Level 3 Diploma in Aviation Maintenance (Military Development Competence) - Aircraft Mechanical Component Overhaul (4608-60)

Version 1.1 (June 2020)

Unit Pack

Qualification at a glance

Subject area	Mechanical
City & Guilds number	4608
Age group approved	16-19, 19+
Entry requirements	None
Assessment types	Portfolio
Approvals	Automatic approval
Registration and certification	Consult the Walled Garden/Online Catalogue for last dates

Title and level	GLH	TQT	City & Guilds qualification number	Ofqual accreditation number
Level 3 Diploma Aviation Maintenance (Military Development Competence) - Aircraft Mechanical Component Overhaul	817	2710	4608-60	603/2068/0

This unit pack must be read in conjunction with the main qualification handbook.

Version and date	Change detail	Section
1.1 June 2020	Unit 412 Aim updated.	Units

Contents

1 Introduction

Level 3 Diploma in Aviation Maintenance (Military Development Competence) - Aircraft Mechanical Component Overhaul

Structure

Learners must complete (301, 302, 304, 455) plus one from (407 - 412)

City & Guilds unit number	Unit title	GLH
Mandatory		
301	Complying with statutory regulations and organisational safety requirements	35
302	Using and interpreting engineering data and documentation	25
304	Reinstating the work area on completion of activities	25
455	Working efficiently and effectively in engineering	25
Optional		
407	Overhauling Components of Aircraft Rotor Heads and Power Transmission Equipment	371
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2 Units

Structure of the units

These units each have the following:

- City & Guilds reference number
- Title
- Guided learning hours (GLH)
- Learning outcomes, which are comprised of a number of assessment criteria

Centres must deliver the full breadth of the range. Specialist equipment or commodities may not be available to all centres, so centres should ensure that their delivery covers their use. This may be covered by a practical demonstration (e.g. video). For the practical assessments for this qualification, centres should ensure that there are sufficient resources to complete the task but are not required to use all the equipment or commodities in the range.

Please refer to the main qualification handbook for full information on the qualification and the shared mandatory units.

Unit 407 Overhauling components of aircraft rotor heads and power transmission equipment

GLH:	371
Unit aim:	This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief. This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to carry out overhauling activities on aircraft rotor heads, blades and power transmission equipment and components, in accordance with approved procedures. The equipment to be overhauled will have been removed from the aircraft and the overhauling activities may take place in a workshop or hangar. It covers a range of aircraft power transmission equipment, such as drive shafts and drive shaft supports, main, nose, tail and intermediate gearbox assemblies, main and tail rotor head assemblies, accelerometers, vibration monitoring equipment and other aircraft specific equipment. The overhauling activities will include carrying out all necessary safety checks, dismantling the equipment to unit or component level, inspecting and checking all components for damage and wear, replacing all `lifed' items and worn/faulty components or units, reassembling the equipment and carrying out all necessary tests/checks. Their responsibilities will require them to comply with organisational policy and procedures for the overhauling activities undertaken, and to report any problems with the overhaul activities, or with the tools and equipment used that they cannot personally resolve or that is outside their permitted authority, to the relevant people. They must ensure that all tools, equipment and materials used in the overhauling activities are removed from the work area, and that all necessary job/task documentation is completed accurately and legibly. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying appropriate overhauling procedures to aircraft power transmission equipment. They will understand the dismantling and reassembly methods and procedures used and their application. They will know how the equipment functions, the common faults encountered, the purpose of the individual components and associated defects, in adequate depth to provide a sound basis for carrying out the overhauling activities, correcting faults and ensuring that the overhauled equipment meets the required specification. They will understand the safety precautions required when carrying out the overhauling activities, especially those for handling large and heavy assemblies. They will be required to demonstrate safe working practices throughout and will understand their responsibility for taking the necessary safeguards to protect themselves and others in the workplace. They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

Performance Requirements

Assessment criteria

The learner can:

P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.

P2 demonstrate the required behaviours in line with the job role and organisational objectives.

P3 follow the relevant maintenance schedules to carry out the required work.

P4 carry out the maintenance activities within the limits of their personal authority.

P5 carry out the maintenance activities in the specified sequence and in an agreed time scale.

P6 report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule.

P7 complete the relevant maintenance records accurately and pass them on to the appropriate person.

P8 dispose of waste materials in accordance with safe working practices and approved procedures.

Learning outcome

The learner will:

1 carry out **all** of the following during the overhauling activities:

1.1 obtain and use the appropriate documentation (such as job instructions, aircraft manuals and overhauling documentation, technical instructions, and other relevant maintenance documentation)

1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work

1.3 provide and maintain safe access and working arrangements for the overhauling area

1.4 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date

1.5 ensure that the rotor heads or power transmission assembly is suitably supported and that appropriate lifting and handling equipment is available

1.6 carry out the overhauling activities, using approved techniques and procedures at all times

1.7 ensure that components and surrounding structures are maintained free from damage and foreign objects

1.8 return all tools and equipment to the correct location on completion of the activities

1.9 leave the work area and rotor/power transmission assembly in a safe and appropriate condition, free from foreign object debris on completion of the activities.

Learning outcome

The learner will:

2 carry out overhauling activities to unit/component level on **three** of the following types of aircraft power transmission equipment:

2.1 intermediate gear box
2.2 main gear box
2.3 tail gear box
2.4 nose/forward gear box
2.5 main rotor head assembly
2.6 tail rotor assembly.

Learning outcome

The learner will:

3 carry out **all** of the following activities, as applicable to the equipment being overhauled:

3.1 cleaning parts prior to dismantling
3.2 checking components for serviceability (such as visual, measurement, NDT, use of probes/scopes)
3.3 pre-disassembly checks and tests
3.4 releasing stored pressure (where applicable)
3.5 fitting blanks to openings to prevent entry of contaminating debris
3.6 replacing all damaged or defective components
3.7 draining/removing any remaining fluids
3.8 reassembling equipment
3.9 dismantling equipment to unit/sub-assembly level
3.10 making mechanical connections
3.11 dismantling units to component level
3.12 setting and adjusting replaced components
3.13 proof-marking/labelling of components
3.14 securing components using mechanical fasteners and threaded devices
3.15 tightening fastenings to the required torque
3.16 replacing all `lifed' items (such as seals, filters, gaskets, bearings, bushes)
3.17 applying locking and retaining devices (such as circlips, pins, wire locking, lock nuts, stiff nuts, swage nuts.

Learning outcome

The learner will:

4 replace a range of aircraft power transmission components, to include **eight** of the following:

4.1 drive shaft
4.2 locks and stops
4.3 tail rotor head
4.4 drive shaft support
4.5 static seals/gaskets
4.6 accelerometers
4.7 bearings (such as ball, roller, tapered)
4.8 dynamic seals
4.9 flexi couplings
4.10 bearing bushes (such as bronze, sintered metal)
4.11 control valves
4.12 rotor brakes
4.13 gears
4.14 sensors
4.15 swash plate
4.16 gear shafts
4.17 main rotor head
4.18 control units
4.19 couplings
4.20 filter units
4.21 levers and linkages
4.22 selector mechanisms
4.23 mechanical controls (plungers, springs, rollers)
4.24 torque converters
4.25 electrical controls (solenoids, motors, switches)
4.26 pumps
4.27 other specific components.

Learning outcome

The learner will:

5 carry out checks and tests on the overhauled equipment, to include **three** of the following:

5.1 visual inspection for completeness and freedom from damage or foreign objects
5.2 main rotor rigging
5.3 tail rotor rigging
5.4 gear box alignment (main, tail, intermediate)

5.5 static or dynamic balancing
5.6 drive shaft/high speed shaft alignment
5.7 freedom and range of movement
5.8 ‘special-to-type' test rig checks
5.9 leak test
5.10 tension adjuster check
5.11 vibration analysis
5.12 safety interlock test.

Learning outcome

The learner will:

6 overhaul aircraft hydraulic equipment in compliance with **one** of the following:

6.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
6.2 Military Aviation Authority (MAA)
6.3 Aerospace Quality Management Standards (AS)
6.4 Federal Aviation Authority (FAA)
6.5 BS, ISO or BSEN standards and procedures
6.6 customer standards and requirements
6.7 organisation standards and procedures
6.8 aircraft manufacturer's requirements.

Learning outcome

The learner will:

7 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:

1.1 job cards
1.2 computer records
1.3 aircraft service/flight log
1.4 aircraft log book
1.5 permit to work/formal risk assessment.

Learning outcome

Knowledge and understanding

Assessment criteria

The apprentice must know and understand:

K1 the specific safety practices and procedures that they need to observe when overhauling aircraft power transmission equipment (including any specific legislation, regulations/codes of practice for the activities, equipment or materials).

K2 the health and safety requirements of the area in which the overhauling activity is to take place and the responsibility these requirements place on them.

K3 hazards associated with carrying out overhauling activities on aircraft power transmission equipment (such as using lifting and handling equipment, handling oils and fluids, lifting and moving large and heavy assemblies, misuse of tools, using damaged or badly maintained tools and equipment, not following laid-down overhauling procedures) and how to minimise them and reduce any risks

K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.

K5 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.

K6 the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the overhaul.

K7 how to extract and use information from aircraft manuals, history/maintenance reports, aircraft logs, charts, circuit and physical layouts, specifications, symbols used in aircraft power transmission systems, and other documents needed in the overhauling process.

K8 how to carry out currency/issue checks on the specifications they are working with.

K9 the procedure for obtaining replacement parts, materials and other consumables necessary for the overhaul.

K10 terminology used in aircraft power transmission systems.

K11 the various types of component that make up the aircraft power transmission equipment (such as drive shafts, bearing housings, bearings, flexible couplings, pumps, control valves, pressure intensifiers, mechanical and electrical control devices).

K12 the basic principles of operation of the power transmission equipment being worked on and the performance characteristics and function of the various sub-assemblies.

K13 the sequence to be adopted for the dismantling/reassembling of the various types of power transmission assemblies.

K14 the techniques used for dismantling the equipment to unit or component level, without damage to the components (such as release of pressures/force, draining of fluids, proof marking/labelling removed components, extraction of components and the need to protect the circuit integrity by fitting covers/protection).

K15 the various mechanical fasteners to be removed and replaced, and their method of removal and replacement (such as threaded fasteners, circlips, special locking and securing devices).

K16 methods of lifting, handling and supporting the components/equipment during the removal and replacement activities.

K17 recognition of contaminants and the problems they can create, the effects and likely symptoms of contamination in the power transmission system.

K18 methods of checking that components are fit for purpose and how to identify defects and wear characteristics.

K19 the uses of inspection/measuring equipment (such as gauges, micrometers, Verniers, dial test indicators, expansion indicators, mirrors, endoprobes, boroscopes, video probes, scales and other measuring devices).

K20 how to identify defects and wear characteristics and the need to replace ‘lifed' items (such as filters, seals, bearings and gaskets).

K21 how to check that replacement components have the correct part/identification markings.

K22 how to reassemble the components (such as the use of gaskets and seals, jointing/sealing compounds; ensuring correct tightness of fittings and connections; eliminating stress on pipework/connections; carrying out visual checks of all components; checking the security of joints and that the system is safe to test).

K23 the identification and application, fitting and removal of different types of bearing (such as roller, ball, thrust).

K24 why securing devices need to be tightened to the correct torque, locked and labelled and the different methods that are used.

K25 the tools and equipment used in the overhauling activities and their calibration/care and control procedures.

K26 how to make adjustments to components/assemblies to ensure that they function correctly (such as setting working clearance, setting travel, alignment).

K27 the recording documentation to be completed for the activities undertaken and where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation.

K28 the need to control and account for all tools and equipment used during the overhauling activity.

K29 the procedure for the safe disposal of waste materials, scrap components and fluids.

K30 the problems that can occur during the overhauling activity and how they can be overcome.

K31 the extent of their own authority and to whom they should report if they have a problem that they cannot resolve.

Unit 407 Overhauling components of aircraft rotor heads and power transmission equipment

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

Unit 408 Overhauling components of aircraft hydraulic equipment

GLH:	371
Unit aim:	Overview This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief. This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to overhauling activities on aircraft hydraulic equipment and components, in accordance with approved procedures. The equipment to be overhauled will have been removed from the aircraft and the overhauling activities may take place in a workshop or hangar. It covers both fixed wing and rotary winged aircraft, and covers a range of hydraulic equipment such as landing gear, nose wheel steering, wheel braking systems, flying controls, rotor brakes, arrestor mechanisms, and other aircraft specific equipment. The overhauling activities will include carrying out all necessary safety checks, dismantling the equipment to unit or component level, inspecting and checking all components for damage and wear, replacing all 'lifed' items and worn/faulty components or units, reassembling the equipment and carrying out all necessary tests/checks. Their responsibilities will require them to comply with organisational policy and procedures for the overhauling activities undertaken, and to report any problems with the overhaul activities, or with the tools and equipment used that they cannot personally resolve or that is outside their permitted authority, to the relevant people. They must ensure that all tools, equipment, and materials used in the overhauling activities are removed from the work area, and that all necessary job/task documentation is completed accurately and legibly. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. The apprentice's knowledge will provide a good understanding of their work and will provide an informed approach to applying appropriate overhauling procedures to aircraft hydraulic equipment. They will understand the dismantling and reassembly methods and procedures used, and their application. They will know how the equipment functions, the common faults encountered, the purpose of the individual components and associated defects, in adequate depth to provide a sound basis for carrying out the overhauling activities, correcting faults and ensuring that the overhauled equipment meets the required specification. They will understand the safety precautions required when carrying out the overhauling activities, especially those for handling hydraulic fluids. They will be required to demonstrate safe working practices throughout and will understand their responsibility for taking the necessary safeguards to protect themselves and others in the workplace. They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

Performance Requirements

Assessment criteria

The learner can:

P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.

P2 demonstrate the required behaviours in line with the job role and organisational objectives.

P3 follow the relevant maintenance schedules to carry out the required work.

P4 carry out the maintenance activities within the limits of their personal authority.

P5 carry out the maintenance activities in the specified sequence and in an agreed timescale.

P6 report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule.

P7 complete the relevant maintenance records accurately and pass them on to the appropriate person.

P8 dispose of waste materials in accordance with safe working practices and approved procedures.

Learning outcome

The learner will:

1 Carry out **all** of the following during the overhauling activities:

1.1. obtain and use the appropriate documentation (such as job instructions, aircraft manuals and overhauling documentation, technical instructions, and other relevant maintenance documentation)

1.2. adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work

1.3. provide and maintain safe access and working arrangements for the overhauling area

1.4. obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date

1.5. ensure that the hydraulic equipment is suitably supported and that appropriate lifting and handling equipment is available

1.6. ensure the safe depressurisation of the hydraulic equipment (where appropriate)

1.7. carry out the overhauling activities, using approved techniques and procedures at all times

1.8. ensure that components and equipment are maintained free from damage and foreign objects

1.9. return all tools and equipment to the correct location on completion of the activities

1.10. leave the work area and the hydraulic equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities

Learning outcome

The learner will:

2 carry out the overhauling activities to unit level on **three** of the following types of aircraft hydraulic equipment:

2.1 main undercarriage
2.2 flying controls
2.3 doors (such as cabin, cargo, hold)
2.4 nose undercarriage
2.5 rotor brakes
2.6 weapon bay doors
2.7 tail undercarriage
2.8 blade fold
2.9 emergency systems
2.10 nose wheel steering
2.11 main rotor control
2.12 utility systems
2.13 main gear steering
2.14 tail rotor control
2.15 ram air turbine (RAT)
2.16 wheel braking system
2.17 spoilers
2.18 damping mechanisms
2.19 outriggers
2.20 other specific hydraulic systems (such as hoists)

Learning outcome

The learner will:

3 carry out **all** of the following activities, as applicable to the equipment being overhauled:

3.1 cleaning parts prior to dismantling
3.2 checking components for serviceability (such as visual, measurement, NDT, use of probes/scopes)
3.3 pre-disassembly checks and tests
3.4 releasing stored pressure (where applicable)
3.5 dismantling units to component level
3.6 dismantling equipment to unit/sub-assembly level
3.7 replacing all damaged or defective components
3.8 draining/removing any remaining fluids
3.9 fitting blanks to openings to prevent entry of contaminating debris
3.10 reassembling equipment
3.11 making mechanical connections

3.12 setting and adjusting replaced components
3.13 proof-marking/labelling of components
3.14 tightening fastenings to the required torque
3.15 replacing all 'lifed' items (such as piston seals, dust caps, filters, gaskets)
3.16 securing components using mechanical fasteners and threaded devices
3.17 applying locking and retaining devices (such as circlips, pins, wire locking, lock nuts, stiff nuts, swage nuts).

Learning outcome

The learner will:

4 carry out overhauling activities to component level on **two** of the following hydraulic components:

4.1 pumps
4.2 pressure intensifiers
4.3 brake units
4.4 hydraulic motors
4.5 accumulators
4.6 actuators/rams
4.7 oil coolers
4.8 cylinders
4.9 control valves
4.10 reservoirs/tanks
4.11 undercarriage legs
4.12 powered flying control units
4.13 dampers
4.14 other specific components.

Learning outcome

The learner will:

5 replace a range of hydraulic components, to include **eight** of the following:

5.1 pipework and hoses
5.2 actuating mechanisms
5.3 spring mechanisms
5.4 pistons
5.5 plungers
5.6 gauges
5.7 spools
5.8 bearings
5.9 gaskets
5.10 valves and seats

5.11 rollers
5.12 sensors
5.13 diaphragms
5.14 regulators
5.15 static and dynamic seals
5.16 filters
5.17 housings
5.18 hydraulic fuses
5.19 other specific components.

Learning outcome

The learner will:

6 carry out checks and tests on the overhauled equipment, to include **three** of the following:

6.1 visual inspection for completeness and freedom
6.2 range of movement/extension from damage or foreign objects
6.3 standard serviceability test
6.4 leak test
6.5 ‘special-to-type' tests
6.6 pressure test
6.7 timing checks.

Learning outcome

The learner will:

7 overhaul aircraft hydraulic equipment in compliance with **one** of the following:

7.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
7.2 Military Aviation Authority (MAA)
7.3 Aerospace Quality Management Standards (AS)
7.4 Federal Aviation Authority (FAA)
7.5 BS, ISO or BSEN standards and procedures
7.6 customer standards and requirements
7.7 organisation standards and procedures
7.8 aircraft manufacturer's requirements.

Learning outcome

The learner will:

8 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:

8.1 job cards
8.2 computer records
8.3 aircraft service/flight log
8.4 aircraft log book
8.5 permit to work/formal risk assessment.

Learning outcome

Knowledge and understanding

Assessment criteria

The apprentice must know and understand:

K1 the safe working practices and procedures and the specific safety precautions to be taken when overhauling aircraft hydraulic equipment (to include wearing protective clothing and equipment; lifting and handling techniques; safe working practices and procedures with regard to working on aircraft hydraulic equipment and when using synthetic oils; procedures and guidelines which satisfy current regulations such as HASAWA, COSHH and other work related legislation and guidelines).

K2 hazards associated with carrying out overhauling activities on aircraft hydraulic equipment (such as using lifting and handling equipment, handling hydraulic oils, releasing stored pressure/fluids, misuse of tools, using damaged or badly maintained tools and equipment, not following laid-down overhauling procedures) and how to minimise them and reduce any risks.

K3 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.

K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.

K5 the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the overhaul.

K6 how to extract and use information from aircraft manuals, history/maintenance reports, aircraft logs, charts, circuit and physical layouts, specifications, symbols used in aircraft hydraulic systems, and other documents needed in the overhauling process.

K7 how to carry out currency/issue checks on the specifications they are working with.

K8 the procedure for obtaining replacement parts, materials and other consumables necessary for the overhaul.

K9 terminology used in aircraft hydraulic systems and the use of fluid power diagrams and associated symbols.

K10 the various types of components that make up the aircraft hydraulic equipment (such as pipes; flexible hoses; valves used for pressure, flow and directional control; double

and single action cylinders/actuators; pumps; pressure intensifiers, mechanical and electrical control devices).

K11 the basic principles of operation of the hydraulic equipment being worked on, and the performance characteristics and function of the valves, cylinders/actuators within the circuit.

K12 the sequence to be adopted for the dismantling/reassembling of various types of hydraulic assembly.

K13 the techniques used to dismantle the equipment to unit or component level, without damage to the components (such as release of pressures/force, draining of fluids, proof marking/labelling removed components, extraction of components and the need to protect the circuit integrity by fitting blanking plugs/covers).

K14 as single acting, double acting); pumps (such as positive and non-positive displacement); static and dynamic seals.

K15 the various mechanical fasteners to be removed and replaced, and their method of removal and replacement (such as threaded fasteners, special securing devices).

K16 methods of lifting, handling and supporting the components/equipment during the removal and replacement activities.

K17 recognition of contaminants and the problems they can create; the effects and likely symptoms of contamination in the hydraulic system.

K18 methods of checking that components are fit for purpose and the uses of inspection/measuring equipment (such as gauges, micrometers, Verniers, dial test indicators, mirrors, endoprobes, boroscopes, video probes, scales).

K19 how to identify defects and wear characteristics, and the need to replace ‘lifed' items (such as filters, seals and gaskets).

K20 how to check that replacement components have the correct part/identification markings.

K21 how to reassemble the components (such as the use of gaskets and seals, jointing/sealing compounds; ensuring correct tightness of fittings and connections; eliminating stress on pipework/connections; carrying out visual checks of all components; checking security of joints and that the system is safe to re-pressurise).

K22 why securing devices need to be tightened to the correct torque, locked and labelled and the different methods that are used.

K23 the tools and equipment used in the overhauling activities and their calibration/care and control procedures.

K24 how to make adjustments to components/assemblies to ensure that they function correctly (such as setting working clearance, setting travel).

K25 the recording documentation to be completed for the activities undertaken and, where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation.

K26 the need to control and account for all tools and equipment used during the overhauling activity.

K27 the procedure for the safe disposal of waste materials, scrap components and used hydraulic fluids.

K28 the problems that can occur during the overhauling activity and how they can be overcome.

K29 the extent of their own authority and to whom they should report if they have a problem that they cannot resolve.

Unit 408 Overhauling components of aircraft hydraulic equipment

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

Unit 409 Overhauling components of aircraft pneumatic, vacuum and environmental equipment

GLH:	371
Unit aim:	This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief. This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to carry out overhauling activities on aircraft pneumatic, vacuum or environmental system equipment and components, in accordance with approved procedures. The equipment to be overhauled will have been removed from the aircraft and the overhauling activities may take place in a workshop or hangar. It covers both fixed wing and rotary winged aircraft and covers a range of pneumatic, vacuum and environmental system equipment such as emergency blow-down systems; air stairs; sanitary and waste disposal systems; arrestor mechanisms and deck locks; air start systems; weapons systems; flying controls; air driven gyros; cabin pressurisation equipment; air conditioning and heating systems; anti-g; pressurisation of bulkheads, pressure domes, door, canopy and window seals; ice and rain protection; demisting equipment; avionic cooling, and other aircraft specific equipment. The overhauling activities will include carrying out all necessary safety activities, dismantling the equipment to unit or component level, inspecting and checking all components for damage and wear, replacing all `lifed' items and worn/faulty components or units, reassembling the equipment and carrying out all necessary tests/checks. Their responsibilities will require them to comply with organisational policy and procedures for the overhauling activities undertaken, and to report any problems with the overhauling activities, or with the tools and equipment used that they cannot personally resolve or that is outside their permitted authority, to the relevant people. They must ensure that all tools, equipment and materials used in the overhauling activities are removed from the work area, and that all necessary job/task documentation is completed accurately and legibly. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying appropriate overhauling procedures to aircraft pneumatic, vacuum and environmental equipment. They will understand the dismantling and reassembly methods and procedures used, and their application. They will know how the equipment functions, the common faults encountered, the purpose of the individual components and associated defects, in adequate depth to provide a sound basis for carrying out the overhauling activities, correcting faults and ensuring that the overhauled equipment meets the required specification. They will understand the safety precautions required when carrying out the overhauling activities. They will be required to demonstrate safe working practices throughout and will understand their responsibility for taking the necessary safeguards to protect themselves and others in the workplace. They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

The learner will:

Performance Requirements

Assessment criteria

The learner can:

P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.

P2 demonstrate the required behaviours in line with the job role and organisational objectives.

P3 follow the relevant overhauling schedules to carry out the required work.

P4 establish the components to be removed and where appropriate, mark components to aid re-assembly.

P5 ensure that any stored energy or substances are released safely and correctly.

P6 carry out the overhaul to the agreed level, using the correct tools and techniques.

P7 ensure that all removed components are correctly identified and stored in the correct location.

P8 report any instances where the overhauling activities cannot be fully met, or where there are identified defects outside the planned overhauling schedule.

P9 complete the relevant documentation, in accordance with organisational requirements.

P10 dispose of unwanted components, waste materials and substances, in accordance with safe working practices and approved procedures.

P11 deal promptly and effectively with problems within their control and report those that cannot be solved.

Learning outcome

The learner will:

1 carry out **all** of the following during the overhauling activities

1.1 obtain and use the appropriate documentation (such as job instructions, aircraft manuals and overhauling documentation, technical instructions and other relevant maintenance documentation)

1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work

1.3 provide and maintain safe access and working arrangements for the overhauling area

1.4 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date

1.5 ensure the safe depressurisation of the pneumatic or vacuum equipment (where appropriate)

1.6 carry out the overhauling activities, using approved techniques and procedures at all times

1.7 ensure that components and equipment are maintained free from damage and foreign objects

1.8 return all tools and equipment to the correct location on completion of the activities

1.9 leave the work area and pneumatic, vacuum or environmental equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities.

Learning outcome

The learner will:

2 carry out the overhauling activities to unit level on **three** of the following types of aircraft pneumatic, vacuum or environmental system equipment:

2.1 air driven gyros
2.2 air conditioning
2.3 nose wheel steering
2.4 spoilers
2.5 demisting equipment
2.6 damping mechanisms
2.7 flying controls
2.8 cabin heating and cooling
2.9 emergency blow-down systems
2.10 engine air start
2.11 avionic cooling
2.12 arrester mechanisms
2.13 air intake shutters
2.14 anti-g
2.15 sanitary systems
2.16 wheel braking
2.17 cabin pressurisation
2.18 gun cocking
2.19 air stairs
2.20 pressurised bulkheads
2.21 deck locks
2.22 ice protection
2.23 pressure domes
2.24 weapon bay doors
2.25 rain protection
2.26 waste disposal/utility systems
2.27 fire protection
2.28 galley equipment
2.29 other specific system.

Learning outcome

The learner will:

3 carry out **all** of the following activities, as applicable to the equipment being overhauled:

3.1 cleaning parts prior to dismantling
3.2 replacing all damaged or defective components
3.3 pre-disassembly checks and tests
3.4 reassembling equipment
3.5 releasing stored energy (where applicable)
3.6 fitting blanks to openings to prevent entry of contaminating debris
3.7 making mechanical connections
3.8 dismantling equipment to unit/sub-assembly level
3.9 setting and adjusting replaced components
3.10 dismantling units to component level
3.11 tightening fastenings to the required torque
3.12 proof-marking/labelling of components
3.13 checking components for serviceability (such as visual, measurement, NDT, use of probes/scopes)
3.14 replacing all 'lifed' items (such as piston seals, dust caps, filters, gaskets)
3.15 securing components using mechanical fasteners and threaded devices
3.16 applying locking and retaining devices (such as circlips, pins, wire locking, lock nuts, stiff nuts, swage nuts).

Learning outcome

The learner will:

4 carry out overhauling activities to component level on **three** of the following pneumatic, vacuum or environmental system components:

4.1 air pumps
4.2 pressure intensifiers
4.3 air reservoirs/tanks
4.4 vacuum pumps
4.5 accumulators
4.6 cold air units/air cycle machines
4.7 water pumps
4.8 compressors
4.9 air-conditioning packs
4.10 motors
4.11 control valves
4.12 cylinders/actuating mechanisms
4.13 air coolers
4.14 regulators

4.15 safety devices
4.16 water extractors
4.17 pressure controllers
4.18 heat exchangers
4.19 toilet flushing equipment
4.20 humidifier
4.21 galley equipment
4.22 other specific components.

Learning outcome

The learner will:

5 replace a range of pneumatic, vacuum or environmental equipment components, to include **eight** of the following:

5.1 pipes, ducting and hoses
5.2 housings
5.3 spring mechanisms
5.4 unions and couplings pistons
5.5 plungers
5.6 gauges
5.7 strainers including water separator
5.8 bearings
5.9 gaskets
5.10 non-return valves
5.11 rollers
5.12 sealing devices
5.13 actuating mechanisms
5.14 regulators
5.15 electrical controls (solenoids, motors, switches)
5.16 pressure reducing valves
5.17 air filters
5.18 diaphragms
5.19 sensors
5.20 door, window and canopy seals
5.21 other specific components.

Learning outcome

The learner will:

6 carry out checks and tests on the overhauled equipment, to include **three** of the following

6.1 leak test

6.2 range of movement
6.3 functional test
6.4 standard serviceability test
6.5 pressure test
6.6 ‘special-to-type' tests
6.7 range of movement/extension
6.8 timings/sequencing.

Learning outcome

The learner will:

7 overhaul aircraft pneumatic, vacuum or environmental equipment, in compliance with **one** of the following:

7.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
7.2 Military Aviation Authority (MAA)
7.3 Aerospace Quality Management Standards (AS)
7.4 Federal Aviation Authority (FAA)
7.5 BS, ISO or BSEN standards and procedures
7.6 customer standards and requirements
7.7 organisation standards and procedures
7.8 aircraft manufacturer's requirements.

Learning outcome

The learner will:

8 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:

8.1 job cards
8.2 computer records
8.3 aircraft service/flight log
8.4 aircraft log book
8.5 permit to work/formal risk assessment.

Learning outcome

Knowledge and understanding

Assessment criteria

The learner must know and understand:

K1 the safe working practices and procedures and the specific safety precautions to be taken when overhauling aircraft pneumatic, vacuum and environmental equipment (to include wearing protective clothing and equipment; lifting and handling techniques; safe working practices and procedures with regard to working on aircraft pneumatic, vacuum and environmental equipment; procedures and guidelines which satisfy current regulations such as HASAWA, COSHH and other work related legislation and guidelines)

K2 hazards associated with carrying out overhauling activities on aircraft pneumatic, vacuum and environmental equipment (such as releasing stored pressure, misuse of tools, using damaged or badly maintained tools and equipment, not following laid-down overhauling procedures), and how to minimise them and reduce any risks

K3 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to

K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to

K5 the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the overhaul

K6 how to extract and use information from aircraft manuals, history/maintenance reports, aircraft logs, charts, circuit and physical layouts, specifications, symbols used in aircraft pneumatic, vacuum and environmental systems and other documents needed in the overhauling process

K7 how to carry out currency/issue checks on the specifications they are working with

K8 the procedure for obtaining replacement parts, materials and other consumables necessary for the overhaul

K9 terminology used in aircraft pneumatic, vacuum and environmental systems, and the use of fluid power diagrams and associated symbols

K10 the various types of component that make up the aircraft pneumatic, vacuum and environmental equipment (such as pipes; flexible hoses; valves used for pressure, flow and directional control; double and single action cylinders/actuators; pumps; pressure intensifiers, mechanical and electrical control devices)

K11 the basic principles of operation of the pneumatic, vacuum and environmental equipment being worked on, and the performance characteristics and function of the valves, cylinders/actuators within the circuit

K12 the sequence to be adopted for the dismantling/reassembling of various types of pneumatic, vacuum and environmental assemblies

K13 the techniques used to dismantle the equipment to unit or component level without damage to the components (such as release of pressures/force, proof

marking/labelling removed components, extraction of components and the need to protect the circuit integrity by fitting blanking plugs/covers)

K14 the identification and application of different types of valve, sensor and actuator (such as rotary, linear, mechanical, electrical); cylinders (such as single acting, double acting); pumps (such as positive and non-positive displacement); static and dynamic seals

K15 the various mechanical fasteners to be removed and replaced, and their method of removal and replacement (such as threaded fasteners, special securing devices)

K16 methods of lifting, handling and supporting the components during the removal and replacement activities

K17 recognition of contaminants and the problems they can create; the effects and likely symptoms of contamination in the pneumatic, vacuum and environmental system

K18 methods of checking that components are fit for purpose, and the uses of inspection/measuring equipment (such as gauges, micrometers, verniers, dial test indicators, mirrors, endoprobes, boroscopes, video probes, scales)

K19 how to identify defects and wear characteristics, and the need to replace 'lifed' items (such as filters, seals and gaskets)

K20 how to check that replacement components have the correct part/identification markings

K21 how to reassemble the components (such as the use of gaskets and seals, jointing/sealing compounds; ensuring correct tightness of fittings and connections; eliminating stress on pipework/connections; carrying out visual checks of all components; checking security of joints and that the system is safe to re-pressurise)

K22 why securing devices need to be tightened to the correct torque, locked and labelled, and the different methods that are used

K23 the tools and equipment used in the overhauling activities and their calibration/care and control procedures

K24 how to make adjustments to components/assemblies to ensure that they function correctly (such as setting working clearance, setting travel)

K25 the recording documentation to be completed for the overhauling activities undertaken and where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation

K26 the need to control and account for all tools and equipment used during the overhauling activity

K27 the procedure for the safe disposal of waste materials and scrap components

K28 the problems that can occur during the overhauling activity and how they can be overcome

K29 the extent of their own authority and to whom they should report if they have a problem that they cannot resolve

Unit 409 Overhauling components of aircraft pneumatic, vacuum and environmental equipment

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers

Unit 410 Overhauling components of aircraft oxygen equipment

GLH:	371
Unit aim:	This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief. This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to carry out overhauling activities on aircraft oxygen equipment and components, in accordance with approved procedures. The equipment to be overhauled will have been removed from the aircraft and the overhauling activities may take place in a workshop or hangar. It covers both fixed wing and rotary winged aircraft, and covers a range of oxygen equipment such as oxygen generation equipment, storage equipment, face masks, drop-down mask equipment and other aircraft-specific oxygen equipment. The overhauling activities will include carrying out all necessary safety checks, dismantling the equipment to unit or component level, inspecting and checking all components for damage and wear, replacing all `lifed' items and worn/faulty components or units, reassembling the equipment and carrying out all necessary tests/checks. Their responsibilities will require them to comply with organisational policy and procedures for the overhauling activities undertaken and to report any problems with the overhauling activities, or with the tools and equipment used that they cannot personally resolve or that is outside their permitted authority, to the relevant people. They must ensure that all tools, equipment and materials used in the overhauling activities are removed from the work area and that all necessary job/task documentation is completed accurately and legibly. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying appropriate overhauling procedures to aircraft oxygen equipment. They will understand the dismantling and reassembly methods and procedures used, and their application. They will know how the equipment functions, the common faults encountered, the purpose of the individual components and associated defects, in adequate depth to provide a sound basis for carrying out the overhauling activities, correcting faults and ensuring that the overhauled equipment meets the required specification. They will understand the safety precautions required when carrying out the overhauling activities, especially those for ensuring that the oxygen equipment and components are maintained free from hydrocarbon contamination. They will be required to demonstrate safe working practices throughout and will understand their responsibility for taking the necessary safeguards to protect themselves and others in the workplace. They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

The learner will:

Performance Requirements

Assessment criteria

The learner can:

P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.

P2 demonstrate the required behaviours in line with the job role and organisational objectives.

P3 follow the relevant maintenance schedules to carry out the required work.

P4 carry out the maintenance activities within the limits of their personal authority.

P5 carry out the maintenance activities in the specified sequence and in an agreed timescale.

P6 report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule.

P7 complete the relevant maintenance records accurately and pass them on to the appropriate person.

P8 dispose of waste materials in accordance with safe working practices and approved procedure.

Learning outcome

The learner will:

1 carry out **all** of the following during the overhauling activities:

1.1 obtain and use the appropriate documentation (such as job instructions, aircraft manuals and overhauling documentation, technical instructions and other relevant maintenance documentation)

1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work

1.3 provide and maintain safe access and working arrangements for the overhauling area

1.4 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date

1.5 ensure the safe depressurisation of the oxygen equipment (where appropriate)

1.6 carry out the overhauling activities, using approved techniques and procedures at all times

1.7 ensure that components and oxygen equipment are maintained free from damage and foreign objects

1.8 return all tools and equipment to the correct location on completion of the activities

1.9 leave the work area and the oxygen equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities.

Learning outcome

The learner will:

2 carry out the overhauling activities to component level on **three** of the following types of aircraft oxygen equipment:

2.1 oxygen generation equipment
2.2 distribution equipment
2.3 ejection seat mounted equipment
2.4 liquid oxygen equipment
2.5 drop down masks
2.6 storage equipment
2.7 face masks
2.8 control valves
2.9 associated ground equipment
2.10 regulators
2.11 water/vapour extractors
2.12 bulk storage equipment.

Learning outcome

The learner will:

3 carry out all of the following activities, as applicable to the equipment being overhauled:

3.1 cleaning parts prior to dismantling
3.2 checking components for serviceability (such as visual, measurement, use of test rigs)
3.3 pre-disassembly checks and tests
3.4 releasing stored pressure (where applicable)
3.5 fitting blanks to openings to prevent entry of contaminating debris
3.6 replacing all damaged or defective components
3.7 dismantling equipment to unit/sub-assembly level
3.8 reassembling equipment
3.9 dismantling units to component level
3.10 making mechanical connections
3.11 proof-marking/labelling of components
3.12 setting and adjusting replaced components
3.13 leak testing
3.14 tightening fastenings to the required torque
3.15 replacing all ‘lifed' items (such as piston seals, dust caps, filters, gaskets)
3.16 securing components using mechanical fasteners and threaded devices
3.17 applying locking and retaining devices (such as circlips, pins, wire locking, lock nuts, stiff nuts, swage nuts).

Learning outcome

The learner will:

4 replace a range of oxygen equipment components, to include **eight** of the following:

4.1 pipework and hoses
4.2 diaphragms
4.3 gauges
4.4 unions and couplings
4.5 actuating mechanisms
4.6 gaskets
4.7 valves and seats
4.8 spring mechanisms
4.9 sensors
4.10 housings
4.11 plungers
4.12 safety devices
4.13 oxygen bottles
4.14 static and dynamic seals
4.15 regulators
4.16 filters
4.17 other specific components.

Learning outcome

The learner will:

5 carry out checks and tests on the overhauled equipment, to include **two** of the following

5.1 leak test
5.2 flow test
5.3 standard serviceability test
5.4 pressure test
5.5 oxygen concentration
5.6 ‘special-to-type' tests.

Learning outcome

The learner will:

6 overhaul aircraft oxygen equipment in compliance with **one** of the following:

6.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
6.2 Military Aviation Authority (MAA)
6.3 Aerospace Quality Management Standards (AS)
6.4 Federal Aviation Authority (FAA)

6.5 BS, ISO or BSEN standards and procedures

6.6 customer standards and requirements

6.7 organisation standards and procedures

6.8 aircraft manufacturer's requirements.

Learning outcome

The learner will:

7 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:

7.1 job cards

7.2 computer records

7.3 aircraft service/flight log

7.4 aircraft log book

7.5 permit to work/formal risk assessment.

Learning outcome

Knowledge and understanding

Assessment criteria

The apprentice must know and understand:

K1 the safe working practices and procedures and the specific safety precautions to be taken when overhauling aircraft oxygen equipment (to include wearing protective clothing and equipment; lifting and handling techniques; safe working practices and procedures with regard to working on aircraft oxygen equipment; procedures and guidelines which satisfy current regulations such as HASAWA, COSHH and other work related legislation and guidelines).

K2 hazards associated with carrying out overhauling activities on aircraft oxygen equipment (such as using lifting and handling equipment, working with pressurised liquids/gasses, working with liquid oxygen, misuse of tools, using damaged or badly maintained tools and equipment, not following laid-down overhauling procedures) and how to minimise them and reduce any risks.

K3 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.

K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to

K5 the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the overhaul.

K6 how to extract and use information from aircraft manuals, history/maintenance reports, aircraft logs, charts, circuit and physical layouts, specifications, symbols used in aircraft oxygen systems and other documents needed in the overhauling process.

K7 how to carry out currency/issue checks on the specifications they are working with.

K8 the procedure for obtaining replacement parts, materials and other consumables necessary for the overhaul.

K9 terminology used in aircraft oxygen systems and the use of fluid power diagrams and associated symbols.

K10 the various types of component that make up the aircraft oxygen equipment (such as pipes; flexible hoses; valves used for pressure, flow and directional control; mechanical and electrical control devices).

K11 the basic principles of operation of the oxygen equipment being worked on and the performance characteristics and function of the valves, cylinders/actuators within the circuit.

K12 the sequence to be adopted for the dismantling/reassembling of various types of oxygen components.

K13 the techniques used to dismantle the equipment to unit or component level, without damage to the components (such as release of pressures/force, draining of fluids, proof marking/labelling removed components, extraction of components and the need to protect the circuit integrity by fitting blanking plugs/covers).

K14 the various mechanical fasteners to be removed and replaced, and their method of removal and replacement (such as threaded fasteners, special securing devices).

K15 methods of lifting, handling and supporting the components/equipment during the removal and replacement activities.

K16 recognition of contaminants and the problems they can create; the effects and likely symptoms of contamination in the system (especially hydrocarbons in oxygen systems).

K17 methods of checking that components are fit for purpose and the uses of inspection/measuring equipment (such as gauges, micrometers, Verniers, dial test indicators, mirrors, endoprobes, boroscopes, video probes, scales, test rigs).

K18 how to identify defects and wear characteristics, and the need to replace ‘lifed' items (such as filters, seals and gaskets).

K19 how to check that replacement components have the correct part/identification markings.

K20 how to reassemble the components (such as the use of gaskets and seals, jointing/sealing compounds; ensuring correct tightness of fittings and connections; eliminating stress on pipework/connections; carrying out visual checks of all components; checking security of joints and that the system is safe to re-pressurise).

K21 why securing devices need to be tightened to the correct torque, locked and labelled, and the different methods that are used.

K22 the tools and equipment used in the overhauling activities and their calibration/care and control procedures.

K23 the recording documentation to be completed for the activities undertaken and where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation.

K24 the need to control and account for all tools and equipment used during the overhauling activity.

K25 the procedure for the safe disposal of waste materials, scrap components and cleaning fluids.

K26 the extent of their own authority and to whom they should report if they have a problem that they cannot resolve.

Unit 410 Overhauling components of aircraft oxygen equipment

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

Unit 411 Overhauling components of aircraft fuel and lubrication equipment

GLH:	371
Unit aim:	This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief. This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to carry out overhauling activities on aircraft fuel and lubrication equipment and components, in accordance with approved procedures. The equipment to be overhauled will have been removed from the aircraft and the overhauling activities may take place in a workshop or hangar. It covers both fixed wing and rotary winged aircraft, and covers a range of fuel and lubrication equipment associated with propulsion units/power plant, auxiliary engines and transmission systems, main and auxiliary fuel tanks, in-flight refuelling equipment, and other aircraft-specific equipment. The overhauling activities will include carrying out all necessary safety checks, dismantling the equipment to unit or component level, inspecting and checking all components for damage and wear, replacing all `lifed' items and worn/faulty components or units, reassembling the equipment and carrying out all necessary tests/checks. Their responsibilities will require them to comply with organisational policy and procedures for the overhauling activities undertaken and to report any problems with the overhaul activities, or with the tools and equipment used that they cannot personally resolve or that is outside their permitted authority, to the relevant people. They must ensure that all tools, equipment and materials used in the overhauling activities are removed from the work area, and that all necessary job/task documentation is completed accurately and legibly. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying appropriate overhauling procedures to aircraft fuel and lubrication equipment. They will understand the dismantling and reassembly methods and procedures used, and their application. They will know how the equipment functions, the common faults encountered, the purpose of the individual components and associated defects, in adequate depth to provide a sound basis for carrying out the overhauling activities, correcting faults and ensuring that the overhauled equipment meets the required specification. They will understand the safety precautions required when carrying out the overhaul activities. They will be required to demonstrate safe working practices throughout, and will understand their responsibility for taking the necessary safeguards to protect themselves and others in the workplace. They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

The learner will:

Performance Requirements

Assessment criteria

The learner can:

P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.

P2 demonstrate the required behaviours in line with the job role and organisational objectives.

P3 follow the relevant overhauling schedules to carry out the required work.

P4 establish the components to be removed and where appropriate, mark components to aid re-assembly.

P5 ensure that any stored energy or substances are released safely and correctly.

P6 carry out the overhaul to the agreed level, using the correct tools and techniques.

P7 ensure that all removed components are correctly identified and stored in the correct location.

P8 report any instances where the overhauling activities cannot be fully met, or where there are identified defects outside the planned overhauling schedule.

P9 complete the relevant documentation, in accordance with organisational requirements.

P10 dispose of unwanted components, waste materials and substances, in accordance with safe working practices and approved procedures.

P11 deal promptly and effectively with problems within their control and report those that cannot be solved.

Learning outcome

The learner will:

1 carry out **all** of the following during the overhauling activities:

1.1 obtain and use the appropriate documentation (such as job instructions, aircraft manuals and overhauling documentation, technical instructions and other relevant maintenance documentation)

1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work

1.3 provide and maintain safe access and working arrangements for the overhauling area

1.4 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date

1.5 ensure the safe draining of the fuel or lubrication equipment (where appropriate)

1.6 carry out the overhauling activities, using approved techniques and procedures at all times

1.7 return all tools and equipment to the correct location on completion of the activities

1.8 leave the work area and the fuel and lubrication equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities.

Learning outcome

The learner will:

2 carry out the overhauling activities to unit level on **three** of the following types of aircraft fuel/lubrication equipment:

2.1 propulsion/power plant fuel system
2.2 in-flight refuelling equipment
2.3 auxiliary engine fuel system
2.4 auxiliary fuel tank
2.5 propulsion/power plant lubrication system
2.6 external/drop down fuel tanks
2.7 auxiliary engine lubrication system
2.8 main fuel tanks
2.9 oil storage system
2.10 fuel drain and jettison equipment
2.11 fuel transmission equipment
2.12 X feed valves and systems
2.13 fuel and de-fuel connections.

Learning outcome

The learner will:

3 carry out **all** of the following activities, as applicable to the equipment being overhauled:

3.1 cleaning parts prior to dismantling
3.2 replacing all damaged or defective components
3.3 pre-disassembly checks and tests
3.4 reassembling equipment
3.5 releasing stored fluids (where applicable)
3.6 fitting blanks to openings to prevent entry of contaminating debris
3.7 making mechanical connections
3.8 dismantling equipment to unit/sub-assembly level
3.9 setting and adjusting replaced components
3.10 dismantling units to component level
3.11 tightening fastenings to the required torque
3.12 proof-marking/labelling of components
3.13 checking components for serviceability (such as visual, measurement, NDT, use of probes/scopes)
3.14 replacing all ‘lifed' items (such as piston seals, dust caps, filters, gaskets)
3.15 securing components using mechanical fasteners and threaded devices

3.16 applying locking and retaining devices (such as circlips, pins, wire locking, lock nuts, stiff nuts, swage nuts.

Learning outcome

The learner will:

4 carry out overhauling activities to component level on **three** of the following fuel or lubrication components:

4.1 actuating mechanisms
4.2 fuel manifold
4.3 control valves (drain, bleed, changeover, dump)
4.4 reservoirs/supply tanks
4.5 cylinders
4.6 electrical controls (solenoids, motors, pressure switches)
4.7 fuel/oil cooling units
4.8 compressor
4.9 pressure intensifiers
4.10 carburettors
4.11 injectors
4.12 fuel flow regulators
4.13 safety devices
4.14 fuel and de-fuel connections
4.15 pumps
4.16 other specific components.

Learning outcome

The learner will:

5 replace a range of fuel or lubrication components, to include **eight** of the following:

5.1 fuel filters
5.2 rigid pipework
5.3 static and dynamic seals
5.4 dip sticks, drip sticks, drop sticks, gauges
5.5 oil filters
5.6 hoses
5.7 gaskets
5.8 strainers
5.9 spring mechanisms
5.10 sealing devices
5.11 magnetic chips
5.12 diaphragms
5.13 fuel flow proportioners

5.14 sensors
5.15 fuel injectors
5.16 other specific components.

Learning outcome

The learner will:

6 carry out checks and tests on the overhauled equipment, to include **three** of the following:

6.1 pressure test
6.2 system flush
6.3 leak test
6.4 ‘special-to-type' tests
6.5 fuel level/contents check
6.6 flow checks
6.7 standard serviceability test.

Learning outcome

Knowledge and understanding

Assessment criteria

The apprentice must know and understand:

K1 the safe working practices and procedures and the specific safety precautions to be taken when overhauling aircraft fuel and lubrication equipment (to include wearing protective clothing and equipment; lifting and handling techniques; safe working practices and procedures with regard to working on aircraft fuel and lubrication equipment; procedures and guidelines which satisfy current regulations such as HASAWA, COSHH and other work related legislation and guidelines).

K2 hazards associated with carrying out overhauling activities on aircraft fuel and lubrication equipment (such as releasing stored energy, handling oil and aviation fuel, misuse of tools, using damaged or badly maintained tools and equipment, not following laid-down overhauling procedures) and how to minimise them and reduce any risk.

K3 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.

K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.

K5 the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the overhaul.

K6 how to extract and use information from aircraft manuals, history/maintenance reports, aircraft logs, charts, circuit and physical layouts, specifications, symbols used in

aircraft fuel and lubrication systems and other documents needed in the overhauling process.

K7 how to carry out currency/issue checks on the specifications they are working with.

K8 the procedure for obtaining replacement parts, materials and other consumables necessary for the overhaul.

K9 terminology used in aircraft fuel and lubrication systems, and the use of fluid power diagrams and associated symbols.

K10 the various types of component that make up the aircraft fuel and lubrication equipment (such as pipes; flexible hoses; compressors; pumps; valves used for drain, bleed, change over; cylinders/actuators; carburettors; pressure intensifiers, mechanical and electrical control devices).

K11 the basic principles of operation of the fuel or lubrication equipment being worked on and the performance characteristics and function of the components within the circuit.

K12 the sequence to be adopted for the dismantling/reassembling of various types of fuel or lubrication assemblies.

K13 the techniques used to dismantle the equipment to unit or component level, without damage to the components (such as release of energy, proof marking/labelling removed components, extraction of components, and the need to protect the circuit integrity by fitting blanking plugs/covers).

K14 the various mechanical fasteners to be removed and replaced, and their method of removal and replacement (such as threaded fasteners, special securing devices).

K15 methods of lifting, handling and supporting the components/equipment during the removal and replacement activities.

K16 recognition of contaminants and the problems they can create; the effects and likely symptoms of contamination in the fuel or lubrication system.

Unit 411 Overhauling components of aircraft fuel and lubrication equipment

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

Unit 412 Overhauling major components of aircraft airframes

GLH:	336
Unit aim:	This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief. This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to carry out overhauling activities on major components of aircraft airframes and equipment, in accordance with approved procedures. The components and or equipment to be overhauled may either remain on the aircraft or they will have been removed, with the overhauling activities taking place on the aircraft, in a hanger or in a workshop. It covers both fixed wing and rotary winged aircraft, and covers a range of equipment such as wings, flying control surfaces, horizontal stabilisers/tailplane, tail pylon, cabin, cargo and weapon bay doors, canopy and other aircraft-specific equipment. The overhauling activities will include carrying out all necessary safety checks, dismantling the equipment to unit or component level, inspecting and checking all components for damage and wear, replacing all `lifed' items and worn/faulty components or units, reassembling the equipment and carrying out all necessary tests/checks. Their responsibilities will require them to comply with organisational policy and procedures for the overhauling activities undertaken, and to report any problems with the overhauling activities, or with the tools and equipment used that they cannot personally resolve or that is outside thier permitted authority, to the relevant people. They must ensure that all tools, equipment and materials used in the overhauling activities are removed from the work area, and that all necessary job/task documentation is completed accurately and legibly. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying appropriate overhauling procedures to major components of aircraft airframes. They will understand the dismantling and reassembly methods and procedures used, and their application. They will know how the equipment functions, the common faults encountered, the purpose of the individual components and associated defects, in adequate depth to provide a sound basis for carrying out the overhauling activities, correcting faults and ensuring that the overhauled equipment meets the required specification. They will understand the safety precautions required when carrying out the overhaul activities, especially those for lifting, moving and supporting the airframe components. They will be required to demonstrate safe working practices throughout and will understand their responsibility for taking the necessary safeguards to protect themselves and others in the workplace. They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

Performance Requirements

Assessment criteria

The learner can:

P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.

P2 demonstrate the required behaviours in line with the job role and organisational objectives.

P3 follow the relevant maintenance schedules to carry out the required work.

P4 carry out the maintenance activities within the limits of their personal authority.

P5 carry out the maintenance activities in the specified sequence and in an agreed timescale.

P6 report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule.

P7 complete the relevant maintenance records accurately and pass them on to the appropriate person.

P8 dispose of waste materials in accordance with safe working practices and approved procedures.

Learning outcome

The learner will:

1 carry out **all** of the following during the overhauling activities:

1.1 obtain and use the appropriate documentation (such as job instructions, aircraft manuals and overhauling documentation, technical instructions and other relevant maintenance documentation)

1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work

1.3 provide and maintain safe access and working arrangements for the overhauling area

1.4 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date

1.5 ensure that the equipment is suitably supported and that appropriate lifting and handling equipment is available

1.6 carry out the overhauling activities, using approved techniques and procedures at all times

1.7 ensure that components and surrounding structures are maintained free from damage and foreign objects

1.8 return all tools and equipment to the correct location on completion of the activities

1.9 leave the work area and the airframe components in a safe and appropriate condition, free from foreign object debris on completion of the activities.

Learning outcome

The learner will:

2 carry out the overhauling activities to unit level on **three** of the following types of aircraft airframe major components:

2.1 wing
2.2 rudders
2.3 elevators
2.4 mission consoles
2.5 spoilers/speed brakes
2.6 ailerons/tailerons
2.7 stabilisers
2.8 avionics cabinets
2.9 air brakes
2.10 canopy
2.11 cargo doors
2.12 galleys
2.13 horizontal stabiliser/tailplane
2.14 tail pylon
2.15 passenger doors
2.16 stairs
2.17 engine doors/nacelles
2.18 escape hatches
2.19 pylons
2.20 toilet
2.21 undercarriage doors
2.22 gun pods
2.23 nose cones
2.24 floor panels
2.25 flaps/slats
2.26 fin
2.27 aerodynamic fairings
2.28 canards/foreplanes
2.29 pilot/crew seats
2.30 windows
2.31 rotor blades
2.32 other specific major component.

Learning outcome

The learner will:

3 carry out **all** of the following activities, as applicable to the equipment being overhauled:

3.1 cleaning parts prior to dismantling
3.2 making holes in airframe materials
3.3 pre-disassembly checks and tests
3.4 cutting airframe materials
3.5 dismantling equipment to unit/sub-assembly level
3.6 fitting blanks to openings to prevent entry of contaminating debris
3.7 countersinking
3.8 dismantling units to component level
3.9 deburring
3.10 proof-marking/labelling of components
3.11 applying sealant/adhesives
3.12 removing and replacing riveted assemblies
3.13 reassembling equipment
3.14 checking components for serviceability (such as visual, measurement, NDT, use of probes/scopes)
3.15 making mechanical connections
3.16 setting and adjusting replaced components
3.17 replacing all damaged or defective components
3.18 tightening fastenings to the required torque
3.19 securing components using mechanical fasteners and threaded devices
3.20 applying locking and retaining devices (such as circlips, pins, wire locking, lock nuts, stiff nuts, swage nuts).

Learning outcome

The learner will:

4 replace a range of components, to include **three** of the following:

4.1 aircraft aerodynamic skin
4.2 primary structural components
4.3 aircraft pressure skin
4.4 secondary structure components
4.5 bearings and housings
4.6 composite material components
4.7 operating mechanisms
4.8 fasteners
4.9 other specific components.

Learning outcome

The learner will:

5 overhaul major airframe equipment in compliance with **one** of the following:

5.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)

5.2 Military Aviation Authority (MAA)
5.3 Aerospace Quality Management Standards (AS)
5.4 Federal Aviation Authority (FAA)
5.5 BS, ISO or BSEN standards and procedures
5.6 customer standards and requirements
5.7 organisation standards and procedures
5.8 aircraft manufacturer's requirements.

Learning outcome

The learner will:

6 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:

6.1 job cards
6.2 computer records
6.3 aircraft service/flight log
6.4 aircraft log book
6.5 permit to work/formal risk assessment.

Learning outcome

Knowledge and understanding

Assessment criteria

The apprentice must know and understand:

K1 the safe working practices and procedures and the specific safety precautions to be taken when overhauling major components of aircraft airframes (to include wearing protective clothing and equipment; lifting and handling techniques; safe working practices and procedures with regard to working on aircraft major airframe equipment; procedures and guidelines which satisfy current regulations such as HASAWA, COSHH and other work related legislation and guidelines).
K2 hazards associated with carrying out overhauling activities on major components of aircraft airframes (such as using lifting and handling equipment, releasing stored pressure/fluids, misuse of tools, using damaged or badly maintained tools and equipment, not following laid-down overhauling procedures) and how to minimise them and reduce any risks.
K3 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.
K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.
K5 the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the overhaul.

K6 how to extract and use information from aircraft manuals, history/maintenance reports, aircraft logs, charts, circuit and physical layouts, specifications, symbols used in major components of aircraft airframe and other documents needed in the overhauling process.

K7 how to carry out currency/issue checks on the specifications they are working with

K8 the procedure for obtaining replacement parts, materials and other consumables necessary for the overhaul.

K9 terminology used for major components of aircraft airframes.

K10 the various types of component that make up the major components of aircraft airframes and the various classes of structure (such as primary, secondary, tertiary).

K11 the sequence to be adopted for the dismantling/reassembling of various types of major airframe assemblies.

K12 the techniques used to dismantle the equipment to unit or component level, without damage to the components (such as proof marking/labelling removed components, extraction of components).

K13 the various mechanical fasteners to be removed and replaced, and their method of removal and replacement (such as threaded fasteners, special securing devices).

K14 methods of lifting, handling and supporting the components/equipment during the overhauling activities.

K15 methods of checking that components are fit for purpose and the uses of inspection/measuring equipment (such as gauges, micrometers, verniers, dial test indicators, mirrors, endoprobes, boroscopes, video probes, scales).

K16 how to identify defects and wear characteristics.

K17 how to check that replacement components have the correct part/identification markings.

K18 how to reassemble the components (such as the use of gaskets and seals, jointing/sealing compounds; ensuring correct tightness of fittings and connections; eliminating stress; carrying out visual checks of all components).

K19 why securing devices need to be tightened to the correct torque, locked and labelled, and the different methods that are used.

K20 the tools and equipment used in the overhauling activities and their calibration/care and control procedures.

K21 the recording documentation to be completed for the activities undertaken and where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation.

K22 the need to control and account for all tools and equipment used during the overhauling activity.

K23 the procedure for the safe disposal of waste materials, scrap components, oils and greases.

K24 the problems that can occur during the overhauling activity and how they can be overcome.

K25 the extent of their own authority and to whom they should report if they have a problem that they cannot resolve.

Unit 412 Overhauling major components of aircraft airframes

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

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Appendix 1 Relationships to other qualifications

Links to other qualifications

Centres are responsible for checking the different requirements of all qualifications they are delivering and ensuring that candidates meet requirements of all units/qualifications.

Literacy, language, numeracy and ICT skills development

This [these] qualification[s] can develop skills that can be used in the following qualifications:

- Functional Skills (England) – see www.cityandguilds.com/functionalskills
- Essential Skills (Northern Ireland) – see www.cityandguilds.com/essentialskillsni
- Essential Skills Wales – see www.cityandguilds.com/esw

Appendix 2 Sources of general information

The following documents contain essential information for centres delivering City & Guilds qualifications. They should be referred to in conjunction with this handbook. To download the documents and to find other useful documents, go to the Centres and Training Providers homepage on www.cityandguilds.com.

Centre Manual - Supporting Customer Excellence contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification, as well as updates and good practice exemplars for City & Guilds assessment and policy issues.

Specifically, the document includes sections on:

- The centre and qualification approval process
- Assessment, internal quality assurance and examination roles at the centre
- Registration and certification of candidates
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Management systems
- Maintaining records
- Assessment
- Internal quality assurance
- External quality assurance.

Our Quality Assurance Requirements encompasses all of the relevant requirements of key regulatory documents such as:

- SQA Awarding Body Criteria (2007)
- NVQ Code of Practice (2006)

and sets out the criteria that centres should adhere to pre and post centre and qualification approval.

Access to Assessment & Qualifications provides full details of the arrangements that may be made to facilitate access to assessments and qualifications for candidates who are eligible for adjustments in assessment.

The **centre homepage** section of the City & Guilds website also contains useful information on such things as:

- **Walled Garden**: how to register and certificate candidates on line
- **Events:** dates and information on the latest Centre events
- **Online assessment**: how to register for e-assessments.

Centre Guide – Delivering International Qualifications contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification.

Specifically, the document includes sections on:

- The centre and qualification approval process and forms
- Assessment, verification and examination roles at the centre

- Registration and certification of candidates
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Frequently asked questions.

Appendix 3 Useful contacts

UK learners General qualification information	**E: learnersupport@cityandguilds.com**
International learners General qualification information	F: +44 (0)20 7294 2413 **E: intcg@cityandguilds.com**
Centres Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results	F: +44 (0)20 7294 2413 **E: centresupport@cityandguilds.com**
Single subject qualifications Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change	F: +44 (0)20 7294 2413 F: +44 (0)20 7294 2404 (BB forms) **E: singlesubjects@cityandguilds.com**
International awards Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports	F: +44 (0)20 7294 2413 **E: intops@cityandguilds.com**
Walled Garden Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems	F: +44 (0)20 7294 2413 **E: walledgarden@cityandguilds.com**
Employer Employer solutions, Mapping, Accreditation, Development Skills, Consultancy	T: +44 (0)121 503 8993 **E: business@cityandguilds.com**
Publications Logbooks, Centre documents, Forms, Free literature	F: +44 (0)20 7294 2413

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As the UK's leading vocational education organisation, City & Guilds is leading the talent revolution by inspiring people to unlock their potential and develop their skills. We offer over 500 qualifications across 28 industries through 8500 centres worldwide and award around two million certificates every year. City & Guilds is recognised and respected by employers across the world as a sign of quality and exceptional training.

City & Guilds Group

The City & Guilds Group is a leader in global skills development. Our purpose is to help people and organisations to develop their skills for personal and economic growth. Made up of City & Guilds, City & Guilds Kineo, The Oxford Group and ILM, we work with education providers, businesses and governments in over 100 countries.

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