Water Treatment Technician Apprenticeship,

Level 3:

End-point Assessment Plan

Introduction & Overview

This document sets out the requirements for end-point assessment (EPA) for the Water Treatment Technician apprenticeship standard. The apprenticeship standard has four distinct job roles: Water Treatment Technician, Water Treatment Equipment Technician, Legionella Risk Assessor and Water Treatment Operations Supervisor. Each apprentice will follow one of these pathways. This document is written for end-point assessment organisations who need to know how EPA for this apprenticeship must operate. It will also be of interest to water treatment technician apprentices, their employers and training providers.

Full time apprentices will typically spend 24-30 months on-programme working towards the apprenticeship standard, with a minimum of 20% off-the-job training.

The EPA should only start once the employer is satisfied that the apprentice is consistently working at or above the level set out in the standard, that the pre-requisite gateway requirements for EPA have been met and that they can be evidenced to an EPA organisation. Water Treatment Apprentices without English and mathematics at level 2 must achieve level 2 English and mathematics prior to taking their EPA.

The EPA must be completed over a maximum total assessment time of 3 months, within a 3-month period, after the apprentice has met the EPA gateway requirements.

EPA must be conducted by an organisation approved to offer services against this standard, as selected by the employer, from the Education & Skills Funding Agency's Register of End-Point Assessment Organisations.

The EPA consists of 3 distinct assessment methods:

- Knowledge test
- Observation
- Professional discussion supported by a portfolio

Performance in the EPA will determine the apprenticeship grade of fail, pass, or distinction.

On-programme **(typically, 24-30 months)**	**End Point Assessment Gateway**	**End Point Assessment** **(maximum 3 months)**
Training to develop the occupation standard's knowledge, skills and behaviours Working towards English/maths Level 2 (if not already acheived) The apprentice collates a portfolio of evidence selected to provide support during the professional discussion The portfolio is not assessed	Apprentice has achieved English and mathematics at Level 2 Portfolio of evidence Employer satisfied apprentice is consistently working at or above the level of the standard	Knowledge Test Observation Professional Discussion Graded fail pass or distinction overall The end-point assessment must commence within 3 months of the apprentice passing the gateway

Diagram 1. Typical Water Treatment Technician Apprenticeship Summary

End-point Assessment Gateway

The EPA should only start once the employer is satisfied that the apprentice is consistently working at or above the level set out in the standard, the pre-requisite gateway requirements for EPA have been met and that they can be evidenced to an End-Point Assessment Organisation (EPAO). Employers may wish to take advice from their apprentice's training provider(s).

Gateway requirements:

- English and mathematics at level 2. For those with an education, health and care plan or a legacy statement the apprenticeships English and Maths minimum requirement is Entry Level 3 and British Sign Language qualification are an alternative to English qualifications for whom this is their primary language.
- Portfolio of evidence that supports the professional discussion

Portfolio of evidence requirements:

The portfolio of evidence will be used to support the professional discussion, as detailed in Annex 1. The portfolio is not assessed, but is used to provide information to support the professional discussion. It is recommended that it includes:

- Evidence that demonstrates the apprentice's knowledge, skills and behaviours (KSBs) that are mapped to the professional discussion – see Annex 1.
- Evidence must relate to 'real' work completed by the apprentice; evidence from simulated activities is not allowed
- A maximum of 30 pieces of evidence to demonstrate consistent achievement of quality and quantity.

The portfolio of evidence must be finalised before passing through the gateway. The apprentice must submit their portfolio of evidence to the EPAO when applying for the EPA. The portfolio of evidence will comprise of naturally occurring evidence gathered during the on-programme period from their workplace, backed up by relevant company processes and procedures. The portfolio of evidence will enable the apprentice to showcase specific work-related projects/tasks that they have completed on their own during the apprenticeship. It is expected that pieces of evidence will cover multiple KSBs.

Examples of evidence (not a definitive list as other relevant evidence sources are permissible) can include:

Work output e.g. surveys, reports, quotations
Work documentation/ record e.g. service reports, log data, workplace risk assessments
Employer feedback/reviews
Witness statements
Recorded questions/answers/ workbooks

Performance records
Target achievement records
Taped evidence (video or audio)
Quality achievement records
Maintenance records
Photographic evidence

End-point Assessment Methods, Timescales & Location

The end-point assessment consists of 3 distinct assessment methods:

- Knowledge test
- Observation
- Professional discussion supported by a portfolio

The end-point assessment must be successfully completed within three-months, after the apprentice has met the EPA gateway requirements.

The assessment methods can be completed in any particular order, allowing EPAOs flexibility in scheduling and cost-effective allocation of resources.

EPAOs must ensure appropriate methods to prevent misrepresentation are in place. For example, screen share and web camera function with an administrator/invigilator when taking the knowledge test on-line.

Requirements for each assessment method are detailed below.

Knowledge test

- Apprentices must complete a multiple-choice test during the EPA period
- The test may be paper-based or delivered via an on-line platform
- The test must assess apprentices against the standard's knowledge as shown in annex 1
- The knowledge test must consist of 30 multiple-choice questions
- Each question must present the apprentice with 4 options, from which the apprentice must select one correct option
- Each question answered correctly must be assigned 1 mark, any incorrect or missing answers must be assigned 0 marks
- Apprentices must have a maximum of 1 hour to complete the test
- The knowledge test must be closed book i.e. the apprentice can't refer to reference books or materials

- Apprentices must take the test in the presence of an EPAO-approved invigilator if the test is paper-based. EPAOs must ensure appropriate methods to prevent mis-representation, for example, screen share and 360 degree camera function with an administrator/invigilator where the test is taken remotely.
- The maximum invigilator to apprentice ratio must be 1 to 20
- Tests must be marked by EPAO independent assessors or markers following a marking guide produced by the EPAO; electronic marking is permissible
- The test must be conducted in a suitable controlled environment i.e. quiet room free from distraction and influence. It is anticipated that EPAOs will use the apprentice's employer's premises wherever possible to minimise costs.
- Independent assessors must award a grade using the following grading boundaries:

Grading boundaries	**Fail**	**Pass**	**Distinction**
Marks	0-17	18-24	25-30

- It is recommended that EPAOs develop questions, in consultation with representative employers ensuring that measures are in place to maintain the security and confidentiality of the questions
- Knowledge assessment questions must be set so that a pass will represent an understanding of <u>all</u> core knowledge statements assigned to this assessment component and test construction must facilitate this.
- EPAOs must ensure the knowledge test is available for apprentices within their 3 month EPA time period
- EPAOs must develop 'question banks' of sufficient size to prevent predictability and review them regularly (and at least once a year) to ensure they, and the specifications they contain, are fit for purpose
- EPAOs must ensure that apprentices have a different set of questions in the case of re-sits/re-takes

Observation

- Apprentices must be directly observed by the independent assessor on a one-to-one basis completing a specified task relating to their relevant job role.
- Water Treatment Technician option must be observed presenting the results and recommendations of a water analysis to the customer.
- Water Treatment Equipment Technician option must be observed servicing a piece of water treatment equipment
- Legionella Risk Assessor option must be observed carrying out a tank inspection

- Water Treatment Operations Supervisor option must be observed supervising a team carrying out a water treatment operation.
- This should be completed in their usual place of work, under normal working conditions. Typically, this will be covered within one task but may be covered over two separate tasks if required
- During or after the task completion the independent assessor must ask 3 open questions to assess related underpinning knowledge and assess those knowledge, skills and behaviours assigned to this assessment component that did not naturally occur during the observation. They may ask follow-up questions where clarification is required. Questioning must be completed within the total time allowed for the observation
- KSBs observed and answers to questions must be documented by the independent assessor
- Apprentices must be provided with a written brief detailing the task(s) they must complete including timescales. The whole observation must take place during one day
- The brief and the observation must be planned in such a way as to provide the apprentice with the opportunity to achieve the elements of the standard outlined in Annex 1
- Observations must be carried out over a maximum total assessment time period of 2 hours (+/- 10%). There may be breaks during the observation to allow the apprentice to move from one location to another
- An observation brief will be produced by the EPAO for each observation listed in Annex 1. On receipt of the brief the apprentice can provide information to aid the scheduling of the EPA including advising what facilities are available on site. Any information provided by the apprentice must only be at the request of the end point assessor.
- The observation is graded by the independent assessor as either a fail or a pass.

Observation Grading Criteria:

- Pass criteria: the apprentice demonstrates evidence for every element of the standard designated for observation, according to the selected job role, as listed in Annex 1
- Fail criteria: the apprentice does not demonstrate satisfactory evidence for one or more of the relevant elements of the standard
- Grading criteria: the grading criteria for Observation are listed in Annex 3

  This assessment method must include direct observation of every element of the standard designated for observation as detailed in Annex 1.

Professional Discussion

- The duration of the professional discussion should be 90 minutes (+10% at the assessors discretion to allow the assessor to complete questioning of an area that has already commenced)
- The independent Assessor (IA) will conduct a professional discussion on a one-to-one basis as part of the end-point assessment, either in person or electronically as approved by the EPAO
- It should take place in quiet room away from the workplace free from distraction and influence
- The independent assessor, using set criteria, must ask the apprentice a minimum of 19 open questions to allow the apprentice to demonstrate their achievement of the relevant parts of the standard; where needed follow up questions are allowed to seek clarification. The apprentice can support their professional discussion responses with reference to their portfolio of evidence.
- The EPAO must produce guidance on what to include in a portfolio and how to organise it so that it is manageable during the professional discussion
- The EPAO must produce sample questions and a question template as a guide for independent assessors, that takes account of the core KSBs outlined in annex 1 and the four job roles (Water Treatment Technician, Water Treatment Equipment Technician, Legionella Risk Assessor or Water Treatment Operations Supervisor) that the apprentice is following. Independent assessors should also develop additional questions pertinent to the evidence presented in the portfolio of evidence. The bank of sample questions must be of sufficient size to prevent predictability and be reviewed regularly (and at least once a year) to ensure they are fit for purpose and allow a different set of questions to be used in the case of re-sits/re-takes.
- Questioning should be recorded electronically, subject to the apprentice's agreement; where permission is not given it is permissible for another independent assessor to be present to document evidence presented.
- Grading criteria: the grading criteria for Professional Discussion are listed in Annex 2

Apprenticeship Grading

Each assessment method is equally weighted. Independent assessors must individually grade each assessment method – fail, pass or distinction, according to the requirements set out in this plan. Observation is pass/fail only. Restrictions on grading apply where apprentices re-sit/re-take an assessment method – see re-sit/re-take section below.

An independent assessor must combine the grades of all three assessment methods to determine the EPA grade. To achieve an EPA pass, apprentices must achieve a pass or distinction in the test and the professional discussion and a pass in the observation. To achieve a distinction, the apprentices must achieve a distinction in both the knowledge test and the professional discussion as well as a pass in the observation. See grading combinations table below.

Independent assessors' decisions must be subject to moderation by the EPAO – see internal quality assurance section below. Decisions must not be confirmed until after moderation.

Knowledge test grade	**Observation grade**	**Professional discussion grade**	**EPA grade**
Failure of any component results in an overall fail			Fail
Pass	Pass	Pass OR Distinction	Pass
Pass OR Distinction	Pass	Pass	Pass
Distinction	Pass	Distinction	Distinction

Re-sit and re-take information

Apprentices who fail one or more EPA method will be offered the opportunity to take a re-sit/retake. Re-sits/re-takes must not be offered to apprentices wishing to move from pass to a distinction. A re-sit does not require further learning, whereas a re-take does.

The apprentice's employer will need to agree that a re-sit/re-take is an appropriate course of action. Apprentices should have a supportive action plan to prepare for the re-sit/re-take.

The timescales for a resit/retake of the entire EPA is agreed between the employer and EPAO. A resit is typically taken within 3 months of the EPA outcome notification. The timescale for a retake is dependent on how much re-training is required and is also typically taken within 3 months of the EPA outcome notification.

The maximum grade awarded to a re-sit/re-take will be pass, unless the EPAO identifies exceptional circumstances affecting the outcome of the original assessment.

EPAOs must ensure that apprentices complete a different knowledge test when taking a re-sit/re-take and use a different set of questions for the professional discussion. When re-sitting/retaking the observation, the apprentice may complete the same task.

End-point Assessment Organisations

Employers must choose an independent EPAO approved to deliver the EPA for this apprenticeship from the Education & Skills Funding Agency's (ESFAs) Register of End Point Assessment Organisations (RoEPAO).

Requirements for Independent Assessors, Invigilators and Markers

EPAOs must appoint:

- invigilators and markers to invigilate and mark the knowledge test (or use electronic marking)
- independent assessors to grade the knowledge test (or use an automatic system)
- independent assessors to assess and grade the observation and the professional discussion
- quality assurance staff to undertake moderation of EPA

Independent assessors must meet the following requirements:

- be independent of the apprentice, their employer and training provider(s) i.e. there must be no conflict of interest
- hold or be working towards an assessor qualification and have had training from their EPAO in terms of good assessment practice, operating the assessment tools and grading
- have a minimum of 5-years' water treatment sector experience working at level 5 or above, gained within the previous 10 years, and have completed a minimum of 3-days relevant continuing professional development (CPD) in the last year; they do not necessarily still need to be employed in the sector
- undertake a minimum of 1-days' EPAO standardisation training per year

Quality assurance staff must be independent of the apprentice, their employer and training provider i.e. there must be no conflict of interest.

Internal quality assurance

Internal quality assurance refers to the requirements that EPA organisation must have in place to ensure consistent (reliable) and accurate (valid) assessment decisions. EPA organisations for this EPA must undertake the following:

- appoint independent assessors that meet the requirements as detailed in this plan – see above
- provide training for independent assessors in terms of good assessment practice, operating the assessment tools and grading
- have quality assurance systems and procedures that support fair, reliable and consistent assessment across organisation and over time
- operate regular standardisation events that enable assessors to attend a minimum of one event per year
- operate moderation of assessment activity and decisions, through examination of documentation and observation of activity, with a minimum of 10 percent of each independent assessors' assessments moderated

Assessment tools and materials

EPA organisations must produce assessment tools and supporting materials for the EPA that follow best assessment practice, as follows:

- Knowledge test question bank
- Question banks for use with the Observation and Professional Discussion.
- Guidance for apprentices on how to use portfolios to support professional discussion
- Documentation for recording assessment evidence and decisions
- Guidance for independent assessors on conducting the EPA
- Guidance for apprentices, their employers and training providers on the EPA

External Quality Assurance

External quality assurance arrangements will ensure that EPAOs delivering EPA for this apprenticeship operate consistently and in line with this plan.

External quality assurance for this apprenticeship standard will be undertaken by Ofqual.

Implementation

Affordability:

The following factors should ensure the EPA is affordable:

- Employers premises should be used for EPA venues where possible
- Remote assessment is permissible, reducing travel costs

Volumes: Initially, it is anticipated that there will be 100-200 starts per year on this apprenticeship and 300 per year once established

Annex 1 – Knowledge, Skills and Behaviours to be assessed by each assessment method

Assessment method	Key
Observation	**O**
Professional Discussion	**PD**
Knowledge Test	**T**

Core Knowledge statement	Assessment method
CK1. Chemical reactions involved in the corrosion and scaling processes in water systems	**T**
CK2. Inhibition methods for the reduction of corrosion of different metals including steel, copper and aluminium in water systems	**T**
CK3. Inhibition methods for the reduction of different scale types in specific water systems including cooling towers, steam boilers and manufacturing processes, etc.	**T**
CK4. Cell structure of waterborne microbes and the interactions with biocidal products used to control them	**T**
CK5. The concepts of flow and heat transfer in water systems and how they affect water treatment processes	**T**
CK6. Ion transfer technologies, including resin and membrane-based systems, used to change water quality	**T**
CK7. The use of specialised analytical equipment for the testing in field of water samples including digital titration, colorimeters and photometers	**T**

Core Skills statements	Assessment method
CS1. Understand, comply with and implement statutory health and safety regulations with regard to the tasks being undertaken.	**O**
CS2. Understand and implement organisational safety requirements for themselves and others, including responsibility and supervision for safe access to water systems and the handling of chemicals.	**O**
CS3. Maintain a safe environment for other building occupants during water treatment operations including any relevant signage and notifications.	**O**
CS4. They should be able to contribute to the development of operational solutions and improvements e.g. safer working practices.	**PD**

CS5. Gather system data to enable the correct selection of operational resources that may be required e.g. access equipment (ladders, scaffold or cherry picker).	**PD**
CS6. Complete work task risk assessments and develop work plans and method statements for the task(s) involved.	**O**
CS7. Ensure the suitability and correct operating condition of resources and equipment for the work tasks involved. This can include test equipment, chemical dosing equipment, water pumps and other specialised equipment.	**O**
CS8. Identification of suitable sampling and application points in a water system	**O**
CS9. Assessment of relevant test parameters and sampling plan for specific water systems	**PD**
CS10. Performance assessment and evaluation of water system conditions and operations utilising specific monitoring equipment	**PD**
CS11. Application of water treatment programmes to specific water system types e.g. cooling towers, steam boilers, heating and chilled systems etc.	**O**
CS12. Interpretation of test results and development of treatment programme improvements and recommendations	**O**
CS13. Identify, evaluate and resolve practical and technical problems encountered, assess suitability of the chemical and physical water treatment options employed and implement the required improvements to the treatment programme or service delivery	**PD**
CS14. Use resources effectively including their own time management, the appropriate competence of staff chosen for the operation involved, the efficient use of staff resources and management of equipment required for specific work tasks	**PD**
CS15. Communicate effectively. Use oral, written, electronic and IT based methods and systems for the accurate communication of technical information to other staff involved and all levels of site management. Review this information and agree actions with the relevant people involved. This can include the use, management and training with regard to electronic log systems for the storage of water system sampling and analytical results, practical demonstration of testing procedures and presentation of reports	**O**
CS16. Maintain level of competence commensurate with job role. Identify and recognise personal training needs and undertake suitable training when required. Complete and record CPD necessary to maintain and enhance competence	**PD**

Behaviour statements	Assessment method
CB1. Act professionally demonstrating dependability, determination, honesty and integrity. Respect others, act ethically and contribute to sustainable development.	**O**
CB2. Be risk aware so as to help reduce risks by checking of information, concentration on the task, and awareness of changing circumstances on activity.	**O**
CB3. Display a self-disciplined, self-motivated, proactive approach to work, willing to make independent decisions and develop solutions and improvements to work practices	**PD**
CB4. Be prepared to work reliably and safely, and supervise the safe and effective operation of others.	**O**
CB5. Be prepared to work effectively and efficiently maintaining good relationships with colleagues, clients, suppliers and the public.	**PD**
CB6. Be receptive to feedback, willing to learn new skills and adjust to change.	**PD**
CB7. Demonstrate adherence to corporate policies on ethics, equality and diversity	**PD**

Job role: Water Treatment Technician Knowledge statements	Assessment method
WTT K1. Understand the water treatment requirements of specific water systems e.g. steam boilers, cooling towers etc.	**PD**
WTT K2. Understand the treatment options available for specific water systems e.g. pre-treatment plant, chemical treatment etc	**PD**
WTT K3.	
a. Acquire the knowledge required to assess the performance of water treatment programmes	**PD**
b. Acquire the knowledge required to recommend improvements to water treatment programmes	**PD**

Job role: Water Treatment Technician Skills statements	Assessment method
WTT S1. Design, specify and recommend chemical water treatment programmes taking account of water supply quality and system operating conditions	**PD**
WTT S2.	**PD**

a. Evaluate the suitability of alternative physical water treatment programmes for specific water systems and applications b. Evaluate the suitability of alternative chemical water treatment programmes for specific water systems and applications	**PD**
WTT S3. Give presentations and demonstrations to customer/site personnel regarding treatment recommendations and control requirements	**O**
WTT S4. Assess the performance of a water system treatment programmes and provide recommendations for improvement	**PD**
WTT S5. Organise, construct, manage and report review meetings with customers/site personnel	**O**

Job role: Water Treatment Equipment Technician Knowledge statements	**Assessment method**
WTE K1. Understand the water treatment requirements of specific water applications and processes e.g. water used for pharmaceutical manufacturing, chemical treatment dosing	**PD**
WTE K2. Understand the equipment options available and their relevant benefits	**PD**
WTE K3.	
a. Acquire the knowledge required to install specific items of equipment relevant to their job role	**PD**
b. Acquire the knowledge required to service specific items of equipment relevant to their job role	**PD**
c. Acquire the knowledge required to maintain specific items of equipment relevant to their job role	**PD**

Job role: Water Treatment Equipment Technician Skills statements	**Assessment method**
WTE S1. Complete water system surveys and produce system diagrams appropriate to the presentation of system data e.g. layout of the treatment plant within the system location	**PD**
WTE S2. Evaluate and design appropriate water treatment equipment installations	**PD**
WTE S3.	
a. Install and commission water treatment equipment	**PD**
b. Service a piece of water treatment equipment	**O**
WTE S4. Assess the performance of a water system treatment programme	**O**

WTE S5. Supervise a team and manage the health, safety and environment of a water treatment equipment installation and/or operation	**PD**

Job role: Legionella Risk Assessor Knowledge statements	**Assessment method**
LRA K1. Know and understand any regulatory requirements and guidance appropriate to the water systems being assessed	**PD**
LRA K2. Understand the principles of risk assessment and the identification of hazards in water systems	**PD**
LRA K3. Understand the application of water treatment programmes for specific water systems	**PD**
LRA K4. Understand the principles of design for water systems and water treatment equipment e.g. water tanks, calorifiers, softeners etc.	**PD**
LRA K5. Acquire the knowledge required to recommend remedial actions, optional system improvements and management requirements	**PD**

Job role: Legionella Risk Assessor Skills statements	**Assessment method**
LRA S1. Carry out site/system investigations and surveys	**O**
LRA S2. Prepare water system diagrams and drawings	**PD**
LRA S3. Assess the comparative risk of Legionellosis presented by specific water systems	**PD**
LRA S4. Identify remedial, improvement and management actions required to minimise any risk presented	**PD**
LRA S5. Prepare and present the assessment report findings to customer/site personnel	**O**
LRA S6. Review the implementation of remedial actions recommended in the risk assessment e.g. pipework changes, insulation and review the employment of management controls e.g. temperature monitoring programmes, system analysis results	**O**

Job role: Water Treatment Operations Supervisor Knowledge statements	Assessment method
WTS K1. Understand the water treatment requirements of specific water systems e.g. drinking water systems, process water systems etc.	**PD**
WTS K2.	
a. Understand chemical cleaning programme options for specific water systems and processes	**PD**
b. Understand disinfection programme options for specific water systems and processes	**PD**
WTS K3. Acquire the knowledge required to assess the performance of water treatment cleaning/disinfection operation	**PD**
WTS K4. Understand the risks involved, the relevant Health and Safety regulations associated with the project and specific requirements of the project site	**PD**
Job role: Water Treatment Operations Supervisor Skills statements	**Assessment method**
WTS S1. Complete water system surveys and produce system diagrams appropriate for the direction and management of a cleaning/disinfection project	**O**
WTS S2. Understand and apply chemical cleaning and disinfection programmes for specific water systems	**PD**
WTS S3.	
a. Install and commission temporary operations equipment required to complete the project e.g. flushing pump stations, side stream filtration, cooling tower packing	**PD**
b. Service temporary operations equipment required to complete the project e.g. flushing pump stations, side stream filtration, cooling tower packing	**O**
WTS S4. Assess the performance and progress of a water treatment cleaning/disinfection operation by sample analysis and make adjustments to the programme as required	**PD**
WTS S5. Supervise a team of Water Treatment Operatives and any associated subcontractors.	**O**
WTS S6. Produce a method statement and control scheme to manage the health, safety and environment during the various phases of a project.	**PD**

Annex 2 Professional Discussion Grading Criteria and Guidance: Water Treatment Technician

Grading Descriptors for Professional Discussion		
Fail: The apprentice will be deemed to have failed if they do not meet all the criteria outlined in the Pass descriptors		
Area of assessment	**Pass**	**Distinction**
	Apprentice demonstrates the knowledge, skills and behaviours that meet the requirements of the role as set out in the standard. To achieve a pass, the candidate must meet all of the following criteria:	In addition to the pass criteria, the apprentice demonstrates knowledge, skills and behaviours that exceed the requirements of the role as set out in the standard. To achieve a distinction, the candidate must achieve 4 out of 6 of the following criteria:
Water system surveys, water system requirements and treatment programme design		
Water Treatment Technician (WTT) WTT K1 WTT S1	Describe the information to be obtained during a water system survey to enable a water treatment programme to be designed e.g. water make up type, water usage, system operation Demonstrate how they have correctly applied an understanding of the water treatment requirements for a specific water system. e.g. by explaining programme design calculations and conclusions Demonstrate how they use the information gathered to design a water treatment programme to meet the requirements, specification or guidance provided,	In addition to the pass criteria: Explain the risks and implications of failure to follow the correct design principles and the likely problems that will occur. e.g. corrosion/scale reducing plant efficiency and lifespan Describe the maintenance and monitoring programme that can be employed to ensure the continued suitability of the treatment programme. e.g. corrosion monitoring of high risk metals within the system

	e.g. by explaining the programme design calculations and conclusions	
Water Treatment Equipment Technician (WTE) WTE K1, WTE K3a WTE S1 WTE S3a	Describe the information to be obtained during a water system survey to enable a water equipment installation to be designed e.g. water make up type, water usage, quality requirements Demonstrate how they have correctly applied an understanding of the water treatment requirements for a specific water system. e.g. by explaining programme design calculations and conclusions Demonstrate how they use the information gathered to design a water treatment installation. e.g. by explaining programme design calculations and conclusions Demonstrate the knowledge required to install specific water treatment equipment e.g. electrical requirements for a softener installation, or the service parts required Describe how they have installed and commissioned items of equipment.	In addition to the pass criteria: Explain the risks and implications of failure to follow the correct design principles and the likely problems that will occur. e.g. poor water quality causing deterioration of final product Describe the maintenance and monitoring programme that can be employed to ensure the continued suitability of the treatment programme. e.g. regenerant usage profile and cost reduction
Legionella Risk Assessor (LRA)		In addition to the pass criteria:

LRA K4 LRA S2	Describe the major elements of a water system and their design e.g. storage tanks, calorifiers, thermostatic mixer valves in a hot water system Describe how they prepare water system diagrams. e.g. schematic drawings produced by computer aided design software	Explain the risks and implications of failure to follow the correct design principles and the likely problems that will occur. e.g. implications of health scare to customers business Describe the monitoring programme that can be employed to ensure the continued suitability of the risk assessment. e.g. the effectiveness of remedial engineering actions taken
Water Treatment Operations Supervisor (WTS) WTS K1 WTS S2	Describe the information to be obtained during a water system survey to enable a water system cleaning programme to be planned e.g. system access points, drainage, power supply Demonstrate how they have correctly applied an understanding of the water treatment requirements for a specific water system. e.g. from the system condition report, operative reports, analytical reports	In addition to the pass criteria: Explain the implications of selecting an unsuitable treatment option and how this could be rectified. e.g. non-dynamic flushing of a multiple floor heating system Explain the benefits for the customer of completing the cleaning procedure e.g. improvement in heat transfer processes derived from a cleaning procedure
Evaluate the water treatment programme options for an application		
Water Treatment Technician (WTT)	Describe the chemical treatment options available	In addition to the pass criteria:

WTT K2 WTT S2a, WTT S2b	for a specific water treatment application e.g. nitrite versus molybdate as a corrosion inhibitor Describe the physical treatment options available for a specific water treatment application e.g. hard water versus softened water make up for a cooling system Demonstrate how they have assessed the suitability of the chemical water treatment options in order to solve a technical problem they have encountered e.g. by explanation of the programme design calculations and conclusions Demonstrate how they have assessed the suitability of the physical water treatment options in order to solve a technical problem they have encountered e.g. by explanation of the programme design calculations and conclusions	Demonstrate how they have evaluated the benefits and drawbacks of different treatment programme options and Demonstrate an understanding of the commercial cost implications of treatment options. e.g. through explanation of the comparison of cost benefits of the options in a quotation Explain the implications of selecting an unsuitable treatment option and how this could be rectified. e.g. incorrect biocide for a closed water system
Water Treatment Equipment Technician (WTE) WTE K2 WTE S2	Describe the treatment options available for a specific water treatment application and Demonstrate how they have assessed the suitability of the treatment options e.g. by explanation of the programme design calculations and conclusions	Demonstrate how they have evaluated the benefits and drawbacks of different equipment options and Demonstrate an understanding of the commercial cost implications of treatment options

		e.g. through explanation of the comparison of cost benefits of the options in a quotation Explain the implications of selecting an unsuitable treatment option and how this could be rectified. e.g. softened water for a sodium sensitive chemical blending plant
Legionella Risk Assessor (LRA) LRA K3, LRA K5 LRA S4	Demonstrate the understanding of the application of a water treatment programme e.g. chlorine dioxide dosing to a cold water supply system Demonstrate the identification of remedial, improvement and management actions. e.g. by explanation of the recommendations given in a risk assessment	Explain the implications of selecting an unsuitable treatment option and how this could be rectified. e.g. continuous dosing of a silver stabilised peroxide to a potable water system Demonstrate an understanding of the cost implications of recommended remedial actions e.g. comparative cost of tank refurbishment versus replacement
Water Treatment Operations Supervisor (WTS) WTS K2a, WTS K2b	Describe the treatment options available for a specific water treatment cleaning application e.g. removal of suspended solids from a closed system Describe the treatment options available for a specific water system disinfection application	Explain the risks and implications of failure to follow the correct cleaning programme and the likely problems that will occur. e.g. incorrect cleaning programme closing down production process and consequent losses to both the customer and the employer

	e.g. sodium hypochlorite versus hydrogen peroxide for mains disinfection	Explain the risks and implications of failure to follow the correct disinfection programme and the likely problems that will occur. e.g. incorrect cleaning programme closing down production process and consequent losses to both the customer and the employer
Water treatment programme operational performance and assessment		
Water Treatment Technician (WTT) CS9, CS10, CS13 WTT K3a, WTT K3b WTT S4	Describe the correct performance criteria for the programme type, the tests to be completed and the correct equipment to be used when performing this task e.g. calcium balance to monitor scale inhibition Demonstrate the evaluation and implementation process that has been completed and explain the conclusions/recommendations arrived at. e.g. by explanation of the customer service report	Explain the risks and implications of poor treatment programme performance. e.g. corrosion/scale reducing plant efficiency and lifespan Demonstrate an understanding of the potential improvements that could be made to the programme and evaluate the benefits of those improvements e.g. changing from non-oxidising biocide programme to oxidising biocide
Water Treatment Equipment Technician (WTE) CS9, CS10, CS13 WTE K3b, WTE K3c	Describe the correct performance criteria for the equipment type, the tests to be completed and the correct equipment to be used when performing this task	Explain the risks and implications of poor treatment equipment performance. e.g. poor water quality causing deterioration of customer's final product

	e.g. recovery rate at specific conductivities for Reverse Osmosis plant Demonstrate the evaluation and implementation process that has been completed and explain the conclusions/recommendations arrived at. e.g. by explanation of the equipment service report Describe the servicing requirements for a specific item of water treatment equipment e.g. membrane cleaning of a Reverse Osmosis plant Describe the maintenance requirements for a specific item of water treatment equipment e.g. routine calibration of a pH monitoring system	Demonstrate an understanding of the potential improvements that could be made to the programme and evaluate the benefits of those improvements e.g. mixed bed polishing unit after Reverse Osmosis for ultrapure water supply
Legionella Risk Assessor (LRA) CS9, CS10, CS13 LRA K2 LRA S3	Describe the correct performance criteria for the system type, the tests that may be completed to assess this and the correct equipment to be used when performing this task e.g. legionella testing of a hot water system Describe the risk assessment principles that they use e.g. risk values weighted by local population of site e.g. by explanation of the risk assessment report findings and recommendations	Explain the risks and implications of poor treatment programme performance. e.g. the commercial implications of health scare to the customer's business Demonstrate an understanding of the potential improvements that could be made to the programme and evaluate the benefits of those improvements e.g. continuous biocide dosing to hot and cold

	Demonstrate the evaluation and implementation process that has been completed and explain the conclusions/recommendations arrived at. e.g. by explanation of the risk assessment report	water systems where legionella are prevalent
Water Treatment Operations Supervisor (WTS) CS9, CS10, CS13 WTS K3 WTS S3a, WTS S4	Describe the correct performance criteria for the operation type, the tests to be completed and the correct equipment to be used when performing this task e.g. iron levels during a dynamic flushing operation Describe how they have installed and commissioned operational equipment. Demonstrate the evaluation and implementation process that has been completed and explain the conclusions arrived at. e.g. by explanation of the job completion report	Explain the risks and implications of poor cleaning operation performance. e.g. incorrect cleaning programme closing down production process and consequent losses Demonstrate an understanding of the potential improvements that could be made to the water treatment programme on a cleaned system e.g. side stream filtration to remove suspended solids
Health, Safety and the Environment		
All roles CS4	Comply with company practices, processes and procedures associated with safety. Demonstrate where they have contributed to the development of an	In addition to the pass criteria: Demonstrate an understanding of where to improve Health and Safety within their workplace, including actions taken

	operational solution to a health and safety issue. Identify the main Health and Safety and compliance requirements of a Water Treatment Technician e.g. Health &Safety at Work Act, L8, BS 2486, BS 8552 etc	e.g. where reduced hazards minimised the risk to health or improved the system integrity.
Water Treatment Equipment Technician (WTE) WTE S5	Apply a safety first approach for themselves and colleagues keeping themselves and others safe. Undertake and document work place risk assessments and hazard reviews in accordance with company procedures. Describe how to supervise the health and safety of a team e.g. ensure all members of the team have the appropriate PPE for the task to be performed	Challenge unsafe practice outside of their immediate control or responsibility and is proactive in resolving those practices e.g. transport of equipment from point of delivery to the site of installation
Legionella Risk assessor (LRA) LRA K1	Identify the main Health and Safety and compliance requirements relevant to the production of a legionella risk assessment	Challenge unsafe practice outside of their immediate control or responsibility and is proactive in resolving those practices e.g. identifies health risks associated with a water system not directly linked to the legionella risk assessment process and brings this to the attention of the client.

Water Treatment Operations Supervisor (WTS) WTS K4 WTS S6	Apply a safety first approach for themselves and colleagues keeping themselves and others safe. Undertake and document work place risk assessments and hazard reviews in accordance with company procedures.	Challenge unsafe practice outside of their immediate control or responsibility and is proactive in resolving those practices e.g. produces a risk based chemical handling and transport procedure for delivery of chemicals to site
Workplace attitude		
All roles CS16 CB3, CB5, CB6, CB7	Describe when they have operated as an effective team member and taken responsibility, e.g. when they have made independent decisions and suggested workplace improvements. Describe the company's policy on ethics, equality and diversity, explaining why this is important, and illustrate this with an example of how they have effectively maintained a good relationship with either a colleague, client, supplier or member of the public. Demonstrate they have been receptive to feedback, willing to learn new skills and adapted to change. Demonstrate how they have assessed personal training needs in order to maintain a satisfactory level of competence in their job role e.g. when they have	In addition to the pass criteria: Demonstrate a clear development plan, outlining choices and opportunities available beyond the completion of the apprenticeship. e.g. personal review/assessment of their career progression potential with current employer and within the industry as a whole and what is required to achieve those goals

	requested external OEM training or specific H&S training e.g. confined spaces	
Resource Management		
All roles CS5, CS14	Explain how their work process, use of resources and management of time is effective. e.g. WTT explain their sample collection and drop off scheduling e.g. WTE describe their equipment parts procurement procedure and work planning e.g. LRA describes the necessary site communication channels for access arrangements e.g. WTS explains the team selection criteria used and the reasons for the organisation of labour on site for the operation	In addition to the pass criteria: Show an understanding of the importance of effective time and resource management and the implications to themselves and their employer. e.g. cost to the employer of aborted site visits, missing materials and call backs

Annex 3 - Observation Grading Criteria and Guidance: Water Treatment Technician

Grading Descriptors for Observation	
The observation is graded by the independent assessor as either fail or pass. **Fail: The apprentice will be deemed to have failed if they do not meet all the criteria outlined in the Pass descriptors**	
Area of assessment	**Pass**
	Apprentice demonstrates the knowledge, skills and behaviours that meet the requirements of the role as set out in the standard. To achieve a pass, the candidate must meet all of the following criteria:
Health & Safety	
All roles CS1, CS2, CS3, CS6 CB2, CB4	Follow the organisational safety requirements for themselves and others, maintaining a safe working environment and completing the task in a safe, competent way. Complete a work task risk assessment and produces a work plan/method statement for the task(s) involved. Demonstrate how they report a risk or concern in the workplace to the correct individual in the organisation.
Communication skills	
All roles CS15 CB1	Communicate effectively with the customer/site personnel and other organisational staff involved with the task. Provide clear and accurate recommendations to customer/site personnel

	e.g. WTT and WTE by discussion of the service report produced e.g. LRA through discussion of the risk assessment report e.g. WTS by discussion of the job completion report Act professionally demonstrating dependability, determination, honesty and integrity. Respect others, act ethically and contribute to sustainable development e.g. by behaving responsibly on site, reducing any impact of the task on the local environment and people, minimising waste produced and using the correct routes for waste disposal.
Water Treatment Technician (WTT) WTT S3 WTT S5	Demonstrate the presentation or demonstration of treatment recommendations or programme controls to a customer Demonstrate how they organise and carry out a review meeting with a customer and that they have imparted the correct information to the relevant people e.g. identify the relevant attendees and produce an agenda for the meeting
Legionella Risk Assessor (LRA) LRA S5, LRA S6	Demonstrate how they prepare and present report findings to the customer personnel and how they discuss with the customer how recommended remedial actions and changes to management controls identified in the risk assessment can be implemented.
Complete Operational Tasks	
All roles CS7, CS8, CS11	Demonstrate how they check the requirement and correct operation of resources/equipment required for the task

	e.g. WTT test equipment is calibrated and reagents are in date e.g. WTE has the correct equipment manual and spare parts for the task e.g. LRA knows if step ladders are required for access and has access to them if required e.g. WTS flushing pumps are in serviceable condition Identify suitable test or application points within the system e.g. WTT identifies sample point for closed water system e.g. WTE identifies suitable access point for a softener installation e.g. LRA identifies suitable point in system to take a microbiological sample e.g. WTs identifies access point for external flushing pump connection Correctly apply the treatment programme for the system involved e.g. WTT identifies the most suitable bleed point for a cooling system e.g. WTE installs the most suitable dosing pump for a chemical application e.g. LRA can identify the suitable temperature monitoring points within a system e.g. WTS supervises a closed system chemical flushing operation
Water Treatment Equipment Technician (WTE) WTE S3	Successfully complete the servicing of a piece of water treatment equipment in accordance with company procedures and relevant equipment specifications
Water Treatment Operations Supervisor (WTS)	

WTS S1, WTS S3b, WTS S5	Produce suitable diagrams to direct and manage the task involved e.g. system diagram identifying sample points Service temporary equipment required for the task in accordance with company procedures and relevant equipment specifications e.g. service an external flushing pump. Correctly supervise a team of water treatment operatives.
Performance Testing	
All roles CS12	Correctly interpret the test results and assess the implications of the results for the treatment programme e.g. WTT identifies the most suitable recommendations for a low treatment level in a closed system e.g. WTE identifies the most suitable recommendations for hardness slippage through a softener e.g. LRA identifies the most suitable recommendations for low hot water temperature e.g. WTS identifies the most suitable recommendations for chlorine levels during a system disinfection
Water Treatment Equipment Technician (WTE) WTE S3b, WTE S4	Service a piece of water treatment equipment e.g. dosing pump in accordance with company procedures and relevant equipment specifications and test for correct operation
Legionella Risk Assessor (LRA) LRA S1	Carry out water storage tank investigation/survey in accordance with company procedures