour can affect others; prevent corrupt practices and professional misconduct; declare conflict of interest);
- respect for life, law and public good (eg take account of limited availability of human and natural resources; hold paramount the health and safety of others);

- **responsible leadership (eg be aware of the issues that engineering raises for society; promote the public awareness of engineering benefits and impact).**

Awareness of engineering ethics guides students in preparation for their professional lives and helps them to identify ethical issues and the practice in which they arise. Ethics also helps students to develop wider skills in communication, reasoning and reflection and the professional attitude to carry forward into their working life.

4. Overview of the approval process

4.1 Approval ethos

IChemE's approval process is a cooperative activity intended to benefit both the approved organisation and IChemE. Besides the approval assessment by IChemE, organisations benefit from an intensive professional consultation on their programmes and gain access to an international chemical engineering teaching community with opportunities for sharing good practice and progressing challenging issues. IChemE approval is a joint enterprise in which both parties seek the truth through mutually respectful discussion of the available evidence.

The approval process is confidential between IChemE and the organisation seeking approval. IChemE will retain ownership of all reports produced but will make these available where appropriate.

4.2 Principal stages of approval

The IChemE approval process has the following principal stages:

- **initial contact between the organisation seeking approval and IChemE;**
- **preparation by the organisation and submission to IChemE;**
- **appointment of assessors by IChemE;**
- **preparation and virtual meeting with the panel of assessors;**
- **report by the assessors to IChemE;**
- **decision by IChemE's approval panel;**
- **implementation of follow-up actions by the organisation.**

4.3 Initial contact - new programmes

IChemE will work with organisations new to IChemE approval to explore the best approach to approval status. Where appropriate, this could include the appointment of a mentor to help the organisation develop to meet the approval requirements.

4.4 Initial contact - existing programmes

Where a programme is already approved, IChemE will contact the organisation during the penultimate year of approval with a view to maintain continuity of approval.

In exceptional circumstances (eg major disruptive event), an organisation can apply in writing to extend the approval for a short period.

4.5 Preparation by the organisation

The organisation will need to make available documents of various kinds for review by the assessors. Preparation of these documents need to be considered well ahead of the virtual meeting with the assessors. Closer to the meeting, the department will be asked to submit a completed questionnaire and other relevant documents to IChemE.

4.6 IChemE assessors and the assessment

At EngTech level, the underpinning knowledge and understanding required can be satisfied by nationally specified qualifications or apprenticeships at the levels described in **Section 2.4**. These are subject to other independent external validation; therefore the range of evidence considered is narrower in scope than that required for accreditation of a Higher Education programme, and a visit by IChemE is not required.

IChemE maintains a pool of trained assessors. A virtual panel of two assessors will be selected from the pool. One of the panel will be appointed as Lead Assessor. Occasionally, an observer may join the virtual panel – often a potential addition to the pool or a member of IChemE staff.

The assessor virtual panel will receive the documents at least two months before the virtual meeting. The meeting will normally last no more than two hours and the assessors will have the opportunity to ask any questions they might have after reviewing the documents.

Following the meeting, the assessors will report their findings to IChemE. The report, excluding the recommendations of the assessors, will be sent to the organisation for comment on any factual inaccuracies.

4.7 The approval decision and subsequent actions

The completed approval report will be considered by IChemE's approval panel and a decision on whether to approval will be made. The programme provider will be notified of the outcome at the earliest opportunity.

Following a successful approval, the programme provider will receive a certificate of approval.

All such approved qualifications and apprenticeships will be entered on the Engineering Council's public searchable database of approved qualifications and apprenticeships by IChemE.

Providers of these qualifications and apprenticeships are eligible to use the Engineering Council's approved qualifications and apprenticeships logos with the associated statement.

Approval is for a fixed period of not more than five years, with the re-approval to the required standards. New approval will not normally exceed two years.

4.8 Approval costs and cost sharing

The costs of approval only include the cost of administration since a physical visit won't be required by the assessors.

The international standard of IChemE approval is maintained through our use of a global pool of trained assessors. All assessors are members of IChemE, working on a volunteer basis, so no fees are payable.

In order for the process to be sustainable there will be an annual fee of £1000 to cover the administrative costs.

5. Preparation for approval

5.1 Preparing the submission documentation

Once contact has been established between IChemE and the programme provider regarding possible approval, the programme provider should in good time appoint a member of staff to be responsible for the whole process including the timely and comprehensive submission of documentation ahead of the virtual meeting with the assessors. Early on, a provisional meeting period will be agreed, and the actual date will be finalised somewhat later in the process.

Well before the virtual meeting will take place, the organisation should ensure that the necessary evidential documents are available.

Document preparation needs to be rigorous and it is advised that sufficient time is made available for this activity. IChemE requires that document submissions are sent in digital form. Various digital forms are acceptable, provided that they are well-structured, easily navigable, readily usable and can be assessed on commonly-used platforms. Whatever form is chosen, it must be convenient for assessors to download or transfer material so that they have access offline.

The submission comprises a completed programme questionnaire and supporting documentation. The complete set of documents should be sent to IChemE two months before the virtual meeting.

IChemE will copy or otherwise make available the documents to the assessor panel. After the assessors have received the advance documents, and prior to the virtual meeting, they may identify a need for further information. In such cases IChemE will give the organisation as much notice as possible to provide this or, alternatively, make arrangements for this to be available for review during the virtual meeting.

6. IChemE assessors and the virtual meeting

6.1 Virtual meeting

A virtual meeting with the assessors is not expected to last more than two hours. The purpose of the meeting will be the assessors to ask for any clarifications or for additional information regarding the documents that have been provided as part of the application process.

Forward planning of the virtual meeting is important in order to ensure that assessors and resources are available. At least six months ahead, IChemE will liaise with the organisation to agree the month of the virtual meeting. Following this, the assessor panel will be identified. At least three months before the virtual meeting, IChemE staff will liaise with the organisation to finalise a mutually convenient date.

This process allows the organisation to prepare a comprehensive submission (**Section 5**). The preliminary documentation must be made available to IChemE at least two months before the virtual meeting.

IChemE staff will distribute the documentation supplied by the organisation to the assessors for review in advance of the meeting and will liaise regarding any further materials required prior to the meeting.

6.2 Selection of assessors

IChemE maintains a pool of trained assessors. The pool comprises of both academics and industrials who have current knowledge of the approval process and requirements. Assessors are appointed to the pool by nomination to and decision of the approval panel.

Assessment panels, each comprising two assessors including the lead assessor, are approved by processes set by the approval panel using the following criteria:

- **all assessors have received IChemE training;**
- **no more than one assessor should be without previous approval experience.**

Organisations do not have the right to select or approve the membership of the assessor panel. Should there be exceptional circumstances that concern the department (for example a perceived conflict of interest with an assessor) then these concerns should be communicated in writing at the earliest opportunity to the senior IChemE staff member responsible for approval and the Chair of the approval panel.

6.3 The role of IChemE assessors

Assessors act in a voluntary capacity on behalf of IChemE. They are required to work within IChemE's code of conduct for volunteer members on IChemE activities (see IChemE Supporting Documents).

For qualifications and programmes that deliver the learning outcomes through the experiential learning the assessor's primary role is to seek evidence that the target learning outcomes are being achieved by assessing the scope of the examinations, projects, laboratory work and other learning activities by the trainees. For training programmes the assessor's primary role is to seek evidence that all the trainees are provided with the opportunity during the programme to develop all the required competencies described in IChemE's Competence and Commitment Report.

The general questions that underpin the work of the assessors include:

- is the training programme, apprenticeship or qualification at the appropriate level in the Regulated Qualifications Framework or the Scottish Credit and Qualifications Framework, or if it lies outside these frameworks, is demonstrably at a comparable level?
- does it have clearly defined outcomes and is it of an appropriate technical nature?
- does it have satisfactory quality assurance arrangements?
- is the scheme satisfactorily assessed?
- are the resources to support the delivery of the learning outcomes adequate?
- how is the progress of the trainees monitored?
- does the scheme provide mentoring support?

Assessors might request to see additional material before or after the virtual meeting. Organisations are respectfully requested to be accommodating of reasonable requests.

At the end of the virtual meeting, assessors will give feedback on their principal findings, including recommendations for improvement. They are however, instructed not to tell the organisation their recommendation on the approval outcome. The decision will be taken to the approval panel.

6.4 The assessors report

The assessors prepare a written report to IChemE's approval panel. The report is expected to be submitted to IChemE within three weeks of the virtual meeting.

The primary purpose of the assessors' report is to inform the approval panel of their findings; how the learning outcomes have been met and whether the required competencies have been developed.

In addition, the assessors will:

- identify and commend strengths and good features of the programme;
- identify any areas where improvements could be made;
- propose recommendations to the approval panel on the future approval status of the programme.

At all stages, the assessors' report will remain confidential to and the property of IChemE. The report is made available in confidence to organisations for their information.

7. Approval outcomes

7.1 Approval decision process

The approval panel will formally review the assessors' report, together with the approval recommendation of the assessor panel for final decision.

The approval panel may ask the lead assessor to amend the report to clarify any ambiguities or other misleading statements. The report will be sent to the organisation for comment on any factual inaccuracies. Any significant changes arising from this and accepted by the assessors will be brought to the attention of the approval panel. Where such changes may have a material effect on the outcome, further discussion will take place as above.

7.2 Approval outcome

The approval panel will make one of the following decisions:

- **approve/re-approve the programme;**
- **approve/re-approve the programme subject to conditions;**
- **to not approve/re-approve the programme.**

Approval may be granted for a period up to maximum of five years. New approval will not normally exceed three years.

IChemE may make approval subject to conditions. These are binding on the programme provider and must be resolved within the indicated timeframe for approval to be maintained and be valid.

Fulfilling the conditions is the responsibility of the programme provider. Reports on fulfilment must be made formally in writing for the approval panel consideration and approval decision.

In the majority of cases IChemE seeks to make recommendations to the programme provider. These are not mandatory. However, they are offered in the spirit of providing help and sharing of good practice in chemical engineering education and application. Adoption by the programme provider of these recommendations is encouraged and generally expected.

If the programme is not approved/re-approved IChemE will advise on the reason this decision was made and will advise the organisation on available assistance.

7.3 After the approval decision

Following an approval award, the programme provider will be sent a decision letter and separately, a certificate to formally acknowledge the approval status of the programme.

There will be ongoing contact between IChemE and the programme provider in terms of approval policy developments during the period of approval. IChemE will liaise with the programme provider regarding policy changes, trainee services, membership and related activities.

7.4 Obligations and duties of the organisation

It is a general condition of approval that programme providers must inform IChemE in a timely fashion of significant changes that impact upon the delivery or nature of the approved programme, apprenticeship or training programme.

7.5 Endorsement logos

Our endorsement logos enable external organisations to demonstrate IChemE approval. They are to be used in compliance with IChemE guidance with the logo. These logos will appear as an endorsement and can be used alongside the logo of the organisation on print and web material. All the logos should be used together with the relevant Engineering Council's logos.

Appendix A

Apprenticeships

The term 'apprenticeship' refers specifically to work-based programmes which have been approved by a statutory regulator (in England this is the Institute for Apprenticeships and Technical Education, IfATE). It is recognised that in jurisdictions that do not have equivalent regulation, there may be programmes that are very similar to apprenticeships that could be approved or accredited as qualifications.

Apprenticeships may contain qualifications and, where they do, these qualifications may be considered for approval or accreditation in their own right and/or included in the evidence presented when an apprenticeship is considered for approval or accreditation. People completing an apprenticeship that contains a degree can only be considered to have an accredited degree if the degree itself is accredited in line with AHEP for the apprenticeship mode of delivery.

The QAA Characteristic Statements for Higher Education in Apprenticeships may also be a useful reference for anyone who is not familiar with degree apprenticeships.

There is an expectation that apprenticeships support professional registration. This Standard introduces the option for approval and accreditation that recognises the extent to which apprenticeships and work-based qualifications contribute towards meeting the competence standards required for professional registration.

Wherever competence is mentioned in this Standard, this means professional competence, as in the competence required to register as CEng, IEng, EngTech or ICTTech, and related to the competences set out in UK-SPEC or the ICTTech Standard.

It is recognised that many work-based qualifications and apprenticeships will deliver some, or all, of the competence required to become a professionally registered engineer or technician. The processes set out in this Standard for approving or accrediting programmes that deliver competence may be applied against either:

- **the full set of competences required for registration set out in UK-SPEC or the ICTTech Standard; or**
- **a set of intermediate competences set out in this Standard which allow approval or accreditation of programmes that sit between the established registration categories EngTech and IEng.**

Appendix B

Qualifications

Qualifications have undergone a range of changes in recent years as the Government requirements for public funding have developed. More information on national frameworks can be found at: **www.gov.uk/what-different-qualification-levels-mean** and more information on regulated qualifications at: Office of Qualifications and Examinations (Ofqual - England and Northern Ireland), Scottish Qualifications Authority and Qualifications Wales.

In 2013, the Department for Education (DfE) introduced a range in England, separating vocational qualifications into 'Applied General' and 'Tech Levels', with the aim to simplifying the vocational qualification system. A descriptor of these qualifications and the criteria for public funding is now included. More information can be found at: **www gov.uk/government/publications/14-to-19-technical-and-applied-qualifications-technical-guidance**

Applied General

These are rigorous advanced (Level 3) qualifications that equip students with transferable knowledge and skills. They are for post-16 students wanting to continue their education through applied learning. They fulfil entry requirements for a range of higher education courses, either by meeting entry requirements in their own right or being accepted alongside and adding value to other qualifications at the same level.

Applied General qualifications must be at least 150 Guided Learning Hours (GLH) and be recognised by a number of Higher Education Institutions (HEIs).

Tech Level

These are rigorous advanced (Level 3) technical qualifications, on a par with A levels and recognised by employers. They are for post-16 students wishing to specialise in a specific industry, occupation or occupational group. They equip a student with specialist knowledge and skills, enabling entry to an apprenticeship or other employment, or progression to a related higher education course. In some cases, these qualifications provide a 'licence to practice' or exemption from professional exams. Tech Levels are one of three components of the new Technical Baccalaureate (TechBacc) performance table measure. Tech Levels must be at least 300 GLH and be recognised by five or more employers, a recognised professional or trade bodies, or a national licensed professional registration scheme.

IChemE may also approve a range of other qualifications that are currently in delivery across the UK (or abroad). These include:

Vocationally Related Qualifications (VRQ)

VRQs are predominantly taught programmes delivered in a classroom or workshop setting. These qualifications are based on National Occupational Standards and provide the underpinning knowledge to help learners achieve a related National Vocational Qualification (NVQ). VRQs prepare learners for further learning and the workplace by offering the practical and academic knowledge and skills required in a particular job. Assessment often combines internal written or practical assignments with external written or onscreen tests.

Technical Certificates

Technical Certificates are VRQs or knowledge qualifications that are recognised within apprenticeship frameworks in England, Wales and Northern Ireland. They are closely linked to National Occupational Standards and give learners the underpinning knowledge and understanding that are required to complete an NVQ. Technical Certificates are not currently recognised in Scotland.

National Vocational Qualifications (NVQ)

NVQs are competence qualifications and are delivered through on-the-job training. NVQs are assessed through a learner's portfolio of evidence which proves their knowledge and ability to perform specific tasks, plus one-to-ones where an assessor watches the learner perform work-related tasks. NVQs are based directly on the National Occupational Standards defined by Sector Skills Councils and industry employers. Available in England, Wales and Northern Ireland as standalone qualifications, NVQs are also key components of apprenticeships frameworks. Many competence qualifications accredited on the Regulated Qualifications Framework (RQF) include 'NVQ' in the title.

Scottish Vocational Qualifications (SVQ)

SVQs are competence qualifications which are recognised in Scotland. Like NVQs, there are also based directly on National Occupational Standards set by Sector Skills Councils and employers. SVQs are assessed through a learner's portfolio of work-based evidence. The specialist awarding organisation for engineering and manufacturing (EAL) SCQs are currently being updated for the new Scottish Credit and Qualifications Framework (SCQF).

Other Types of Qualifications:

Key Skills: Key Skills qualifications remain available for apprentices in England to gain transferable skills in application of number, communication, and information and communication technology. Wider Key Skills are open to learners across England, Wales and Northern Ireland. These cover improving own learning and performance, problem solving, and working with others. The qualifications are assessed through a combination of multiple-choice exams and evidence gathered in a portfolio.

Functional Skills: Functional Skills qualifications cover the fundamental practical skills in English, Mathematics and Information and Communication Technology (ICT) for learners and apprentices in England. The qualifications focus on applying these skills in real life situations, and feature assessments with task-based questions.

Essential Skills Wales: These qualifications show the ability to master the skills needed in education, training, work and life in general. The suite covers application of number, communication, and information and communication technology (ICT) for learners and apprentices in Wales. As these qualifications are a method of demonstrating competence, it is recommended that they are embedded in everyday workplace activities or other programmes of learning.

Basic Skills: Basic skills qualifications cover adult literacy and adult numeracy for learners involved in a wide range of programmes both in and out of the workplace. Their purpose is to improve confidence in these areas, giving learners the ability to progress in education, training and work as well as using these skills effectively in their personal lives.

Appendix C

Learning outcomes at Level 3

C1 Science and mathematics

The study of chemical engineering requires a substantial grounding in engineering principles, science and mathematics commensurate with the level of study. On successful completion of an approved or accredited programme, an individual will be able to:

- **apply knowledge of mathematics, statistics, natural science and engineering principals to well-defined problems.**

C2 Chemical engineering analysis

Chemical engineering analysis involves the application of engineering concepts and tools to analyse, model and solve problems. At higher levels of study engineers will work with information that may be uncertain or incomplete. On successful completion of an approved or accredited programme, an individual will be able to:

- **analyse well-defined problems reaching substantiated conclusions;**
- **use appropriate computational and analytical techniques to solve well-defined problems;**
- **select and use technical literature and other sources of information to address well-defined problems.**

C3 Design and innovation

Design is the creation and development of an economically viable product, process or system to meet a defined need. It involves significant technical and intellectual challenges commensurate with the level of study. On successful completion of an approved or accredited programme, and individual will be able to:

- **contribute to design solutions for well-defined technical problems and assist with the design of systems, components or processes to meet business, customer or used needs as appropriate. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal and environmental matters, codes of practice and industry standards;**
- **apply a systematic approach to the solution of well-defined problems.**

C4 The engineer and society

Engineering activity can have a significant societal impact and engineers must operate in a responsible and ethical manner, recognise the importance of diversity, and help ensure that the benefits of innovation and progress are shared equitably and do not compromise the natural environment or deplete natural resources to the detriment of future generations. On successful completion of an approved or accredited programme, an individual will be able to:

- **evaluate the environmental and societal impact of solutions to well-defined problems;**
- **apply ethical principles and recognise the need for engineers to exercise their responsibilities in an ethical manner and in line with professional codes of conduct;**
- **identify, evaluate and mitigate risks (the effects of uncertainty) specific to their field of activity;**
- **adopt a holistic and proportionate approach, to the mitigation of security risks;**
- **recognise the importance of equality, diversity and inclusion in the workplace.**

C5 Engineering practice

The practical application of chemical engineering concepts and tools, engineering and project management, teamwork and communication skills. Engineers also require a sound grasp of the commercial context of their work, specifically the ways an organisation creates, delivers and captures value in economic, social, cultural or other contexts. On successful completion of an approved or accredited programme, an individual will be able to:

- use practical laboratory and workshop skills to investigate well-defined problems;
- select and apply appropriate materials, equipment, engineering technologies and processes to plan and undertake well-defined programmes of work;
- recognise the need for quality management systems and continuous improvement in the context of well-defined problems;
- demonstrate awareness of engineering management principles, commercial context and project management;
- function effectively as an individual and as a member of a team;
- communicate effectively with technical and non-technical audiences;
- plan and record self-learning and improve performance, as the foundation for lifelong learning/CPD.

Appendix D

UK-SPEC (EngTech) competence statements

A. Use process related knowledge and understanding to apply technical and practical skills.

A1. Ability to review, select and use appropriate technical techniques, procedures and methods to undertake (chemical, biochemical and process engineering) tasks.

A2. Ability to use appropriate scientific, technical, chemical, biochemical or process engineering principles.

B. Contribute to one or more of the following: (de)commissioning, design/development, modification/refurbishment, manufacture, construction, operation/maintenance of products, quality assurance, cleanout, environmental/waste management of processes, systems, equipment or devices.

B1. Ability to identify problems, apply appropriate methods to identify causes, achieve (a) technical solution(s) and evaluate the result.

B2. Ability to identify, organise and use resources effectively to complete tasks, with consideration for cost, quality, safety, security and environmental impact.

C. Accept and exercise personal responsibility

C1. Ability to work reliably and effectively, without close supervision.

C2. Ability to accept responsibility for your work or that of others.

C3. Ability to accept, allocate and supervise technical and other tasks.

D. Use effective communication and interpersonal skills

D1. Communicate technical ideas, information and plans by means of written, electronic and oral presentation.

D2. Work effectively with colleagues, clients, suppliers or the public.

D3. Demonstrate personal and social skills and awareness of diversity and inclusion issues.

E. Make a personal commitment to appropriate codes of professional conduct; recognising obligations to society, the profession and the environment.

E1. Commitment to uphold IChemE's Code of Professional Conduct.

E2. Ability to manage and apply safe systems of work.

E3. Ability to operate and act responsibly, taking account of the need to progress environmental, social and economic outcomes simultaneously.

E4. Carry out and record CPD necessary to maintain and enhance competence in own area of practice.

E5. Ability to exercise responsibilities in an ethical manner.

Appendix E

Glossary of terms used in the guidelines

Where relevant, definitions have been adopted from the Engineering Council **AQAH (Approval of Qualifications and Apprenticeship Handbook).**

Term	Definition
Apprenticeship Standard or Framework	An apprenticeship standard of framework is a definition of requirements for an apprenticeship programme. It is used by training providers, colleges, and employers to ensure that all apprenticeship programmes are delivered consistently and to agreed standards. Each standard or framework includes details of the knowledge, skills and competence needed to be demonstrated by the end of the apprenticeship, and may include formal qualifications, behaviours, key skills, and any other requirements of the apprenticeship. Each standard or framework may also include information on job roles, entry routes, length of the apprenticeships and career paths available upon completion.
Approval and Accreditation of Qualifications and Apprenticeships (AAQA)	Published by the Engineering Council, this document forms part of the Standard used by the UK engineering profession to assess the competence and commitment of individual engineers and technicians. It was developed collaboratively in consultation with engineers representing the breadth of the profession, from industry, academia and many different disciplines and specialisms.
Approval	A process of peer review of a technician programme against published learning outcomes. This involves a review of a qualification or an apprenticeship programme by a number of professionally registered engineers.
Assessor	A person appointed by IChemE who is trained in assessing the suitability of a programme for approval.
Awarding Organisation (AO)	Awarding Organisations develop and award qualifications to meet the needs of learners, employers and other stakeholders. In the UK, they are 'recognised' and regulated by Office of Qualifications and Examinations (Ofqual), Scottish Qualifications Authority (SQA) and Qualifications Wales. Awarding Organisations focus on: ■ **developing high quality qualifications that meet the needs of employers and learners;** ■ **approving centres and working with them to ensure high quality delivery of qualifications;** ■ **carrying out activity designed to assure the quality of the qualifications awarded;** ■ **developing products and services to support their centres and learners.**
Chartered Engineer (CEng)	One of the professional titles available to individuals who meet the required standard of competence and commitment. www.icheme.org/ceng

Term	Definition
Competence	The ability to carry out a task to an effective standard. Its achievement required the right level of knowledge, understanding and skill, as well as a professional attitude. It is part of the requirement (along with commitment) that must be demonstrated in order for an individual to be admitted to the Engineering Council's Register at the relevant level.
Condition (of approval)	Where continued approval is dependent upon the programme provider meeting requirements set by IChemE. Conditions are binding on the programme provider and must be resolved within the indicated timeframe for approval to be maintained and valid.
Continuing Professional Development (CPD)	The systematic acquisition of knowledge and skills, and the development of personal qualities, to maintain and enhance professional competence. All members of IChemE have an obligation to undertake CPD, and to support the learning of others. www.icheme.org/career/cpd
Credit and Qualification Framework for Wales	Credit and Qualifications Framework for Wales (CQFW) covers learning from the very initial stages (Entry, 1, 2, & 3) to the most advanced (Level 8). It is managed by a strategic operational partnership comprising of the Welsh Government, Higher Education Funding Council for Wales (HEFCW) and Qualifications Wales.
Dublin Accord	The Dublin Accord is an agreement for the international recognition of Engineering Technician educational base. More information can be found at: www.ieagreements.org/accords/dublin/
Engineering Council	The UK regulatory body for the engineering profession that sets and maintains internationally recognised standards of professional competence and ethics, and holds the UK register of professional engineers and technicians. www.engc.org.uk
Engineering Technician (EngTech)	One of the professional titles available to individuals who meet the required standard of competence and commitment. www.engc.org.uk/engtech
Evidence	Auditable material supporting the approval application, for example the quality review reports etc.
Exemplifying qualification	An educational or vocational qualification that demonstrates the knowledge, understanding and skills to meet or partly meet the requirement for registration in a particular category. Other qualifications may be permitted if they achieve (or exceed) the same level.
Further education (FE)	In the UK, this refers to education that is post-school and defined on the regulated Qualifications Framework (RQF) as being at Level 3 upwards in England and Northern Ireland, at Level 3 upwards on the Credit and Qualifications Framework Wales (CQFW) or Level 6 upwards on the Scottish Credit and Qualifications Framework (SCQF). It typically offers nationally available qualifications including: Vocational Qualifications (N/SVQs), Higher National Certificates (HNCs), and Higher National Diplomas (HNDs).

Term	Definition
Guided Learning Hours (GLH)	The number of tutor-led contact hours required to support learner achievement of a unit/module or qualification. Guided learning hours (GLH) include: ■ induction specific to the programme; ■ one-to-one or group tutorials; ■ teaching sessions; ■ facilitated workshops; ■ assessment of learner achievements where the learner is present, eg when assessing an individual in the workplace or assessing a skills activity in a classroom environment. Guided learning hours (GLH) do not include: ■ time spent by tutors preparing teaching sessions and learning materials; ■ time spent by tutors marking assessments where the learner is not present; ■ study undertaken by the learner in their own time; ■ know-how to use appropriate codes of practice and industry standards; ■ learner support that is not specific to the content of the programme eg study skills.
Incorporated Engineer (IEng)	One of the professional titles available to individuals who meet the required standard of competence and commitment. www.engc.org.uk/ieng
International Engineering Alliance (IEA)	Partnership of international organisations and responsible for the governance of the international accords such as Dublin, Sydney and Washington Accords.
Learning outcome	A statement of achievement expected of an individual from an approved qualification or apprenticeship.
Modern Apprenticeship (MA)	Modern apprenticeships, available in Scotland, are apprenticeship standards/ frameworks which are approved by the Modern Apprenticeship Group (MAG). They set out the minimum requirements which must be included in any recognised Scottish apprenticeship framework. Frameworks and their criteria can be found at: www.skillsdevelopmentscotland.co.uk/what-we-do/apprenticeships/modern-apprenticeships
Modern Apprenticeship Group (MAG)	The Modern Apprenticeship Group (MAG) is an independent group which draws its authority from the Scottish Government. The group is responsible for the approval and de-approval of all the Scottish frameworks and encourages Sector Skills Councils (SSCs) to develop robust frameworks with high participation and completion rates, which can respond to the needs of their sector in changing economic circumstances and priorities.

Term	Definition
NOS	National Occupational Standard(s) are the statements of the standards of performance individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding.
Ofqual	The Office of Qualifications and Examinations Regulation (Ofqual) regulates qualifications, examinations and assessments in England and vocational qualifications in Northern Ireland. Ofqual maintain standards and confidence in qualifications: GCSEs and A levels in England, and vocational qualifications in both England and Northern Ireland. Ofqual is independent of government and report directly to Parliament and the Northern Ireland Assembly. www.gov.uk/government/organisations/ofqual
Office for Standards in Education (Ofsted)	Ofsted is the Office for Standards in Education, Children's Services and Skills. Ofsted inspects and regulates services that care for children and young people, and services providing education and skills for learners of all ages.
Output standard	The overall standard that a programme comprising a level of qualification and a set of associated learning outcomes, must meet in order to secure approval status.
Professional Engineering Institution (PEI)	Membership organisation which is licenced by the Engineering Council to assess applicants for professional registration.
PEI Own Qualification	This is a qualification developed by, and where the professional engineering institution is itself the awarding body.
Professional registration	The process whereby an individual is admitted to the Engineering Council's register based on the individual demonstrating via a peer review process by a licenced professional engineering institution that they have met the profession's standards of commitment and competence.
Programme provider	The term 'Programme provider' is used for convenience throughout these guidelines for the Academic unit or organisation responsible for delivering the programmes under review.
Regulated Qualifications Framework (RQF)	The Regulated Qualifications Framework (formerly the Qualifications and Credit Framework) is a framework that applies to qualifications, diplomas, certificates and other academic awards granted by an education provider in England and vocational qualifications in Northern Ireland.
Royal Charter	A formal document issued by the monarch granting rights and powers to an individual or an organisation.
SASE/W	Specification of Apprenticeship Standards for England (SASE) or Wales (SASW). See https://acecerts.co.uk/web/frameworks-library and https://acwcerts.co.uk/web/frameworks-library

Term	Definition
Scottish Credit and Qualifications Framework (SCQF)	Scottish Credit and Qualifications Framework: a framework that applies to qualifications and other academic awards in Scotland. For reference points see https://scqf.org.uk
Sydney Accord	Similar to the Dublin Accord, for Incorporated Engineers (in the UK) or Engineering Technologists www.ieagreements.org/accords/sydney/
Threshold	The minimum standard that a qualification or apprenticeship must meet.
Total Qualification Time (TQT)	Total Qualification Time (TQT) is an indication of how long a typical learner might take to study a qualification, including the time spent on their individual study and on assessment. It includes Guided Learning Hours (GLH), which is the amount of time spent actually being taught or any other form of education or training.
UK-SPEC: the UK Standard for Professional Engineering Competence	The UK Standard which sets out the competence and commitment requirements for registration with the Engineering Council as an Engineering Technician, Incorporated Engineer or Chartered Engineer. www.engc.org.uk/ukspec
Unique Identifier	All UK regulated qualifications possess a unique identifier (typically an alphanumeric code) by which they are identified on the Ofqual or SCQF register.

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