LEVEL 3 CERTIFICATE IN ENGINEERING SKILLS FOR TECHNICIANS - MECHANICAL

Centre Qualification Handbook

Competence-based Qualifications

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INTRODUCTION TO THE HANDBOOK

This qualification sits within the Regulated Qualifications Framework (RQF).

This Qualification Handbook has been developed to ensure that PAA\VQ-SET Centres understand the requirements of the qualification. The Handbook contains the following information:

- Qualification Structure
- Assessment Requirements
- Assessment Methods
- Glossary
- Qualification Units

This Qualification Handbook has been developed to provide support in the implementation of the qualification as well as giving information to ensure that the assessment and quality assurance is consistent, robust and reliable within each centre and nationally. The handbook also contains details of the skills and/or knowledge the learner must obtain to achieve the units and qualification.

Qualification Structure

This section of the handbook summarises the content of the qualification and the skills and/or knowledge learners that achieve it can be expected to gain. It also outlines the units required to achieve the qualification and will give the learner an idea of how long the qualification will take to achieve through the Total Qualification Time (TQT) and how much contact time they can expect through the Guided Learning Hours (GLH). It also provides information about possible progression opportunities once the qualification has been achieved.

Assessment Requirements

The assessment requirements for the qualification will cover any specific information about how the qualification may be assessed, such as whether assessors require specific qualifications or occupational competence and whether simulation is permitted in the achievement process.

Assessment Methods

This section summarises the different assessment methods and types of evidence that support assessment; these may be used to demonstrate competence or the achievement of knowledge and understanding.

Qualification Units

The unit overview summarises the content of the unit and the skills and/or knowledge the learner will have gained on achievement of the unit. The units may also contain additional information in the assessment context which will describe the areas to be covered and any appropriate assessment guidance and evidence requirements which will outline additional assessment requirements and should be built into assessment plans and included on assessment records. The unit detail will also confirm whether simulation is permitted for that particular unit.

Qualification Assessment and Support Materials

Centres will be sent the following qualification assessment and support materials:

- Assessment Forms – it is not mandatory to use these forms. Centres may wish to use their own assessment documentation – these should be approved by the External Verifier prior to use.
- Learner Guide
- Qualification Handbook
- Registration Spreadsheet & Certification Claim Forms

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Qualification Summary

This qualification provides individuals with the knowledge and skills required by an operator to safely carry out mechanical engineering tasks within the sugar manufacturing process. The qualification covers: carrying out and managing general engineering and mechanical engineering tasks, working in a workshop, and working on gearboxes, maintaining and replacing pipework, working on belt conveyors, scrolls and elevators, drive belts, pulleys and couplings.

Total Qualification Time (TQT) and Guided Learning Hours (GLH)

Guided Learning Hours (GLH)

Guided Learning Hours are the time the learner is under the immediate supervision or guidance of a lecturer, supervisor, tutor or other appropriate provider or education or training.

The GLH for this qualification is 119

Total Qualification Time (TQT)

Total Qualification Time is comprised of 2 elements:

1. GLH
   plus
2. an estimate of the number of hours a learner will reasonably be likely to spend in preparation, study or any other form of participation in education or training, including assessment, which takes place as directed by (but not under the immediate supervision of) a lecturer, supervisor, tutor or other appropriate provider or education or training

The TQT for this qualification is 212

Achieving the Qualification

Learners must achieve two Mandatory Units.

Unit No.	Unit Name
BS 16k	Engineering knowledge skills for Technicians - Mechanical
BS 16c	Engineering Skills for Technicians - Mechanical

Progression

This qualification is part of a suite of bespoke qualifications designed to meet an important need for operatives to have the required knowledge and skills to work in various roles in the Sugar Manufacturing Industry. The suite contains a number of qualifications that cover various operator roles in the Sugar Industry such as Beet End Operations, Sugar End Operations, Animal Feed Operations, Bioethanol Operations, Chromatographic Separation Operations and Roving the Plant, along with other more generic requirements; learners may progress onto other qualifications within the suite.

Further qualification information can be found on the PAA\VQ-SET website www.paa-uk.org or on the Register of Regulated Qualifications website http://register.ofqual.gov.uk

ASSESSMENT REQUIREMENTS

Assessors must ensure that, when assessing the skills, knowledge and/or understanding, the evidence produced by learners is:

- Valid – does evidence meet the requirements described in the unit?
- Authentic – has the learner produced the evidence?
- Current – has the evidence been produced recently and does it demonstrate current competence?
- Sufficient – is there enough evidence to demonstrate competence?

to enable reliable and consistent judgements to be made about the achievement of all the requirements of the unit(s) and qualification.

PAA\VQ-SET Centres must ensure that people involved in the assessment process have the appropriate expertise and are adequately informed and supported to fulfil their responsibilities.

ASSESSMENT STRATEGY

Below is the information to support the assessment requirements of the qualification:

- Mandatory use of evidence from workplace performance
- Use of Simulation
- Occupational competence of assessors and verifiers

Mandatory use of evidence from workplace performance

a. Unless the use of simulation is expressly permitted within the qualification or unit specific evidence requirements, evidence must demonstrate the learner's competence in a real or realistic environment.

b. Knowledge and Understanding will be assessed via (pre-set and/or free form) questions, or by inference from performance, which cover three primary types of knowledge:

- Knowledge of facts and procedures
- Understanding of principles, concepts and underpinning procedures
- How to apply principles and procedures in specific contexts

All questions must be asked by the assessor at appropriate moments throughout the assessment process, preferably linked to observed activity and/or review of documentary evidence. The questions asked of, and answers provided by, the learner must be recorded.

Use of Simulation

c. The qualification or unit specific assessment requirements will define where evidence from simulation is acceptable, and in which contexts.

Simulation should be used only where direct evidence of learner performance cannot be obtained. Under these circumstances simulation may be used for summative assessment. Reasons for the use of simulation should be made clear to and agreed by the external verifier and should include the following details:

- which competence (and standards) the simulation was designed to assess;
- the kind of equipment, facilities and physical environment proposed for the simulation of performance. It is unlikely that the External Verifier will approve a simulation if it does not involve real plant and equipment;
- how the simulated activity relates to the learner's normal work context in terms of the pressures of time, access to resources and access to information, and the communication media; and

- how the simulation was set up and conducted, preferably supported by physical evidence such as photographs or inspection of a test rig.

  Assessors, internal verifiers and external verifiers should monitor the proportion of evidence generated via simulations to ensure that it is not the primary source of a learner's claim to competence.

d. Under these circumstances simulations are reserved for aspects of competence illustrated by the following contexts:

- where demonstration of emergency shutdown and related safety procedures would be; **dangerous and/or disruptive** to plant/environment/individuals; **too costly** such as total plant shutdown or dealing with spillage of dangerous substances; where **issues of confidentiality** restrict access to real work opportunities;
- demonstrating specific aspects of the operation which rarely or never occur due to effective quality assurance systems;
- the capacity to integrate disparate knowledge to cope with unforeseen events and to solve problems; or
- aspects of working relationships and communications for which no opportunity has presented for the use of naturally occurring workplace evidence of learner performance.

e. Simulation must enable the individual to demonstrate competence in a real or realistic work environment. In this context this means in specialist centres which replicate the workplace in terms of equipment and environment, reflect normal working situations and use relevant industrial or commercial standards and procedures. Short work placements or non-realistic work environments which do not replicate the pressures and requirements of normal commercial or industrial activities will not be acceptable. The bulk of the learner's evidence should be drawn from their normal working activity and not consist of artificially contrived opportunities for one-off demonstration of competence. Similarly equipment must be that used in current commercial and industrial contexts. Procedures and standards used should be those which are nationally or internationally recognised or devised by specific companies as standard operating procedure.

f. Simulation must enable the individual to acquire his/her skills and knowledge in a realistic work environment. In this context this means in specialist centres which replicate the workplace in terms of equipment and environment, it reflects normal working situations and uses relevant industrial or commercial standards and procedures. Where possible providers should attempt to replicate the pressures and requirements of normal commercial or industrial activities. Equipment must be that used in current commercial and industrial contexts. Procedures and standards used should be those which are nationally or internationally recognised or devised by specific companies as standard operating procedure.

g. Circumstances outside of those listed in Section D above may also be considered suitable for the use of simulation with the agreement of the External Verifier and PAA\VQ-SET. Under these circumstances simulation may be used for formative assessment only.

Occupational competence of Assessor and Verifiers

h. Assessors:

- must be competent in the units they are assessing. This is shown through the assessor having achieved the award they are assessing OR providing quality evidence to the external verifier that they are able to make valid judgements of the competence of learners. This could be done through a combination of a) personal interview, b) review of employment histories and/or c) examination of the assessor's judgement during assessments.
- must have a working knowledge of awards and a full understanding of that part of the award for which they have responsibility.
- should hold or be working towards suitable qualifications for assessment, as defined by PAA\VQ-SET.

i. Internal verifiers:

- must be either working in the appropriate sector itself OR they must be able to demonstrate they possess practical and up-to-date knowledge of current working practices appropriate to the sector in which they are carrying out verification practices; and
- must be appointed by a PAA\VQ-SET recognised centre
- must have a working knowledge of the awards they are internally verifying
- should hold or be working towards suitable qualifications for verification, as defined by PAA\VQ-SET.

ASSESSMENT METHODS AND TYPES OF EVIDENCE

The following section gives information on the different assessment methods/types of evidence that support assessment. The following assessment methods/types of evidence may be used to demonstrate competence or that the learner has achieved the required level of knowledge and understanding.

Observation of Performance

Observation allows the assessor to see learners carrying out their work activities. It will take place primarily in the workplace but can also be undertaken in a training scheme. Natural discussion should take place where possible during observation, allowing the assessor to ask questions relating to what they are observing at the time. Assessors must capture their observations either by a written report and/or other methods (e.g. video, audio recording).

Questioning

This method of assessment can be used to ensure that the learner has knowledge and understanding to support their skills. Questions can be used to check knowledge - these questions can either be verbal during or at the end of an observation, or they can be set in a written format in formal or informal conditions. As some units may focus entirely on learners' knowledge, assessors may encourage a variety of evidence to meet the requirements of the unit – use of verbal and/or written questions, learner statements and professional discussion (see below). Verbal questioning or professional discussion should be captured, either by written notes or audio recording.

Products

Work product evidence may be generated as a result of work activities undertaken by learners, and could include reports, letters, or records of work carried out.

Witness Statement or Testimony

A Witness Statement or Testimony is confirmation by others that the learner carried out an activity or series of activities relevant to the requirements of the unit. It could be written by the learner and signed by the witness to confirm that it did take place, or the witness may write the statement. Alternatively, the assessor could speak to the witness and record the discussion. The statement can then be used as evidence within an assessment.

There may be occasions when an Expert Witness may be required to contribute to the assessment process. PAA\VQ-SET's definition of an Expert Witness is 'an experienced employee who works in partnership with the assessor, by observing the learner carrying out their duties and recording their observations in line with the assessment procedures'. It should be noted that while the Expert Witness makes a valued contribution to the assessment process, it is the assessor who makes the assessment decision.

Simulation

Simulations are a source of performance evidence showing how an activity is carried out. Simulations require careful planning to ensure that they reflect as near as possible "real life" conditions and the requirements of the qualification(s). As a result of this the costs to set up a simulation may be considerable. Simulations are likely to be used in the following situations:

- they occur infrequently (e.g. dealing with emergencies)
- they involve unusual working conditions (e.g. working in isolation, outside the workplace)
- the work is hazardous
- it is not cost effective

Any use of simulation should be discussed and agreed with the PAA\VQ-SET External Verifier and approved prior to implementation.

Recognition of Prior Learning (RPL)

This is the process whereby credit is given to experienced individuals for their previous achievements. It requires careful mapping of the individual's experience to the unit(s) to ensure that it meets the requirements. This exercise must be referred to the External Verifier to ensure that all the evidence presented is acceptable.

Professional Discussion

A Professional Discussion gives the learner the opportunity to tell their assessor what they are doing and why they are doing it in a particular way. The discussion should be supported by appropriate evidence – an observation report, work product or witness testimony. Professional Discussions should be planned to give the learner the chance to prepare, and should be recorded.

Learner Statements

A Learner Statement is an account of an activity that took place, described by the learner. A detailed statement could demonstrate skill, and also provides evidence of knowledge and understanding. Learner statements should be authenticated by an appropriate person.

Photographs and use of other media

Photographs and use of other media, e.g. video and audio, can provide detail of work activities carried out and questioning. Photographs are more effective when used with supporting statements. Video and audio evidence should be effectively referenced to allow specific activities or questioning to be found easily. It is important to note that if photographs and other media are to be used, the learner and assessor should ensure that permission is gained from all people who may be involved.

GLOSSARY

Term	Definition
Access Arrangements	Arrangements that are approved in advance of an examination or assessment to allow achievement to be demonstrated by learners with a disability, special learning needs (including where the learner's first language is not English, Welsh or Irish) or to avoid unlawful discrimination
Appeal	The process through which an awarding organisation may be challenged on the outcome of an enquiry about results or, where appropriate, other procedural decisions affecting a centre or an individual learner
Assessment	The process of making judgements about the extent to which a learner's work meets the requirements of a unit, or any additional assessment requirements of a qualification
Assessor	A person who assesses a learner's work
Award of Qualifications	A certificate (electronic or paper-based) issued to an individual that recognises their achievement
Award	A qualification with a TQT value between 10 and 129
Awarding Organisation	A body recognised by the qualifications regulators to award qualifications
Centre	An organisation accountable to an awarding organisation for assessment arrangements leading to the award of qualifications
Centre Recognition	A process through which a centre wishing to offer an award or awards is confirmed as being able to maintain the required quality and consistency of assessment, and comply with other requirements of the awarding organisation
Certificate (1) for a Unit or Qualification	A record of attainment of a qualification issued by an awarding organisation
Certificate (2)	A qualification with a TQT value between 130 and 369
Credit	An award that may be made to a learner in recognition of the achievement of a unit or qualification
Credit Value	The number of credits that may be awarded to a learner for the successful achievement of a unit or qualification
Diploma	A qualification with a TQT value of 370 or above
Guided Learning Hours	The number of hours of teacher-supervised or directed study time required to teach a qualification or unit of a qualification
Learning Time	The amount of time a learner at the level of the unit is expected to take, on average, to complete the unit to the standard required
Level	An indication of the relative demand, complexity and/or depth of achievement, and/or the autonomy of the learner in demonstrating that achievement

Term	Definition
Mandatory Units	Units that must be achieved for the qualification to be awarded
National Occupational Standards (NOS)	Describe what a person needs to do, know and understand in a job to carry out the role in a consistent and competent way
Optional Unit	A unit that a learner may choose to complete to achieve the required number of units for award of the qualification
Pathway	A route to the achievement of a qualification that requires particular units to be achieved and is identified by an endorsement to a qualification title
Qualification	An award made to a Learner for the achievement of the required units or other components for that qualification
Qualification Level	An indication of the relative demand, complexity and/or depth of achievement, and/or the autonomy of the learner, represented by a qualification
Qualifications Regulators	Government-designated statutory organisations required to establish national standards for qualifications and secure consistent compliance with them
Recognition of Prior Learning (RPL)	A method of assessment that considers whether a learner can demonstrate that they can meet the assessment requirements for a unit through knowledge, understanding or skills they already possess and do not need to develop through a course of learning
Sector Skills Council	A body responsible for formulating and reviewing occupational standards for a specific sector across the UK, and for supporting the development of units and qualifications based on these standards. Each SSC is an employer-led, independent organisation and is licensed by government
Standardisation Of Assessment	A process to ensure that assessment leading to the award of qualifications is applied consistently by individuals, centres and awarding organisations
Unique Learner Number (ULN)	The unique number that is used to identify an individual learner
Unit	A component of a qualification

LEVEL 3 CERTIFICATE IN ENGINEERING SKILLS FOR TECHNICIANS – MECHANICAL

CONTENT OF THE QUALIFICATION

MANDATORY UNITS

UNIT BS 16K	**ENGINEERING KNOWLEDGE SKILLS FOR TECHNICIANS - MECHANICAL**
LEVEL	3
GUIDED LEARNING HOURS	93

Unit Overview

This unit addresses the knowledge required by an operator to safely carry out mechanical engineering tasks within the sugar manufacturing process.

Assessment Guidance and Evidence Requirements

The learner should provide evidence to meet all the required knowledge and understanding within this unit. This could be provided through different types of evidence and assessment methods, for example learner statements, questioning and professional discussion which should be recorded for verification – evidence may also include the completion of knowledge workbooks. The Learner should also achieve a British Sugar competency rating of Level 3 for all assessment criteria.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Know how to safely carry out engineering tasks	1.1. Describe the double block and bleed procedure 1.2. Describe the Permit To Work (PTW) procedures 1.3. Explain the Food Safety Procedures 1.4. Describe the engineering and organisational standards that apply when carrying out engineering tasks 1.5. Explain the requirement for a Product Intervention Permit 1.6. Explain how to ensure that plant is mechanically and electrically isolated and therefore safe to work on 1.7. Describe the organisation's procedures for lifting and rigging 1.8. Describe own sites housekeeping standards that must apply when carrying out engineering work 1.9. Explain the term 'fit for purpose' 1.10. Describe the process to be put in place to ensure the safe working on plant with explosion suppression 1.11. Describe the various energy sources that will be encountered 1.12. Explain how to correctly dispose of consumables to own site standards 1.13. Describe the risk assessment process 1.14. Explain how scaffolding is to be checked as fit for purpose 1.15. Explain the procedures for working in a zoned area 1.16. Explain the safe use of solvents used for cleaning and gluing at own site
2. Know how to manage engineering tasks	2.1. Explain the importance of recording all work on the Computerised Maintenance Management System (CMMS) 2.2. Explain compliance and legal regulations with respect to engineering work as detailed in the Business Management System (BMS) 2.3. Explain the organisation's procedure for ordering parts 2.4. Explain Condition Monitoring Techniques at own site 2.5. Explain the process to work in an environment where conditions change
3. Know how to work in a workshop	3.1. Describe the housekeeping requirements for own site workshops 3.2. Describe the health and safety standards at own site for working in the workshops 3.3. Describe the consequence of selecting the wrong hand or power tool

4. Know how to carry out general mechanical engineering tasks	4.1. Describe the different types of condition based diagnostic tools that are used to fault find mechanical defects 4.2. Give an overview of the organisation's Mechanical Code of Practice (MCOP) 4.3. Describe the different fault finding methodologies 4.4. Explain where and when to use different fault finding methodologies 4.5. Describe the different types of materials used in mechanical devices, and why they are used for specific components 4.6. Describe the different types of nuts and bolts used in the organisation, and where they should be used 4.7. Describe the different types of bearings and where they are used within the organisation 4.8. Explain the function of a gland and how it can be re-packed with correct packing for application 4.9. Describe the different types of couplings and where they are used by the organisation 4.10. Describe the various techniques to remove difficult parts 4.11. List the different types of oils and grease used within the organisation, and where they are used and the consequence of incorrect selection 4.12. Explain the principles of Vibration Analysis (VA) 4.13. Describe the different methods of aligning plant and how the laser alignment tool works 4.14. Explain why oil samples are required to be tested and how to interpret the results 4.15. Explain the types of measuring tools that could be used
5. Know how to work on centrifugal and positive displacement pumps	5.1. Explain the potential dangers when removing a pump 5.2. Describe the range of different pumps used at own site and the different situations for which they are used 5.3. Explain the working of a centrifugal pump and its associated pump curve 5.4. Explain the working of a positive displacement pump and its associated pump curve 5.5. Explain the different types of mechanical seal and how they work 5.6. Explain asset care of a mechanical seal
6. Know how to work on gearboxes	6.1. Explain the workings of different types of gearboxes and how to identify them 6.2. Describe the different types of couplings and how they are connected to the shaft at own site 6.3. Explain the key elements for the set-up of a gearbox in hot and cold working environments

7. Know how to maintain and replace pipework	7.1. Describe the organisation's standard for breaking into pipework 7.2. Describe how to isolate and support pipework 7.3. Explain why care must be taken to remove pipework 7.4. Explain how to remove static energy from pipework 7.5. Describe the organisation's standard for small bore pipe 7.6. Explain why care must be taken when removing pipework 7.7. Explain different materials for pipework used at own site and why selection of materials is important 7.8. Explain why thickness testing is required 7.9. Explain the importance of lagging and labelling
8. Know How To Work On Belt Conveyors, Scrolls And Elevators	8.1. Describe the different types of Belt Conveyors, their component parts and how they work at own site 8.2. Explain the different maintenance requirements for each type of belt conveyor 8.3. Describe a scrolls component parts and how they work at own site 8.4. Explain the different maintenance requirements for scrolls 8.5. Describe how to identify faulty bearings and rollers 8.6. Explain why details of defective belts and skirts must be entered into the Computerised Maintenance Management System (CMMS) 8.7. Explain how to tension and align a conveyor belt 8.8. Explain how to align a scroll 8.9. Explain explosion protection methodology at own site 8.10. Explain how to align a belt
9. Know how to work on drive belts and drives, pulleys and couplings	9.1. Describe the different type of drive belts used at own site 9.2. Describe the different type of pulleys used at own site 9.3. Describe the different type of couplings used at own site 9.4. Describe the different type of taperlock used at own site 9.5. Explain how to align a drive and why correct alignment is essential

UNIT BS 16C	**ENGINEERING SKILLS FOR TECHNICIANS – MECHANICAL**
LEVEL	3
GUIDED LEARNING HOURS	26

Unit Overview

This unit addresses the skills required by an operator to safely carry out mechanical engineering tasks within the sugar manufacturing process.

Assessment Guidance and Evidence Requirements

Competence will be demonstrated by the learner achieving a British Sugar competency rating of Level 3 for all assessment criteria, and providing a range of supporting evidence which may include observation reports, learner statements, witness statements, product of work, etc.

- The use of simulation is not acceptable in the assessment of this unit.
- Workplace performance evidence is mandatory.

Learning Outcome and Assessment Criteria

Learning outcomes The learner will:	Assessment criteria The learner can:
1. Safely carry out engineering tasks	1.1. Complete an appropriate risk assessment before undertaking any work 1.2. Ensure appropriate stakeholders are informed of the work being carried out 1.3. Make safe the area in which work will be carried out in line with organisational standards 1.4. Wear appropriate Personal Protective Equipment (PPE) 1.5. Isolate plant to be worked on 1.6. Ensure any rigging and scaffolding has been installed correctly and is fit for the work to be undertaken 1.7. Use Mobile Elevator Working Platform (MEWP) in line with organisation working procedures 1.8. Carry out work in conjunction with appropriate Safe System Of Work (SSOW) 1.9. Where appropriate use simple lifting techniques as specified in organisational standards 1.10. Maintain own site housekeeping standards at all times 1.11. Undertake all work in line with the organisation's product quality, environmental, health and safety guidelines and engineering standards 1.12. Request support from other engineering disciplines if work requires additional and/or more complex engineering support 1.13. Ensure plant is safe and correctly tested to be fit for purpose 1.14. Manage energy sources to prevent harm to persons or plant
2. Manage engineering tasks	2.1. Locate relevant job and activities on the Computerised Maintenance Management System (CMMS) 2.2. Identify parts that need to be replaced and/or serviced and record in the Computerised Maintenance Management System (CMMS) 2.3. Obtain appropriate parts from stores 2.4. Complete an order requisition for parts that are none stock or out of stock 2.5. Complete an order requisition for labour 2.6. Inform management and appropriate colleagues as to how long the repair of and/or replacement of plant will take 2.7. Ensure that work on, repair of and/or replacement of plant is done to maintain appropriate compliance and legal requirements

	2.8. Finish specific activity and close off in the Computerised Maintenance Management System (CMMS)
	2.9. Carry out appropriate Condition Monitoring Techniques
3. Work in a workshop	3.1. Ensure the workshop environment is clean and ready to carry out the necessary work
	3.2. Select appropriate hand and power tools to ensure no damage is done to components
	3.3. Work methodically, drawing a diagram of plant components and labelling each if appropriate, to assist re-assembly
	3.4. Maintain workshop housekeeping practices at all times
4. Carry out general mechanical engineering tasks	4.1. Use a range of hand and power tools in an appropriate manner
	4.2. Use appropriate condition based diagnostic testing equipment to identify plant or plant components that may need replacing or maintaining
	4.3. Decide if plant can be worked on in-situ or could be removed to a more suitable place
	4.4. Disconnect plant for in-situ work and/or removal from site
	4.5. Use appropriate equipment to help release unyielding parts
	4.6. Inspect disassembled plant and replace consumable parts
	4.7. Re-pack glands on appropriate plant and ensure that flushing is in place and operational
	4.8. Inspect and replace couplings if damaged
	4.9. Use appropriate connection and sealing devices for re-assembling and re-installing plant
	4.10. Use correct lubrication to the appropriate level
	4.11. Install plant following appropriate installation guidelines and procedures using alignment tools and techniques where appropriate
	4.12. Carry out Vibration Analysis (VA), ensuring a consistent use of points on each piece of plant
	4.13. Change lubrication as necessary and take samples for testing using information from oil reports
	4.14. Return plant to service
5. Work on centrifugal and positive displacement pumps	5.1. Ensure pump is fully mechanically isolated
	5.2. Disconnect pump from associated driving plant
	5.3. Remove pump using procedure for cracking pipework and checking for stored pressure and liquid
	5.4. Overhaul a range of centrifugal and positive displacement of pumps into their component parts

	5.5. Make a diagrammatic drawing of the stripped pump to ensure reassembly is correct
	5.6. Measure and check all parts of the stripped pump to identify any failures such as fretting
	5.7. Record if pump needs additional work to make fit for purpose or needs to be discarded and leave parts safely in box
	5.8. Clean and lubricate all parts appropriately if pump can be re-assembled
	5.9. Inspect and replace worn parts and reassemble, ensuring mechanical seals are correctly in place
	5.10. Re-install pump, ensuring correct fittings are used
	5.11. Reconnect driving plant and return to service
	5.12. Decommission and rotate mechanical seals in none operational periods
6. Work On Gearboxes	6.1. Fully isolate and remove couplings
	6.2. Strip the gearbox down to its constituents parts
	6.3. Inspect gearbox teeth, shaft and bearings and replace worn and damaged parts as appropriate
	6.4. Re-assemble gearbox, ensuring end float and oil wedge are set correctly and correct and lubricate
	6.5. Re-install and return to service
7. Maintain and replace pipework	7.1. Isolate and correctly support pipework that needs to be removed
	7.2. Remove pipework safely and maintain as appropriate
	7.3. Remove pipework and flush clean if appropriate
	7.4. Replace cleaned or new pipework, ensuring gaskets are properly cleaned and the correct seals and retaining nuts and bolts are used
	7.5. Thickness test pipework to own sites standard, take appropriate action if necessary and record in Computerised Maintenance Management System (CMMS)
	7.6. Ensure any new or maintained pipework has been appropriately lagged and labelled and return to service
8. Work on belt conveyors and scrolls and elevators	8.1. Inspect and replace faulty rollers, bearings, skirts and scrapers
	8.2. Identify any belt and skirt that is frayed and may needs replacing and enter details on Computerised Maintenance Management System (CMMS)
	8.3. Tension belts after replacing belt / and/or bearings using appropriate equipment
	8.4. Align pulleys and set tracking
	8.5. Check condition of links on elevators and replace if worn
	8.6. Align internal scroll bearings

	8.7. Ensure all relevant parts are lubricated as required, as appropriate 8.8. Inspect and record condition of belt joint and record in Computerised Maintenance Management System (CMMS) 8.9. Test and replace faulty instrument protection devices 8.10. Return to service
9. Work on drive belts and drives, pulleys and couplings	9.1. Remove guards as appropriate to access drive belts 9.2. Inspect belts and replace worn drive belts 9.3. Inspect pulleys and replace worn pulleys 9.4. Adjust drive belt alignment and ensure correct tension 9.5. Inspect and replace worn couplings and taperlock 9.6. Return to service