

Level 3 NVQ Extended Diploma in Aeronautical Engineering (1789-34)

September 2018 version 2.4

Revised version for registrations from August 1st 2013





Qualification at a glance

Subject area	Engineering
City & Guilds number	1789
Age group approved	16-18, 19+
Entry requirements	Level 3
Assessment	Portfolio
Automatic approval	Available
Support materials	1789-34 Level 3 NVQ Extended Diploma in Aeronautical Engineering Handbook Level 3 NVQ Diploma in Aeronautical Engineering Handbook PEO Unit pack (containing units 704-773)
Registration and certification	Consult the Walled Garden/Online Catalogue for last dates

In 2013 the Performing Engineering Operations (PEO) units, following a review by the SSC SEMTA, were updated for a Summer release. As a result of this City & Guilds obtained a new accreditation and qualification number for the Level 3 Extended Diploma, which contains a substantial number of the PEO units. The non-extended level 3 Diploma and level 2 qualifications were unchanged.

Title and level	GLH	TQT	City & Guilds number	Accreditation number
Level 3 NVQ Extended Diploma in Aeronautical Engineering (Aircraft Manufacture Mechanical)	441	1650	1789-34	601/0080/1
Level 3 NVQ Extended Diploma in Aeronautical Engineering (Aircraft Manufacture Electrical)	441	1650	1789-34	601/0080/1
Level 3 NVQ Extended Diploma in Aeronautical Engineering (Aircraft Power Plant Assembly, Installation and Testing)	441	1650	1789-34	601/0080/1

Level 3 NVQ Extended Diploma in Aeronautical Engineering (Installing Aircraft Interiors)	441	1650	1789-34	601/0080/1
Level 3 NVQ Extended Diploma in Aeronautical Engineering (Aircraft Surface Finishing)	441	1650	1789-34	601/0080/1
Level 3 NVQ Extended Diploma in Aeronautical Engineering (Survival Equipment Maintenance)	441	1650	1789-34	601/0080/1
Level 3 NVQ Extended Diploma in Aeronautical Engineering (Weapons Maintenance)	441	1650	1789-34	601/0080/1
Level 3 NVQ Extended Diploma in Aeronautical Engineering (Avionics Maintenance)	441	1650	1789-34	601/0080/1
Level 3 NVQ Extended Diploma in Aeronautical Engineering (Aircraft Mechanical Maintenance)	441	1650	1789-34	601/0080/1
Level 3 NVQ Extended Diploma in Aeronautical Engineering (Aircraft Engine Overhaul)	441	1650	1789-34	601/0080/1
Level 3 NVQ Extended Diploma in Aeronautical Engineering (Aircraft Mechanical Component Overhaul)	441	1650	1789-34	601/0080/1
Level 3 NVQ Extended Diploma in Aeronautical Engineering (Avionic Component Overhaul)	441	1650	1789-34	601/0080/1
Level 3 NVQ Extended Diploma in Aeronautical Engineering (Aircraft Technical Design and Development)	441	1650	1789-34	601/0080/1

Level 3 NVQ Extended Diploma in Aeronautical Engineering (On Aircraft Maintenance)	441	1650	1789-34	601/0080/1
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Version and date	Change detail	Section
2.0 Feb 2014	Amend rules of combination to include additional optional units (009-011, 274-276)	Structure
2.1 June 2014	Amended Unit 403 UAN	Unit / Structure
2.3 August 2017	Added TQT details Deleted QCF	Qualification at a glance, Structure Throughout
2.4 September 2018	Changed from a seven to a nine	Unit 001 assessment criteria 2.3



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1 Introduction

This document tells you what you need to do to deliver the qualification:

Area	Description
Who is the qualification for?	For learners who work or want to work in the Engineering sector
What does the qualification cover?	Allows learners to learn, develop and practise the skills required for employment and/or career progression in the engineering sector.
Is the qualification part of a framework or initiative?	It is part of the Engineering Apprenticeship framework.
Who did we develop the qualification with?	It was developed in association with SEMTA, the Sector Skills Council for Science, Engineering and Manufacturing Technologies.
What opportunities for progression are there?	It allows learners to progress into employment or to the following City & Guilds qualifications: <ul style="list-style-type: none">• City & Guilds Level 4 Extended Diploma in Engineering Manufacture• City & Guilds Professional Recognition Awards.• ILM Level 4 or Level 5 Qualifications in Management• Foundation Degree or other higher education qualifications

Structures

The minimum credit required to achieve this qualification is **165 credits**. However the minimum credit required can differ considerably depending on the pathway undertaken.

The Level 3 NVQ Extended Diploma in Aeronautical Engineering, pathways are:

- Aircraft Manufacture Mechanical
- Aircraft Manufacture Electrical
- Aircraft Power Plant Assembly, Installation and Testing
- Installing Aircraft Interiors
- Aircraft Surface Finishing
- Survival Equipment Maintenance
- Weapons Maintenance
- Avionics Maintenance
- Aircraft Mechanical Maintenance
- Aircraft Engine Overhaul
- Aircraft Mechanical Component Overhaul
- Avionic Component Overhaul
- Aircraft Technical Design and Development
- On Aircraft Maintenance

To achieve the Level 3 NVQ Extended Diploma in Aeronautical Engineering, learners **must** achieve the **20 credits** from the mandatory units (001- 002, 403-404) and **must** complete the minimum requirements for the pathway they are undertaking.

Learners **must** also achieve from the Performing Engineering Operations (PEO) units either:

- a minimum of **27 credits** and **3 units** from PEO pathway A (009-011, 204-261, 265-273, 274-276), **or**:
- a minimum of **51 credits** must be achieved from PEO pathway B; this must be achieved from:
 - **11 credits** and **1 unit** from group B1 (204, 232, 261),
 - **16 credits** and **2 units** from group B2 (262-264) and
 - **24 credits** and **2 units** from group B3 (265-268).
- If the PEO pathway A (009-011, 204-261, 265-273, 274-276) is undertaken learners **must** note the following barred units:
 - Only one unit from 204, 232 and 261 may be included in the learners choice of three units.
 - If unit 265 is selected units 205, 206, 208, 211, 212, 215, 216, 217 cannot be included in the learners choice of three units.
 - If unit 266 is selected units 210, 222, 223, 225, 226, 227, 228, 229, 230, 234 cannot be included in the learners choice of three units.
 - If unit 267 is selected units 233, 235, 236, 240 cannot be included in the learners choice of three units.
 - If unit 268 is selected units 219, 221, 237, 238, 239, 240, 258, 259 cannot be included in the learners choice of three units.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Mandatory			
A/601/5013	001	Complying with statutory regulations and organisational safety requirements	5
Y/601/5102	002	Using and interpreting engineering data and documentation	5
K/601/5055	403	Working efficiently and effectively in engineering	5
K/601/4228	404	Reinstating the work area on completion of activities	5

Performing Engineering Operations - Engineering Practices (Pathway A)

Learners **must** achieve a minimum of **27** credits from at least **3** units if they select this pathway.

Optional Group A

Unit accreditation number	City & Guilds unit number	Unit title	Credit value	Excluded combination of units (if any)
R/601/4269	Unit 009	Servicing Aircrew Protective Helmets and Electrical Headsets	20	
D/601/4274	Unit 010	Servicing Aircrew Nuclear, Biological and Chemical (NBC) Respirators and Equipment	22	
H/601/4275	Unit 011	Servicing Aircrew Life Preserver Equipment	22	
F/504/6348	Unit 204	Producing Mechanical Engineering Drawings using a CAD System	11	232, 261
J/504/6349	Unit 205	Producing Components using Hand Fitting Techniques	14	265
F/504/6351	Unit 206	Producing Mechanical Assemblies	15	265
L/504/6353	Unit 207	Forming and Assembling Pipework Systems	14	
R/504/6354	Unit 208	Carrying Out Aircraft Detail Fitting Activities	14	265
L/504/6367	Unit 209	Installing Aircraft Mechanical Fasteners	11	

L/504/6370	Unit 210	Producing Aircraft Detail Assemblies	14	266
Y/504/6372	Unit 211	Preparing and Using Lathes for Turning Operations	15	265
K/504/6375	Unit 212	Preparing and Using Milling Machines	15	265
T/504/6377	Unit 213	Preparing and Using Grinding Machines	15	
F/504/6379	Unit 214	Preparing and Proving CNC Machine Tool Programs	14	
F/504/6382	Unit 215	Preparing and Using CNC Turning Machines	14	265
L/504/6384	Unit 216	Preparing and Using CNC Milling Machines	14	265
D/504/6387	Unit 217	Preparing and Using CNC Machining Centres	14	265
D/504/6390	Unit 218	Preparing and Using Industrial Robots	14	
T/504/6394	Unit 219	Maintaining Mechanical Devices and Equipment	14	268
J/504/6397	Unit 220	Assembling and Testing Fluid Power Systems	14	
F/504/6401	Unit 221	Maintaining Fluid Power Equipment	14	268
J/504/6402	Unit 222	Producing Sheet Metal Components and Assemblies	14	266
L/504/6403	Unit 223	Producing Platework Components and Assemblies	14	266

R/504/6404	Unit 224	Cutting and Shaping Materials using Thermal Cutting Equipment	14	
Y/504/6405	Unit 225	Preparing and Proving CNC Fabrication Machine Tool Programs	14	266
D/504/6406	Unit 226	Preparing and Using CNC Fabrication Machinery	14	266
K/504/6408	Unit 227	Preparing and Using Manual Metal Arc Welding Equipment	15	266
M/504/6409	Unit 228	Preparing and Using Manual TIG or Plasma-arc Welding Equipment	15	266
H/504/6410	Unit 229	Preparing and Using Semi-automatic MIG, MAG and Flux cored arc Welding Equipment	15	266
Y/504/6419	Unit 230	Preparing and Using Manual Oxy/fuel Gas Welding Equipment	14	266
L/504/6420	Unit 231	Preparing and Using Manual Flame Brazing and Braze Welding Equipment	11	
R/504/6421	Unit 232	Producing Electrical or Electronic Engineering Drawings using a CAD System	11	
Y/504/6422	Unit 233	Wiring and Testing Electrical Equipment and Circuits	14	267

D/504/6423	Unit 234	Forming and Assembling Electrical Cable Enclosure and Support Systems	13	266
H/504/6424	Unit 235	Assembling, Wiring and Testing Electrical Panels/Components Mounted in Enclosures	14	267
K/504/6425	Unit 236	Assembling and Testing Electronic Circuits	14	267
M/504/6426	Unit 237	Maintaining Electrical Equipment/Systems	15	268
T/504/6427	Unit 238	Maintaining Electronic Equipment/Systems	15	268
A/504/6428	Unit 239	Maintaining and Testing Process Instrumentation and Control Devices	15	268
F/504/6429	Unit 240	Wiring and Testing Programmable Controller Based Systems	15	267, 268
T/504/6430	Unit 241	Using Wood for Pattern, Modelmaking and Other Engineering Applications	15	
A/504/6431	Unit 242	Assembling Pattern, Model and Engineering Woodwork Components	14	
F/504/6432	Unit 243	Producing Composite Mouldings using Wet Lay-up Techniques	14	
L/504/6434	Unit 244	Producing Composite Mouldings using Pre-Preg Techniques	14	

R/504/6435	Unit 245	Producing Composite Mouldings using Resin Flow Infusion Techniques	14	
Y/504/6436	Unit 246	Producing Composite Assemblies	14	
D/504/6437	Unit 247	Producing Components by Rapid Prototyping Techniques	11	
H/504/6438	Unit 248	Producing and Preparing Sand Moulds and Cores for Casting	14	
K/504/6439	Unit 249	Producing and Preparing Molten Materials for Casting	14	
D/504/6440	Unit 250	Producing Cast Components by Manual Means	13	
H/504/6441	Unit 251	Fettling, Finishing and Checking Cast Components	11	
M/504/6443	Unit 252	Finishing Surfaces by Applying Coatings or Coverings	9	
T/504/6444	Unit 253	Finishing Surfaces by Applying Treatments	9	
A/504/6445	Unit 254	Carrying Out Heat Treatment of Engineering Materials	9	
F/504/6446	Unit 255	Carrying Out Hand Forging of Engineering Materials	9	
J/504/6447	Unit 256	Stripping and Rebuilding Motorsport Vehicles (Pre-Competition)	14	
L/504/6448	Unit 257	Inspecting a Motorsport Vehicle During a Competition	14	

R/504/6449	Unit 258	Diagnosing and Rectifying Faults on Motorsport Vehicle Systems (During Competition)	15	268
J/504/6450	Unit 259	Carrying out Maintenance Activities on Motorsport Vehicle Electrical Equipment	15	268
L/504/6451	Unit 260	Stripping and Rebuilding Motorsport Engines (Pre-Competition)	14	
R/504/6452	Unit 261	Producing CAD Models (Drawings) using a CAD System	11	204, 232
K/504/6456	Unit 265	General Machining, Fitting and Assembly Applications	12	205, 206, 208, 211, 212, 215, 216, 217
M/504/6457	Unit 266	General Fabrication and Welding Applications	12	210, 222, 223, 225, 226, 227, 228, 229, 230, 234
T/504/6458	Unit 267	General Electrical and Electronic Engineering Applications	12	233, 235, 236, 240
A/504/6459	Unit 268	General Maintenance Engineering Applications	12	219, 221, 237, 238, 239, 240, 258, 259
L/503/4056	Unit 269	Joining Public Service Vehicle Components by Mechanical Processes	11	
R/503/4057	Unit 270	Assembling Structural Sub Assemblies to Produce a Public Service Vehicle	14	
Y/503/4058	Unit 271	Fitting Sub Assemblies and Components to Public Service Vehicles	14	

R/503/7198	Unit 272	Preparing and Manoeuvring Armoured Fighting Vehicles (AFVs) for Maintenance and Transportation	14	
J/504/3404	Unit 273	Producing Composite Mouldings using Resin Film Infusion Techniques	14	
J/505/9960	Unit 274	Maintaining armament equipment	15	
D/505/9964	Unit 275	Military aircraft flight servicing	12	
A/505/9969	Unit 276	Aircraft armament systems husbandry	13	

Technical support pathway

Performing Engineering Operations - Technical support (PEO pathway B)

Learners **must** achieve a minimum of **51** credits if they select this pathway. This **must** be achieved from **11 credits and 1 unit** from Optional group B1, **16 credits** and **2 units** from Optional group B2 and **24 credits and 2 units** from Optional group B3.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value	Excluded combination of units (if any)
Optional group B1				
F/504/6348	Unit 204	Producing Mechanical Engineering Drawings using a CAD System	11	
R/504/6421	Unit 232	Producing Electrical or Electronic Engineering Drawings using a CAD System	11	

R/504/6452	Unit 261	Producing CAD Models (Drawings) using a CAD System	11
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Optional group B2

Y/504/6453	Unit 262	Producing Engineering Project Plans	8
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D/504/6454	Unit 263	Using Computer Software Packages to Assist with Engineering Activities	8
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H/504/6455	Unit 264	Conducting Business Improvement Activities	8
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Optional group B3

K/504/6456	Unit 265	General Machining, Fitting and Assembly Applications	12
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M/504/6457	Unit 266	General Fabrication and Welding Applications	12
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T/504/6458	Unit 267	General Electrical and Electronic Engineering Applications	12
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A/504/6459	Unit 268	General Maintenance Engineering Applications	12
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To achieve the **Level 3 Diploma in Aeronautical Engineering (Aircraft Manufacture Mechanical)**, learners must achieve a minimum of **128** credits from a minimum of **4** units from the optional units.

Learners **must** also achieve the mandatory units (001-002, 403-404) and one of the Performing Engineering Operations pathways.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Optional			
A/601/4363	405	Marking out composite and/or metallic aircraft components	28
J/601/4365	406	Cutting and shaping aircraft components	48
R/601/4367	407	Bending and forming aircraft components	48
Y/601/4368	408	Installing aircraft mechanical fasteners into composite and/or metallic components	42
D/601/4369	409	Producing aircraft detail assemblies	71
Y/601/4371	410	Producing composite and/or metallic aircraft sub-assemblies	71
D/601/4372	411	Producing composite and/or metallic aircraft major assemblies	70
H/601/4373	412	Installing aircraft mechanical controls	86
A/601/4380	413	Repairing airframes and structures	62
F/601/4381	414	Modifying airframes	60
D/601/4386	415	Modifying aircraft mechanical systems	77
M/601/4389	416	Carrying out routine servicing of aircraft	42
D/601/4422	423	Moulding acrylic aircraft components	50
J/601/4432	426	Producing aircraft composite assemblies	86
J/601/4446	427	Vacuum forming aircraft components	50
D/601/4453	428	Producing aircraft components by plastic injection moulding	62
T/601/4474	430	Assembling aircraft transparencies	40
M/601/4506	439	Drilling and finishing holes in composite and/or metallic aircraft structures or components	40
A/601/4508	441	Installing aircraft hydraulic systems	86
T/601/4510	442	Installing aircraft pneumatic systems	86
F/601/4512	443	Installing aircraft de-icing systems	86

L/601/4514	444	Installing aircraft fuel systems	86
D/601/4517	445	Installing aircraft environmental systems	86
K/601/4519	446	Installing flying control surfaces and systems	86
H/601/4521	447	Installing aircraft armament systems	86
T/601/4524	448	Installing aircraft assisted escape mechanisms	70
F/601/4526	449	Installing aircraft main engines	95
R/601/4529	450	Installing aircraft auxiliary engines	89
R/601/4532	451	Installing aircraft power transmission systems	89
M/601/4537	452	Testing installed aircraft engines	55
A/601/4542	453	Testing aircraft power transmission systems	55
L/601/4545	454	Testing aircraft hydraulic systems	55
Y/601/4547	455	Testing aircraft pneumatic systems	55
Y/601/4550	456	Testing aircraft environmental systems	55
M/601/4554	457	Testing aircraft de-icing systems	55
F/601/4560	458	Testing aircraft fuel systems	55
T/601/4572	459	Testing aircraft flying control surfaces and systems	55
R/601/4577	460	Testing aircraft armament systems	50
D/601/4579	461	Testing aircraft assisted escape systems	50
L/601/4707	493	Applying finishes to aircraft composite mouldings	46
F/601/5188	602	Producing aircraft composite mouldings using pre-preg laminating techniques	86
J/601/5192	603	Producing aircraft composite mouldings using wet lay-up techniques	86
Y/601/5195	604	Producing aircraft composite mouldings using resin infusion laminating techniques	86
H/601/5197	605	Trimming aircraft composite mouldings using hand tools	46
Y/601/5200	606	Identifying defects in aircraft composite mouldings	30
D/601/5201	607	Repairing aircraft composite mouldings	77
K/601/5203	608	Bonding aircraft composite mouldings	30
K/601/6111	611	Setting plastic injection moulding machines for the production of aircraft components	70

To achieve the **Level 3 Diploma in Aeronautical Engineering (Aircraft Manufacture Electrical)**, learners must achieve a minimum of **200** credits from a minimum of **4** units from the optional units.

Learners **must** also achieve the mandatory units (001-002, 403-404) and one of the Performing Engineering Operations pathways.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Optional			
M/601/4585	462	Installing aircraft cableforms/looms	77
A/601/4587	463	Installing aircraft instrument panels and meters	86
A/601/4590	464	Installing aircraft visual display units and computer systems	86
H/601/4597	465	Installing aircraft engine control units	77
L/601/4609	466	Installing aircraft power supplies	77
L/601/4612	467	Installing aircraft communication systems	86
T/601/4622	468	Installing aircraft flight guidance and control systems	86
R/601/4630	469	Installing aircraft navigational systems	86
Y/601/4659	470	Installing aircraft radar systems	86
R/601/4661	471	Installing aircraft countermeasure systems	86
Y/601/4662	472	Installing aircraft electro-optical and infrared systems	86
H/601/4664	473	Installing aircraft instrumentation systems	86
K/601/4665	474	Modifying aircraft electrical systems	77
H/601/4681	475	Modifying aircraft avionics systems	77
K/601/4682	476	Testing aircraft cableforms/looms	55
M/601/4683	477	Testing aircraft visual display units and computer systems	55
T/601/4684	478	Testing aircraft engine control units	55
A/601/4685	479	Testing aircraft communication systems	55
J/601/4687	480	Testing aircraft flight guidance and control systems	55
R/601/4689	481	Testing aircraft navigational systems	55
L/601/4691	482	Testing aircraft radar systems	55

R/601/4692	483	Testing aircraft countermeasure systems	55
D/601/4694	484	Testing aircraft electro-optical and infrared systems	55
H/601/4695	485	Testing aircraft instrumentation systems	55
K/601/4696	486	Producing aircraft wiring layouts and routings	35
T/601/4698	487	Producing aircraft electrical sub-assemblies, cableforms and looms	86
H/601/4700	488	Modifying aircraft cableforms and looms	77

To achieve the **Level 3 NVQ Diploma in Aeronautical Engineering (Aircraft Power Plant Assembly, Installation and Testing)**, learners must achieve a minimum of **118** credits and a minimum of **2** units from the optional units.

Learners **must** also achieve the mandatory units (001-002, 403-404) and one of the Performing Engineering Operations pathways.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Optional			
F/601/4476	431	Producing aircraft engine compressor assemblies	95
R/601/4479	432	Producing aircraft engine combustion assemblies	126
R/601/4482	433	Producing aircraft engine turbine assemblies	84
T/601/4488	434	Producing aircraft engine gearbox assemblies	95
Y/601/4497	435	Producing aircraft piston engine assemblies	95
Y/601/4502	436	Producing aircraft engine major assemblies	147
K/601/4505	437	Dressing aircraft engines	63
F/601/4526	449	Installing aircraft main engines	95
M/601/4537	452	Testing installed aircraft engines	55
K/601/4889	561	Carrying out test bed runs on aircraft engines (uninstalled)	150

To achieve the **Level 3 Diploma in Aeronautical Engineering (Installing Aircraft Interiors)**, learners must achieve a minimum of **120** credits and a minimum of **4** units from the optional units.

Learners **must** also achieve the mandatory units (001-002, 403-404) and one of the Performing Engineering Operations pathways.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Optional			
H/601/4390	417	Installing aircraft domestic equipment	71
F/601/4395	418	Installing aircraft lockers and storage units	35
A/601/4413	419	Installing aircraft interior panels and soft furnishings	30
R/601/4417	420	Installing aircraft seating and furniture	30
R/6014420	421	Cutting and shaping soft furnishing materials	25

To achieve the **Level 3 NVQ Diploma in Aeronautical Engineering (Aircraft Surface Finishing)**, learners must achieve a minimum of **132** credits and a minimum of **4** units from the optional units.

Learners **must** also achieve the mandatory units (001-002, 403-404) and one of the Performing Engineering Operations pathways.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Optional			
K/601/4701	489	Applying aircraft paint finishes by hand	46
T/601/4703	490	Applying aircraft paint finishes by spray guns	46
A/601/4704	491	Applying transfers, decals and livery to aircraft	20
J/601/4706	492	Stripping and removing aircraft finishes	20
L/601/4707	493	Applying finishes to aircraft composite mouldings	46

To achieve the **Level 3 Diploma in Aeronautical Engineering (Survival Equipment Maintenance)**, learners must achieve a minimum of **140** credits and **5** units from the optional units.

Learners **must** also achieve the mandatory units (001-002, 403-404) and one of the Performing Engineering Operations pathways.

Unit accreditation number	City & Guilds unit	Unit title	Credit value
Optional			
L/601/4710	494	Carrying out maintenance of aircrew protective helmets and electrical headsets	28
M/601/4716	495	Carrying out maintenance of aircrew protective clothing	28
F/601/4719	496	Carrying out maintenance of aircrew nuclear, biological and chemical (NBC) respirators and equipment	30
F/601/4722	497	Carrying out maintenance of aircrew life preserver equipment	30
J/601/4723	498	Carrying out maintenance of aircrew inertia reels and restraint harnesses	28
R/601/4725	499	Carrying out maintenance of aircraft multi-seat life rafts and emergency packs	30
D/601/4727	500	Carrying out maintenance of aircrew oxygen masks	30
M/601/4733	501	Carrying out maintenance of aircrew personal survival packs (PSP)	28
T/601/4734	502	Carrying out maintenance of aircrew quick-release fasteners (QRF)	28
A/601/4735	503	Carrying out maintenance of ejection seat headbox parachute assemblies	30
J/601/5175	598	Carrying out maintenance of free fall parachute assemblies	30
R/601/5177	599	Carrying out maintenance of static line parachute assemblies	30
H/601/5183	600	Carrying out maintenance of brake parachute assemblies	30
A/601/5187	601	Carrying out maintenance of night vision goggles	28

To achieve the **Level 3 Diploma in Aeronautical Engineering (Weapons Maintenance)**, learners must achieve a minimum of **233** credits. Learners must obtain **either**:

- a minimum of **100** credits from Optional Group 1 and a minimum of **166** credits from Optional Group 2 **or**
- a minimum of **100** credits from Optional Group 1, a minimum of **50** credits from Optional Group 3 and a minimum of **83** credits from Optional Group 4.

Learners **must** also achieve the mandatory units (001-002, 403-404) and one of the Performing Engineering Operations pathways.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Optional Group 1			
F/601/4736	504	Testing uninstalled aircraft assisted escape system (AAES) components	53
J/601/4737	505	Testing installed aircraft armament systems	53
L/601/4738	506	Testing uninstalled aircraft armament system components	53
R/601/4739	507	Undertaking fault diagnosis on installed aircraft armament systems	50
J/601/4740	508	Undertaking fault diagnosis on uninstalled aircraft armament system components	50
L/601/4741	509	modifying aircraft armament systems and components	50
Y/601/4743	510	Testing installed aircraft assisted escape systems (AAES)	53
Optional Group 2			
D/601/4744	511	Overhauling aircraft gun systems	83
H/601/4745	512	Overhauling aircraft assisted escape systems (AAES)	83
K/601/4746	513	Overhauling aircraft armament release systems	83
Optional Group 3			
M/601/4747	514	Removing aircraft armament system components	50
T/601/4748	515	Removing aircraft assisted escape systems (AAES)	50
A/601/4749	516	Removing aircraft armament expendable stores	55
R/601/6104	609	Dismantling aircraft armament expendable stores	55

Optional Group 4			
M/601/4750	517	Installing aircraft armament system components	83
T/601/4751	518	Installing aircraft assisted escape systems (AAES)	83
A/601/4752	519	Installing aircraft armament expendable stores	83
H/601/6107	610	Assembling aircraft armament expendable stores	83

To achieve the **Level 3 Diploma in Aeronautical Engineering (Avionics Maintenance)**, learners must achieve a minimum of **360** credits. Learners must achieve **93** credits from the Mandatory Unit group, plus a minimum of **161** credits from Optional Group 1 and a minimum of **106** credits from Optional Group 2.

Learners **must** also achieve the mandatory units (001-002, 403-404) and one of the Performing Engineering Operations pathways.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Mandatory			
F/601/4753	520	Carrying out fault diagnosis on aircraft avionics components or systems	53
J/601/4754	521	Undertaking scheduled maintenance of aircraft avionics equipment/systems	40
Optional Group 1			
R/601/4756	522	Removing and replacing avionic indication and gauging components in aircraft systems	86
H/601/4759	523	Removing and replacing components of aircraft electrical power control, distribution and protection systems	86
D/601/4761	524	Removing and replacing components of aircraft pitot static systems	86
H/601/4762	525	Removing and replacing components of aircraft armament systems	86
K/601/4763	526	Removing and replacing components of aircraft communication systems	86
T/601/4765	527	Removing and replacing components of aircraft passive warning and optical/surveillance systems	86
F/601/4767	528	Removing and replacing components of aircraft radar systems	86
L/601/4769	529	Removing and replacing components of aircraft navigational and computing systems	86
J/601/4771	530	Removing and replacing components of aircraft flight guidance and control systems	86
L/601/4772	531	Removing and replacing components of aircraft internal and external lighting systems	84
R/601/4773	532	Modifying aircraft avionic systems	77

Optional Group 2			
Y/601/4774	533	Carrying out tests on avionic indication and gauging components of aircraft systems	53
H/601/4776	534	Carrying out tests on aircraft electrical power control, distribution and protection systems	53
M/601/4781	535	Carrying out tests on aircraft pitot static systems	53
A/601/4783	536	Carrying out tests on aircraft communication systems	53
F/061/4784	537	Carrying out tests on aircraft passive warning and optical/surveillance systems	53
R/601/4787	538	Carrying out tests on aircraft radar systems	53
D/601/4789	539	Carrying out tests on aircraft navigational and computing systems	53
Y/601/4791	540	Carrying out tests on aircraft flight guidance and control systems	53

To achieve the **Level 3 Diploma in Aeronautical Engineering (Aircraft Mechanical Maintenance)**, learners must achieve a minimum of **321** credits. Learners must achieve **93** credits from the Mandatory Unit group, plus a minimum of **122** credits from Optional Unit group 1 and a minimum of **106** credits from Optional Unit Group 2.

Learners **must** also achieve the mandatory units (001-002, 403-404) and one of the Performing Engineering Operations pathways.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Mandatory			
Y/601/4807	541	Carrying out fault diagnosis on aircraft airframe, mechanical components and systems	53
H/601/4809	542	Undertaking scheduled maintenance of aircraft airframe and mechanical equipment	40
Optional Group 1			
A/601/4380	413	Repairing airframes and structures	62
F/601/4381	414	Modifying airframes	60
H/601/4812	543	Removing and replacing aircraft power plant and components	89
M/601/4814	544	Removing and replacing components of aircraft control systems	89
A/601/4816	545	Removing and replacing components of aircraft fuel and lubrication systems	89
J/601/4818	546	Removing and replacing components of aircraft hydraulic systems	89
J/601/4821	547	Removing and replacing components of aircraft pneumatic and vacuum systems	89
R/601/4823	548	Removing and replacing components of aircraft environmental systems	89
D/601/4825	549	Removing and replacing components of aircraft power transmission systems	89
M/601/4828	550	Removing and replacing components of aircraft cabin systems, equipment and furnishings	77
M/601/4831	551	Removing and replacing major assemblies of aircraft airframes	89
T/601/4832	552	Modifying aircraft propulsion equipment and systems	77

Optional Group 2			
L/601/4836	553	Carrying out tests on aircraft engines and systems	55
Y/601/4841	554	Carrying out tests on aircraft control systems	53
H/601/4857	555	Carrying out tests on aircraft fuel and storage systems	55
L/601/4870	556	Carrying out tests on aircraft hydraulic systems	55
Y/601/4872	557	Carrying out tests on aircraft pneumatic and vacuum systems	55
A/601/4878	558	Carrying out tests on aircraft environmental systems	55
J/601/4883	559	Carrying out tests on aircraft power transmission systems	55
H/601/4888	560	Carrying out checks and tests on replaced airframe major assemblies	53

To achieve the **Level 3 Diploma in Aeronautical Engineering (Aircraft Engine Overhaul)**, learners must achieve a minimum of **143** credits and a minimum of **2** units from the optional units.

Learners **must** also achieve the mandatory units (001-002, 403-404) and one of the Performing Engineering Operations pathways.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Optional			
K/601/4505	437	Dressing aircraft engines	63
K/601/4889	561	Carrying out test bed runs on aircraft engines (uninstalled)	150
J/601/4902	562	Overhauling aircraft gas turbine engines by module replacement	150
J/601/4916	563	Overhauling aircraft gas turbine engine compressor assemblies	135
Y/601/4919	564	Overhauling aircraft gas turbine engine combustion assemblies	150
Y/601/4970	565	Overhauling aircraft gas turbine engine turbine assemblies	125
H/601/4972	566	Overhauling aircraft gas turbine engine gearbox assemblies	125
J/601/4981	567	Overhauling aircraft piston engines	125
A/601/6114	612	Dismantling aircraft gas turbine engines to module/unit level	80
T/601/6127	613	Rebuilding aircraft gas turbine engines assemblies after overhaul	150

To achieve the **Level 3 Diploma in Aeronautical Engineering (Aircraft Mechanical Component Overhaul)**, learners must achieve a minimum of **125** credits from the optional units.

Learners **must** also achieve the mandatory units (001-002, 403-404) and one of the Performing Engineering Operations pathways.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Optional			
K/601/4987	568	Overhauling components of aircraft rotor heads, blades and power transmission equipment	135
M/601/4988	569	Overhauling components of aircraft hydraulic equipment	135
R/601/5034	570	Overhauling components of aircraft pneumatic, vacuum and environmental equipment	135
Y/601/5035	571	Overhauling components of aircraft oxygen equipment	135
A/601/5044	572	Overhauling components of aircraft fuel and lubrication equipment	135
D/601/5053	573	Overhauling major components of aircraft airframes	125

To achieve the **Level 3 Diploma in Aeronautical Engineering (Avionic Component Overhaul)**, learners must achieve a minimum of **120** credits from the optional units.

Learners **must** also achieve the mandatory units (001-002, 403-404) and one of the Performing Engineering Operations pathways.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Optional			
J/601/5113	574	Overhauling components of aircraft navigational and computing equipment	125
T/601/5138	575	Overhauling components of aircraft communication equipment	125
A/601/5139	576	Overhauling components of aircraft radar equipment	125
M/601/5140	577	Overhauling components of aircraft indication and gauging equipment	125
T/601/5141	578	Overhauling components of aircraft electrical equipment	125
F/601/5143	579	Overhauling components of aircraft pitot static equipment	125
R/601/5146	580	Overhauling components of aircraft passive warning and optical/surveillance systems	125
Y/601/5147	581	Overhauling components of aircraft flight guidance and control equipment	125
D/601/5148	582	Overhauling components of aircraft internal and external lighting equipment	120
T/601/6130	614	Overhauling components of aircraft avionic equipment	125

To achieve the **Level 3 Diploma in Aeronautical Engineering (Aircraft Technical Design and Development)**, learners must achieve a minimum of **213** credits. Learners must achieve a minimum of **53** credits from Optional Group 1 and a minimum of **160** credits from Optional Group 2.

Learners **must** also achieve the mandatory units (001-002, 403-404) and one of the Performing Engineering Operations pathways.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Optional Group 1			
Y/601/5150	583	Producing aeronautical electrical engineering drawings using computer aided techniques	150
H/601/5152	584	Producing aeronautical electronic engineering drawings using computer aided techniques	150
K/601/5153	585	Producing aeronautical mechanical engineering drawings using computer aided techniques	150
M/601/5154	586	Producing Aeronautical Engineering Drawings/Models using 3D Computer Aided Techniques	150
T/601/5155	587	Development Testing Aeronautical Electronic Equipment	53
Optional Group 2			
A/601/5156	588	Monitoring aeronautical engineering activities	40
F/601/5157	589	Planning aeronautical engineering activities	40
J/601/5158	590	Producing technical details for aeronautical engineering activities	40
L/601/5159	591	Obtaining resources for aeronautical engineering activities	40
L/601/5162	592	Implementing aeronautical engineering activities	40
Y/601/5164	593	Implementing quality assurance systems in an aeronautical engineering environment	40
H/601/5166	594	Rectifying aeronautical engineering problems	40
T/601/5169	595	Providing technical guidance on Aeronautical engineering activities	40
K/601/5170	596	Carrying out project management of aeronautical engineering activities	40

To achieve the **Level 3 Diploma in Aeronautical Engineering (On Aircraft Maintenance)**, learners must achieve a minimum of **289** credits. Learners must achieve a minimum of **15** credits from Optional Group 1 and a minimum of **274** credits and **4** units from Optional Group 2.

Learners **must** also achieve the mandatory units (001-002, 403-404) and one of the Performing Engineering Operations pathways.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Optional Group 1			
Y/601/6136	701	Lifting and trestling/shoring aircraft for maintenance/repair operations	15
K/601/6142	702	Levelling and weighing aircraft	15
F/601/6146	703	Towing, marshalling and parking aircraft	15
R/601/6152	704	Carrying out flight servicing and routine maintenance of aircraft	40
Optional Group 2			
K/601/6156	705	Maintaining air conditioning systems on aircraft (ATA 21)	86
A/601/6159	706	Maintaining auto flight systems on aircraft (ATA 22)	86
F/601/6163	707	Maintaining communication systems on aircraft (ATA 23)	86
L/601/6165	708	Maintaining electrical power systems on aircraft (ATA 24)	86
D/601/6168	709	Maintaining equipment and furnishings on aircraft (ATA 25)	77
H/601/6172	710	Maintaining fire protection systems on aircraft (ATA 26)	77
F/601/6177	711	Maintaining flight control systems on aircraft (ATA 27)	86
L/601/6182	712	Maintaining fuel systems on aircraft (ATA 28)	86
H/601/6186	713	Maintaining hydraulic systems on aircraft (ATA 29)	86
M/601/6188	714	Maintaining ice and rain protection systems on aircraft (ATA 30)	86
A/601/6193	715	Maintaining indicating and recording systems on aircraft (ATA 31)	86
J/601/6195	716	Maintaining landing gear on aircraft (ATA 32)	86

L/601/6201	717	Maintaining lighting systems on aircraft (ATA 33)	86
R/601/6202	718	Maintaining navigation systems on aircraft (ATA 34)	86
M/601/6210	719	Maintaining oxygen systems on aircraft (ATA 35)	86
L/601/6215	720	Maintaining pneumatic systems on aircraft (ATA 36)	86
D/601/6221	721	Maintaining vacuum systems on aircraft (ATA 37)	86
T/601/6225	722	Maintaining water and waste systems on aircraft (ATA 38)	86
L/601/6232	723	Maintaining cabin systems on aircraft (ATA 44)	86
M/601/6238	724	Maintaining airborne auxiliary power systems on aircraft (ATA 49)	86
L/601/6246	725	Maintaining cargo and accessory compartments on aircraft (ATA 50)	55
K/601/6254	726	Maintaining doors on aircraft (ATA 52)	86
J/601/6259	727	Maintaining fuselage, nacelles and pylons on aircraft (ATA 53 & 54)	71
R/601/6264	728	Maintaining stabilisers on aircraft (ATA 55)	77
K/601/6268	729	Maintaining windows on aircraft (ATA 56)	77
K/601/6271	730	Maintaining wings on aircraft (ATA 57)	86
F/601/6275	731	Maintaining propeller/propulsor systems on aircraft (ATA 61)	86
H/601/6284	732	Maintaining rotor systems on rotorcraft (ATA 62 & 64)	86
A/601/6288	733	Maintaining rotor drives systems on rotorcraft (ATA 63 & 65)	86
F/601/6292	734	Maintaining rotor blade and tail pylon folding systems on rotorcraft (ATA 66)	86
L/601/6294	735	Maintaining flight control systems on rotorcraft (ATA 67)	86
H/601/6298	736	Maintaining power plant on aircraft (ATA 71)	86
K/601/6299	737	Maintaining turbine engines on aircraft (ATA 72)	86
M/601/6336	738	Maintaining reciprocating engines on aircraft (ATA 72)	86
F/601/6339	739	Maintaining engine fuel and control systems on aircraft (ATA 73)	86
T/601/6340	740	Maintaining ignition systems on aircraft (ATA 74)	71
F/601/6342	741	Maintaining bleed air systems on aircraft (ATA 75)	77

R/601/6345	742	Maintaining engine controls on aircraft (ATA 76)	86
H/601/6348	743	Maintaining engine indicating systems on aircraft (ATA 77)	86
D/601/6350	744	Maintaining engine exhaust systems on aircraft (ATA 78)	77
T/601/6354	745	Maintaining lubricating oil systems on aircraft (ATA 79)	77
L/601/6358	746	Maintaining engine starting systems on aircraft (ATA 80)	77
Y/601/6363	747	Maintaining reciprocating engine turbo-supercharging systems on aircraft (ATA 81)	77
M/601/6370	748	Maintaining engine water injection systems on aircraft	77
A/601/6372	749	Maintaining radar systems on aircraft	86

Total Qualification Time

Total Qualification Time (TQT) is the total amount of time, in hours, expected to be spent by a Learner to achieve a qualification. It includes both guided learning hours (which are listed separately) and hours spent in preparation, study and assessment.

Title and level	GLH	TQT
Level 3 NVQ Extended Diploma In Aeronautical Engineering	441	1650



2 Centre requirements

Approval

Centres currently offering the City & Guilds NVQ in Aeronautical Engineering (1789) will be automatically approved to run this new qualification.

To offer this qualification new centres will need to gain both centre and qualification approval. Please refer to the *Centre Manual - Supporting Customer Excellence* for further information.

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualification before designing a course programme.

Resource requirements

Physical resources and site agreements

Centres can use specially designated areas within a centre to assess, for example, the installation of specialised electrical systems, alignment and setting up of electric motors and driven devices (pumps, compressors and generators). The equipment, systems and machinery must meet industrial standards and be capable of being used under normal working conditions, for example electric motors must have a method of applying sufficient power and not be connected up to show movement.

Centre staffing

Staff delivering this qualification must be able to demonstrate that they meet the following occupational expertise requirements. They should:

- be occupationally competent or technically knowledgeable in the area for which they are delivering training and/or have experience of providing training; this knowledge must be to the same level as the training being delivered
- have recent relevant experience in the specific area they will be assessing
- have credible experience of providing training.

Centre staff may undertake more than one role, eg tutor and assessor or internal verifier, but cannot internally verify their own assessments.

Assessors and internal verifier

Assessor requirements to demonstrate effective assessment practice

Assessment must be carried out by competent Assessors that as a minimum must hold the Level 3 Award in Assessing Competence in the Work Environment. Current and operational assessors that hold units D32 and/or D33 or A1 and/or A2 as appropriate for the assessment

requirements set out in this Unit Assessment Strategy. However, they will be expected to regularly review their skills, knowledge and understanding and where applicable undertake continuing professional development to ensure that they are carrying out workplace assessment to the most up to date National Occupational Standards (NOS).

Assessor technical requirements

Assessors must be able to demonstrate that they have verifiable, relevant and sufficient technical competence to evaluate and judge performance and knowledge evidence requirements as set out in the relevant unit learning outcomes and associated assessment criteria.

This will be demonstrated either by holding a relevant technical qualification or by proven industrial experience of the technical areas to be assessed. The assessor's competence must, at the very least, be at the same level as that required of the learner(s) in the units being assessed.

Assessors must also be fully conversant with the Awarding Organisation's assessment recording documentation used for the NVQ units against which the assessments and verification are to be carried out, other relevant documentation and system and procedures to support the QA process.

Verifier requirements (internal and external)

Internal quality assurance (**Internal Verification**) must be carried out by competent Verifiers that as a minimum must hold the Level 4 Award in the Internal Quality Assurance of Assessment Processes and Practices. Current and operational Internal Verifiers that hold internal verification units V1 or D34 will not be required to achieve the Level 4 Award as they are still appropriate for the verification requirements set out in this Unit Assessment Strategy. Verifiers must be familiar with, and preferably hold, either the nationally recognised Assessor units D32 and/or D33 or A1 and/or A2 or the Level 3 Award in Assessing Competence in the Work Environment.

External quality assurance (**External Verification**) must be carried out by competent External Verifiers that as a minimum must hold the Level 4 Award in the External Quality Assurance of Assessment Processes and Practices. Current and operational External Verifiers that hold external verification units V2 or D35 will not be required to achieve the Level 4 Award as they are still appropriate for the verification requirements set out in this Unit Assessment Strategy. Verifiers must be familiar with, and preferably hold, either the nationally recognised Assessor units D32 and/or D33 or A1 and/or A2 or the Level 3 Award in Assessing Competence in the Work Environment.

External and Internal Verifiers will be expected to regularly review their skills, knowledge and understanding and where applicable undertake continuing professional development to ensure that they are carrying out workplace Quality Assurance (verification) of Assessment Processes and Practices to the most up to date National Occupational Standards (NOS). Verifiers, both Internal and External, will also be expected to be fully conversant with the terminology used in the NVQ units against which the assessments and verification are to be carried out, the appropriate Regulatory Body's systems and procedures and the relevant Awarding Organisation's documentation.

Continuing Professional Development (CPD)

Centres must support their staff to ensure that they have current knowledge of the occupational area, that delivery, mentoring, training, assessment and verification is in line with best practice, and that it takes account of any national or legislative developments.

Candidate entry requirements

City & Guilds does not set entry requirements for this qualification. However, centres must ensure that candidates have the potential and opportunity to gain the qualification successfully so should have the opportunity to gather work based evidence.

The Semta Engineering Manufacture apprenticeship framework suggests that employers would be interested in candidates that:

- Are keen and motivated to work in an engineering environment
- Are willing to undertake a course of training both on-the-job and off-the-job and apply this learning in the workplace
- Have previous work experience or employment in the sector
- Have completed a 14 to 19 Diploma in Engineering or Manufacturing
- Have completed a Young Apprenticeship in Engineering or other related area
- Have GCSEs in English, Maths and Science
- Have completed tests in basic numeracy, literacy and communication skills and have spatial awareness.

As a guide, the Engineering Manufacturing framework is suitable for applicants who have five GCSEs grades D to E in English, Maths and Science. The selection process on behalf of employers may include initial assessment where applicants will be asked if they have any qualifications or experience that can be accredited against the requirements of the apprenticeship. They may also be required to take tests in basic numeracy and literacy, communications skills and spatial awareness. There may also be an interview to ensure applicants have selected the right occupational sector and are motivated to become an apprentice, as undertaking an apprenticeship is a major commitment for both the individual and the employer.

Assessment environment (extract from Semta Unit Assessment Strategy 1 January 2011)

The evidence put forward for this qualification can only be regarded valid, reliable, sufficient and authentic if achieved and obtained in the working environment and be clearly attributable to the learner. However, in certain circumstances, simulation/replication of work activities may be acceptable.

The use of high quality, realistic simulations/replication, which impose pressures which are consistent with workplace expectations, should only be used in relation to the assessment of the following:

- Rare or dangerous occurrences, such as those associated with health, safety and the environment issues, emergency scenarios and rare operations at work.

- The response to faults and problems for which no opportunity has presented for the use of naturally occurring workplace evidence of learners competence.
- Aspects of working relationships and communications for which no opportunity has presented for the use of naturally occurring workplace evidence of learners competence.

Simulations/replications will require prior approval from centres City & Guilds external verifier/qualification consultant and should be designed in relation to the following parameters:

- The environment in which simulations take place must be designed to match the characteristics of the working environment.
- Competencies achieved via simulation/replication must be transferable to the working environment.
- Simulations which are designed to assess competence in dealing with emergencies, accidents and incidents must be verified as complying with relevant health, safety and environmental legislation by a competent health and safety/environmental control officer before being used.
- Simulated activities should place learners under the same pressures of time, access to resources and access to information as would be expected if the activity was real.
- Simulated activities should require learners to demonstrate their competence using plant and/or equipment used in the working environment.
- Simulated activities which require interaction with colleagues and contacts should require the learner to use the communication media that would be expected at the workplace.
- For health and safety reason simulations need not involve the use of genuine substances/materials. Any simulations which require the learner to handle or otherwise deal with materials substances/should ensure that the substitute takes the same form as in the workplace.

Age restrictions

Learners must be 16 years or older, otherwise there is no age restriction for this qualification unless this is a legal requirement of the process or the environment.



3 Delivering the qualification

Initial assessment and induction

An initial assessment of each candidate should be made before the start of their programme to identify:

- if the candidate has any specific training needs
- support and guidance they may need when working towards their qualification
- any units they have already completed, or credit they have accumulated which is relevant to the qualification
- the appropriate type and level of qualification.

We recommend that centres provide an induction programme so the candidate fully understands the requirements of the qualification, their responsibilities as a candidate, and the responsibilities of the centre. This information can be recorded on a learning contract.

Recording documents

Candidates and centres may decide to use a paper-based or electronic method of recording evidence.

City & Guilds endorses several ePortfolio systems, including our own, **Learning Assistant**, an easy-to-use and secure online tool to support and evidence learners' progress towards achieving qualifications. Further details are available at: www.cityandguilds.com/eportfolios.

City & Guilds has developed a set of *recording forms* including examples of completed forms, for new and existing centres to use as appropriate. *recording forms* are available on the City & Guilds website.

Although new centres are expected to use these forms, centres may devise or customise alternative forms, which must be approved for use by the external verifier, before they are used by candidates and assessors at the centre. Amendable (MS Word) versions of the forms are available on the City & Guilds website.



4 Assessment

Assessment of the qualification

The evidence put forward for this unit can only be regarded as valid, reliable, sufficient and authentic if achieved and obtained in the working environment and be clearly attributable to the learner. However, in certain circumstances, simulation/replication of work activities may be acceptable.

The use of high quality, realistic simulations/replication, which impose pressures which are consistent with workplace expectations, should only be used in relation to the assessment of the following:

- rare or dangerous occurrences, such as those associated with health, safety and the environment issues, emergency scenarios and rare operations at work;
- the response to faults and problems for which no opportunity has presented for the use of naturally occurring workplace evidence of learners competence;
- aspects of working relationships and communications for which no opportunity has presented for the use of naturally occurring workplace evidence of learners competence.

Simulations/replications will require prior approval from the specific Awarding Organisation and should be designed in relation to the following parameters:

- the environment in which simulations take place must be designed to match the characteristics of the working environment;
- competencies achieved via simulation/replication must be transferable to the working environment;
- simulations which are designed to assess competence in dealing with emergencies, accidents and incidents must be verified as complying with relevant health, safety and environmental legislation by a competent health and safety/environmental control officer before being used;
- simulated activities should place learners under the same pressures of time, access to resources and access to information as would be expected if the activity was real;
- simulated activities should require learners to demonstrate their competence using plant and/or equipment used in the working environment;
- simulated activities which require interaction with colleagues and contacts should require the learner to use the communication media that would be expected at the workplace;
- for health and safety reason simulations need not involve the use of genuine substances/materials. Any simulations which require the

learner to handle or otherwise deal with materials substances/should ensure that the substitute take the same form as in the workplace.

Carrying Out Assessment

The NVQ units were specifically developed to cover a wide range of activities. The evidence produced for the units will, therefore, depend on the learners choice of “bulleted items” listed in the unit assessment criteria.

Where the assessment criteria gives a choice of bulleted items (for example ‘any three from five’), assessors should note that learners do not need to provide evidence of the other items to complete the unit (in this example, two) items, particularly where these additional items may relate to other activities or methods that are not part of the learners normal workplace activity or area of expertise.

Minimum Performance Evidence requirements

Performance evidence must be the main form of evidence gathered. In order to demonstrate consistent, competent performance for a unit, a minimum of three different examples of performance must be provided, and must be sufficient to show that the assessment criteria have been achieved to the prescribed standards. It is possible that some of the bulleted items in the assessment criteria may be covered more than once. The assessor and learner need to devise an assessment plan to ensure that performance evidence is sufficient to cover all the specified assessment criteria and which maximises the opportunities to gather evidence. Where applicable, performance evidence maybe used for more than one unit.

The most effective way of assessing competence, is through direct observation of the learner. Assessors must make sure that the evidence provided reflects the learner’s competence and not just the achievement of a training programme.

Evidence that has been produced from team activities, for example, maintenance or installation activities is only valid when it clearly relates to the learners specific and individual contribution to the activity, and not to the general outcome(s).

Each example of performance evidence will often contain features that apply to more than one unit, and can be used as evidence in any unit where appropriate.

Performance evidence must be a combination of:

- outputs of the learner’s work, such as items that have been manufactured, installed, maintained, designed, planned or quality assured, and documents produced as part of a work activity together with:
- evidence of the way the learner carried out the activities such as witness testimonies, assessor observations or authenticated learner reports, records or photographs of the work/activity carried out, etc.

Competent performance is more than just carrying out a series of individual set tasks. Many of the units contain statements that require the learner to provide evidence that proves they are capable of combining the various features and techniques. Where this is the case, separate fragments of evidence would not provide this combination of features and techniques and will not, therefore, be acceptable as demonstrating competent performance.

If there is any doubt as to what constitutes valid, authentic and reliable evidence, the internal and/or external verifier should be consulted.

Assessing knowledge and understanding

Knowledge and understanding are key components of competent performance, but it is unlikely that performance evidence alone will provide enough evidence in this area. Where the learners knowledge and understanding (and the handling of contingency situations) is not apparent from performance evidence, it must be assessed by other means and be supported by suitable evidence.

Knowledge and understanding can be demonstrated in a number of different ways. Semta expects oral questioning and practical demonstrations to be used, as these are considered the most appropriate for these units. Assessors should ask enough questions to make sure that the learner has an appropriate level of knowledge and understanding, as required by the unit.

Evidence of knowledge and understanding will **not** be required for those bulleted items in the assessment criteria that have not been selected by the learner.

The achievement of the specific knowledge and understanding requirements of the units cannot simply be inferred by the results of tests or assignments from other units, qualifications or training programmes. Where evidence is submitted from these sources, the assessor must, as with any assessment, make sure the evidence is valid, reliable, authentic, directly attributable to the learner, and meets the full knowledge and understanding requirements of the unit.

Where oral questioning is used the assessor must retain a record of the questions asked, together with the learner's answers.

Witness testimony

Where observation is used to obtain performance evidence, this must be carried out against the unit assessment criteria. Best practice would require that such observation is carried out by a qualified Assessor. If this is not practicable, then alternative sources of evidence may be used.

For example, the observation may be carried out against the assessment criteria by someone else that is in close contact with the learner. This could be a team leader, supervisor, mentor or line manager who may be regarded as a suitable witness to the learners competency. However, the witness must be technically competent in the process or skills that they

are providing testimony for, to at least the same level of expertise as that required of the learner. It will be the responsibility of the assessor to make sure that any witness testimonies accepted as evidence of the learner's competency are reliable, auditable and technically valid.

Recording forms

Candidates and centres may decide to use a paper-based or electronic method of recording evidence.

City & Guilds has developed a set of *Recording forms* including examples of completed forms, for new and existing centres to use as appropriate. **N/SVQ Recording forms** are available on the City & Guilds website.

Although it is expected that new centres will use these forms, centres may devise or customise alternative forms, which must be approved for use by the external verifier, before they are used by candidates and assessors at the centre.

City & Guilds endorses several ePortfolio systems. Further details are available at: **www.cityandguilds.com/eportfolios**.



5 Units

Availability of units

This handbook contains the mandatory units that are specific to this qualification; units 001-002, 009 – 011, 274 – 276, 403-404.

To obtain the unit pack containing units 204-273, which are taken from the City & Guilds 7682 Level 2 NVQ Diploma in Performing Engineering Operations, visit **www.cityandguilds.com** and the 1789 qualification webpage.

To obtain the Level 3 NVQ Diploma in Aeronautical Engineering Handbook containing units 405-421, 423, 426-428, 430-437, 439, 441-596, 600-614 and 701-749 visit **www.cityandguilds.com** and the 1789 qualification webpage.

Structure of units

These units each have the following:

- City & Guilds unit number
- Title
- Unit Accreditation Number (UAN)
- Level
- Credit value
- Recommended Guided Learning Hours (GLH)
- Relationship to National Occupational Standards (NOS)
- Endorsement by a sector or other appropriate body
- Unit aim(s)
- Learning outcomes which are comprised of a number of assessment criteria.
- Supporting information

Unit 001

Complying with statutory regulations and organisational safety requirements

UAN:	A/601/5013
Level:	3
Credit value:	5
GLH:	35
Relationship to NOS:	This unit has been derived from national occupational standard: Complying with statutory regulations and organisational safety requirements (Suite 2).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing.
Aim:	This unit covers the skills and knowledge needed to prove the competences required to deal with statutory regulations and organisational safety requirements. It does not deal with specific safety regulations or detailed requirements, it does, however, cover the more general health and safety requirements that apply to working in an industrial environment.

The learner will be expected to comply with all relevant regulations that apply to their area of work, as well as their general responsibilities as defined in the Health and Safety at Work Act. The learner will need to be able to identify the relevant qualified first aiders and know the location of the first aid facilities. The learner will have a knowledge and understanding of the procedures to be adopted in the case of accidents involving injury and in situations where there are dangerous occurrences or hazardous malfunctions of equipment, processes or machinery. The learner will also need to be fully conversant with their organisation's procedures for fire alerts and the evacuation of premises.

The learner will also be required to identify the hazards and risks that are associated with their job. Typically, these will focus on their working environment, the tools and equipment that they use, the materials and substances that

they use, any working practices that do not follow laid-down procedures, and manual lifting and carrying techniques.

The learner's responsibilities will require them to comply with all relevant statutory and organisational policy and procedures for health and safety in the workplace. The learner must act in a responsible and safe manner at all times, and present themselves in the workplace suitably prepared for the activities to be undertaken. The learner will be expected to report any problems with health and safety issues, to the relevant authority.

The learner's knowledge will provide a good understanding of the relevant statutory regulations and organisational requirements associated with their work, and will provide an informed approach to the procedures used. The learner will need to understand their organisation's health and safety requirements and their application, in adequate depth to provide a sound basis for carrying out their activities in a safe and competent manner.

Learning outcome
The learner will: 1. be able to comply with statutory regulations and organisational safety requirements
Assessment criteria
The learner can: 1.1 comply with their duties and obligations as defined in the Health and Safety at Work Act 1.2 demonstrate their understanding of their duties and obligations to health and safety by: a. applying in principle their duties and responsibilities as an individual under the Health and Safety at Work Act b. identifying, within their organisation, appropriate sources of information and guidance on health and safety issues, such as: i. eye protection and personal protective equipment (PPE) ii. COSHH regulations iii. Risk assessments c. identifying the warning signs and labels of the main groups of hazardous or dangerous substances d. complying with the appropriate statutory regulations at all times 1.3 present themselves in the workplace suitably prepared for the activities to be undertaken 1.4 follow organisational accident and emergency procedures 1.5 comply with emergency requirements, to include: a. identifying the appropriate qualified first aiders and the location of first aid facilities

- b. identifying the procedures to be followed in the event of injury to themselves or others
 - c. following organisational procedures in the event of fire and the evacuation of premises
 - d. identifying the procedures to be followed in the event of dangerous occurrences or hazardous malfunctions of equipment
- 1.6 recognise and control hazards in the workplace
- 1.7 Identify the hazards and risks that are associated with the following:
- a. their working environment
 - b. the equipment that they use
 - c. materials and substances (where appropriate) that they use
 - d. working practices that do not follow laid-down procedures
- 1.8 use correct manual lifting and carrying techniques
- 1.9 demonstrate one of the following methods of manual lifting and carrying:
- a. lifting alone
 - b. with assistance of others
 - c. with mechanical assistance
- 1.10 apply safe working practices and procedures to include:
- a. maintaining a tidy workplace, with exits and gangways free from obstruction
 - b. using equipment safely and only for the purpose intended
 - c. observing organisational safety rules, signs and hazard warnings
 - d. taking measures to protect others from any harm resulting from the work that they are carrying out.

Learning outcome
The learner will: 2. know how to comply with statutory regulations and organisational safety requirements
Assessment criteria
The learner can: 2.1 describe the roles and responsibilities of themselves and others under the Health and Safety at Work Act, and other current legislation (such as The Management of Health and Safety at Work Regulations, Workplace Health and Safety and Welfare Regulations, Personal Protective Equipment at Work Regulations, Manual Handling Operations Regulations, Provision and Use of Work Equipment Regulations, Display Screen at Work Regulations, Reporting of Injuries, Diseases and Dangerous Occurrences Regulations) 2.2 describe the specific regulations and safe working practices and procedures that apply to their work activities 2.3 describe the warning signs for the nine main groups of hazardous substances defined by Classification, Packaging and Labelling of Dangerous Substances Regulations 2.4 explain how to locate relevant health and safety information for their tasks, and the sources of expert assistance when help is needed 2.5 explain what constitutes a hazard in the workplace (such as moving parts of machinery, electricity, slippery and uneven surfaces, poorly placed equipment, dust and fumes, handling and transporting, contaminants and irritants, material ejection, fire, working at height, environment, pressure/stored energy systems, volatile, flammable or toxic materials, unshielded processes, working in confined spaces) 2.6 describe their responsibilities for identifying and dealing with hazards and reducing risks in the workplace 2.7 describe the risks associated with their working environment (such as the tools, materials and equipment that they use, spillages of oil, chemicals and other substances, not reporting accidental breakages of tools or equipment and not following laid-down working practices and procedures) 2.8 describe the processes and procedures that are used to identify and rate the level of risk (such as safety inspections, the use of hazard checklists, carrying out risk assessments, COSHH assessments) 2.9 describe the first aid facilities that exist within their work area and within the organisation in general; the procedures to be followed in the case of accidents involving injury 2.10 explain what constitute dangerous occurrences and hazardous malfunctions, and why these must be reported even if no-one is injured 2.11 describe the procedures for sounding the emergency alarms, evacuation procedures and escape routes to be used, and the need to report their presence at the appropriate assembly point 2.12 describe the organisational policy with regard to fire fighting procedures; the common causes of fire and what they can do to help prevent them

- 2.13 describe the protective clothing and equipment that is available for their areas of activity
- 2.14 explain how to safely lift and carry loads, and the manual and mechanical aids available
- 2.15 explain how to prepare and maintain safe working areas; the standards and procedures to ensure good housekeeping
- 2.16 describe the importance of safe storage of tools, equipment, materials and products
- 2.17 describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve.

Unit 001 Complying with statutory regulations and organisational safety requirements

Supporting information

Guidance

2.1 (such as The Management of Health and Safety at Work Regulations, Workplace Health and Safety and Welfare Regulations, Personal Protective Equipment at Work Regulations, Manual Handling Operations Regulations, Provision and Use of Work Equipment Regulations, Display Screen at Work Regulations, Reporting of Injuries, Diseases and Dangerous Occurrences Regulations)

2.5 (such as moving parts of machinery, electricity, slippery and uneven surfaces, poorly placed equipment, dust and fumes, handling and transporting, contaminants and irritants, material ejection, fire, working at height, environment, pressure/stored energy systems, volatile, flammable or toxic materials, unshielded processes, working in confined spaces)

2.7 (such as the tools, materials and equipment that they use, spillages of oil, chemicals and other substances, not reporting accidental breakages of tools or equipment and not following laid-down working practices and procedures)

2.8 (such as safety inspections, the use of hazard checklists, carrying out risk assessments, COSHH assessments)

Unit 002

Using and interpreting engineering data and documentation

UAN:	Y/601/5102
Level:	2
Credit value:	5
GLH:	25
Relationship to NOS:	This unit has been derived from national occupational standard: Using and interpreting engineering data and documentation (Suite 2).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing.
Aim:	<p>This unit covers the skills and knowledge needed to prove the competences required to make effective use of text, numeric and graphical information, by interpreting and using technical information extracted from documents such as engineering drawings, technical manuals, reference tables, specifications, technical sales/marketing documentation, charts or electronic displays, in accordance with approved procedures. The learner will be required to extract the necessary information from the various documents, in order to establish and carry out the work requirements, and to make valid decisions about the work activities based on the information extracted.</p>

The learner's responsibilities will require them to comply with organisational policy and procedures for obtaining and using the documentation applicable to the activity. They will be expected to report any problems with the use and interpretation of the documents that they cannot personally resolve, or are outside their permitted authority, to the relevant people. They will be expected to work to instructions if necessary, with an appropriate level of supervision or as a member of a team, and take personal responsibility for their own actions and for the quality and accuracy of the work that they carry out.

The learner's underpinning knowledge will provide a good understanding of the types of documentation used, and will provide an informed approach to applying instructions and procedures. They will be able to read and interpret the documentation used and will know about the conventions, symbols and abbreviations, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

Learning outcome
The learner will: 1. be able to use and interpret engineering data and documentation
Assessment criteria
The learner can: 1.1 use the approved source to obtain the required data and documentation 1.2 use the data and documentation and carry out all of the following: a. check the currency and validity of the data and documentation used b. exercise care and control over the documents at all times c. correctly extract all necessary data in order to carry out the required tasks d. seek out additional information where there are gaps or deficiencies in the information obtained e. deal with or report any problems found with the data and documentation f. make valid decisions based on the evaluation of the engineering information extracted from the documents g. return all documents to the approved location on completion of the work h. complete all necessary work related documentation such as production documentation, installation documentation, maintenance documentation, planning documentation 1.3 correctly identify, interpret and extract the required information 1.4 extract information that includes three of the following: a. materials or components required b. dimensions c. tolerances d. build quality e. installation requirements f. customer requirements g. time scales h. financial information i. operating parameters j. surface texture requirements k. location/orientation of parts l. process or treatments required m. dismantling/assembly sequence n. inspection/testing requirements

- o. number/volumes required
 - p. repair/service methods
 - q. method of manufacture
 - r. weld type and size
 - s. operations required
 - t. connections to be made
 - u. surface finish required
 - v. shape or profiles
 - w. fault finding procedures
 - x. safety/risk factors
 - y. environmental controls
 - z. specific data (such as component data, maintenance data, electrical data, fluid data)
 - aa. resources (such as tools, equipment, personnel)
 - bb. utility supply details (such as electricity, water, gas, air)
 - cc. location of services, including standby and emergency backup systems
 - dd. circuit characteristics (such as pressure, flow, current, voltage, speed)
 - ee. protective arrangements and equipment (such as containment, environmental controls, warning and evacuation systems and equipment)
 - ff. other specific related information
- 1.5 use the information obtained to ensure that work output meets the specification
- 1.6 use information extracted from documents to include one from the following:
- a. drawings
 - b. diagrams
 - c. manufacturers manuals/drawings
 - d. approved sketches
 - e. technical illustrations
 - f. photographic representations
 - g. visual display screen information
 - h. technical sales/marketing documentation
 - i. contractual documentation
 - j. other specific drawings/documents
- 1.7 use information extracted from related documentation, to include two from the following:
- a. instructions
 - b. specifications
 - c. reference materials
 - d. schedules
 - e. operation sheets
 - f. service/test information
 - g. planning documentation
 - h. quality control documents
 - i. company specific technical instructions
 - j. national, international and organisational standards
 - k. health and safety standards relating to the activity (such as COSHH)

<ul style="list-style-type: none"> l. other specific related documentation <p>1.8 deal promptly and effectively with any problems within their control and report those which cannot be solved</p> <p>1.9 report any inaccuracies or discrepancies in documentation and specifications.</p>
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Learning outcome
The learner will:
2. know how to use and interpret engineering data and documentation
Assessment criteria
The learner can:
2.1 explain what information sources are used for the data and documentation that they use in their work activities
2.2 explain how documents are obtained, and how to check that they are current and valid
2.3 explain the basic principles of confidentiality (including what information should be available and to whom)
2.4 describe the different ways/formats that data and documentation can be presented
2.5 explain how to use other sources of information to support the data
2.6 describe the importance of differentiating fact from opinion when reviewing data and documentation
2.7 describe the importance of analysing all available data and documentation before decisions are made
2.8 describe the different ways of storing and organising data and documentation to ensure easy access
2.9 describe the procedures for reporting discrepancies in the data or documentation, and for reporting lost or damaged documents
2.10 describe the importance of keeping all data and documentation up to date during the work activity, and the implications of this not being done
2.11 explain the care and control procedures for the documents, and how damage or graffiti on documents can lead to scrapped work
2.12 explain the importance of returning documents to the designated location on completion of the work activities
2.13 explain what basic drawing conventions are used and why there needs to be different types of drawings (such as isometric and orthographic, first and third angle, assembly drawings, circuit and wiring diagrams, block and schematic diagrams)
2.14 explain what types of documentation are used and how they interrelate
2.15 explain the imperial and metric systems of measurement; tolerancing and fixed reference points
2.16 describe the meaning of the different symbols and abbreviations found on the documents that they use
2.17 describe the extent of their own responsibility, when to act on their own initiative to find, clarify and evaluate information, and to whom they should report if they have problems that they cannot resolve.

Unit 002 Using and interpreting engineering data and documentation

Supporting information

Guidance

1.6 drawings (such as component drawings, assembly drawings, modification drawings, repair drawings, welding/fabrication drawings, distribution and installation drawings) diagrams (such as schematic, fluid power diagrams, piping, wiring/circuit diagrams)

1.7 instructions (such as job instructions, drawing instructions, manufacturers instructions), specifications (such as material, finish, process, contractual, calibration), reference materials (such as manuals, tables, charts, guides, notes)

2.4 (such as such as drawings, job instructions product data sheets, manufacturers' manuals, financial spreadsheets, production schedules, inspection and calibration requirements, customer information)

2.5 (such as electronic component pin configuration specifications, reference charts, standards, bend allowances required for material thickness, electrical conditions required for specific welding rods, mixing ratios for bonding and finishing materials, metal specifications and inspection requirements, health and safety documentation)

2.14 (such as production drawings, assembly drawings, circuit and wiring diagrams, block and schematic diagrams)

2.16 (such as surface finish, electronic components, weld symbols, linear and geometric tolerances, pressure and flow characteristics)

Unit 403

Working efficiently and effectively in engineering

UAN:	K/601/5055
Level:	3
Credit value:	5
GLH:	25
Relationship to NOS:	This unit has been derived from national occupational standard: working efficiently and effectively in engineering (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing.
Aim:	<p>This unit covers the skills and knowledge needed to prove the competences required to work efficiently and effectively in the workplace, in accordance with approved procedures and practices. Prior to undertaking the engineering activity, the learner will be required to carry out all necessary preparations within the scope of their responsibility. This may include preparing the work area and ensuring that it is in a safe condition to carry out the intended activities, ensuring they have the appropriate job specifications and instructions and that any tools, equipment, materials and other resources required are available and in a safe and usable condition.</p> <p>On completion of the engineering activity, the learner will be required to return their immediate work area to an acceptable condition before recommencing further work requirements. This may involve placing completed work in the correct location, returning and/or storing any tools and equipment in the correct area, identifying any waste and/or scrapped materials and arranging for their disposal, and reporting any defects or damage to tools and equipment used.</p> <p>In order to be efficient and effective in the workplace, the learner will also be required to demonstrate that they can create and maintain effective working relationships with colleagues and line management. The learner will also be expected to review objectives and targets for</p>

their personal development and make recommendations to, and communicate any opportunities for, improvements that could be made to working practices and procedures.

The learner's responsibilities will require them to comply with organisational policy and procedures for the engineering activities undertaken, and to report any problems with the activities, or the tools and equipment that are used that they cannot personally resolve, or are outside their permitted authority, to the relevant people. The learner will be expected to take personal responsibility for their own actions and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to working efficiently and effectively in an engineering environment. The learner will understand the need to work efficiently and effectively, and will know about the areas they need to consider when preparing and tidying up the work area, how to contribute to improvements, deal with problems, maintain effective working relationships and agree their development objectives and targets, in adequate depth to provide a sound basis for carrying out the activities safely and correctly.

The learner will understand the safety precautions required when carrying out engineering activities. The learner will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Learning outcome
The learner will: 1. be able to work efficiently and effectively in engineering
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 prepare the work area to carry out the engineering activity 1.3 prepare to carry out the engineering activity, taking into consideration all of the following, as applicable to the work to be undertaken: a. the work area is free from hazards and is suitably prepared for the activities to be undertaken b. any required safety procedures are implemented

- c. any necessary personal protection equipment is obtained and is in a usable condition
 - d. tools and equipment required are obtained and checked that they are in a safe and useable condition
 - e. all necessary drawings, specifications and associated documentation is obtained
 - f. job instructions are obtained and understood
 - g. the correct materials or components are obtained
 - h. storage arrangements for work are appropriate
 - i. appropriate authorisation to carry out the work is obtained
- 1.4 check that there are sufficient supplies of materials and/or consumables and that they meet work requirements
- 1.5 ensure that completed products or resources are stored in the appropriate location on completion of the activities
- 1.6 complete work activities, to include all of the following:
- a. completing all necessary documentation accurately and legibly
 - b. returning tools and equipment
 - c. returning drawings and work instructions
 - d. identifying, where appropriate, any unusable tools, equipment or components
 - e. arranging for disposal of waste materials
- 1.7 tidy up the work area on completion of the engineering activity
- 1.8 deal promptly and effectively with problems within their control and report those that cannot be resolved
- 1.9 deal with problems affecting the engineering process, to include two of the following:
- a. materials
 - b. tools and equipment
 - c. drawings
 - d. job specification
 - e. quality
 - f. people
 - g. timescales
 - h. safety
 - i. activities or procedures
- 1.10 contribute to and communicate opportunities for improvement to working practices and procedures
- 1.11 make recommendations for improving to two of the following:
- a. working practices
 - b. working methods
 - c. quality
 - d. safety
 - e. tools and equipment
 - f. supplier relationships
 - g. internal communication
 - h. customer service
 - i. training and development
 - j. teamwork
 - k. other
- 1.12 maintain effective working relationships with colleagues to include

two of the following:

- a. colleagues within own working group
- b. colleagues outside normal working group
- c. line management
- d. external contacts

1.13 review personal training and development as appropriate to the job role

1.14 review personal development objectives and targets to include one of the following:

- a. dual or multi-skilling
- b. training on new equipment / technology
- c. increased responsibility
- d. understanding of company working practices, procedures, plans and policies
- e. other specific requirements.

Learning outcome

The learner will:

- 2. know how to work efficiently and effectively in engineering

Assessment criteria

The learner can:

- 2.1 describe the safe working practices and procedures to be followed whilst preparing and tidying up their work area
- 2.2 describe the correct use of any equipment used to protect the health and safety of themselves and their colleagues
- 2.3 describe the procedure for ensuring that all documentation relating to the work being carried out is available and current, prior to starting the activity
- 2.4 describe the action that should be taken if documentation received is incomplete and/or incorrect
- 2.5 describe the procedure for ensuring that all tools and equipment are available prior to undertaking the activity
- 2.6 describe the checks to be carried out to ensure that tools and equipment are in full working order, prior to undertaking the activity
- 2.7 describe the action that should be taken if tools and equipment are not in full working order
- 2.8 describe the checks to be carried out to ensure that all materials required are correct and complete, prior to undertaking the activity
- 2.9 describe the action that should be taken if materials do not meet the requirements of the activity
- 2.10 explain whom to inform when the work activity has been completed
- 2.11 describe the information and/or documentation required to confirm that the activity has been completed
- 2.12 explain what materials, equipment and tools can be reused
- 2.13 explain how any waste materials and/or products are transferred, stored and disposed of
- 2.14 explain where tools and equipment should be stored and located
- 2.15 describe the importance of making recommendations for improving working practices
- 2.16 describe the procedure and format for making suggestions for

improvements

- 2.17 describe the benefits to organisations if improvements can be identified
- 2.18 describe the importance of maintaining effective working relationships within the workplace
- 2.19 describe the procedures to deal with and report any problems that can affect working relationships
- 2.20 describe the difficulties that can occur in working relationships
- 2.21 describe the regulations that affect how they should be treated at work (such as Equal Opportunities Act, Race and Sex Discrimination, Working Time Directive)
- 2.22 describe the benefits of continuous personal development
- 2.23 describe the training opportunities that are available in the workplace
- 2.24 describe the importance of reviewing their training and development
- 2.25 explain with whom to discuss training and development issues
- 2.26 describe the extent of their own responsibility and to whom they should report if they have any problems that they cannot resolve.

Unit 403 Working efficiently and effectively in engineering

Supporting information

Guidance

2.21 (such as Equal Opportunities Act, Race and Sex Discrimination, working Time Directive)

Unit 404

Reinstating the work area on completion of activities

UAN:	K/601/4228
Level:	3
Credit value:	5
GLH:	25
Relationship to NOS:	This unit has been derived from national occupational standard aeronautical engineering Unit 004: Reinstating the work Area on completion of activities (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing.
Aim:	<p>This unit covers the skills and knowledge needed to prove the competences required to reinstate the work area, in accordance with approved procedures. The learner will be required to follow the correct procedures for the safe storage of finished products and surplus materials, and to correctly identify and separate all waste materials and ensure that they are removed to their designated locations. The learner will also need to ensure that all tools, equipment and documents used are accounted for and returned to the appropriate places. Tidying of the work area will be of prime importance and includes office and clean working area environments, workshops, staging and platforms, internal areas of aircraft such as wings, tanks and fuselage sections, and areas that are airside.</p> <p>The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems with the reinstatement activities that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. The learner will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality of the work they carry out.</p> <p>The learner's knowledge will provide a good understanding of their work, and provide an informed approach to applying the required</p>

procedures. The learner will understand the need for reinstating the work areas, and will know about the storage requirements of the products, equipment, materials, documentation and consumables, in adequate depth to provide a sound basis for carrying out the activities to the required standard and ensuring that the work area is reinstated satisfactorily.

The learner will understand the safety precautions required when reinstating the work area. The learner will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Learning outcome
The learner will: 1. be able to reinstate the work area on completion of activities
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following activities during reinstatement of the work area: a. work to current schedules b. 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 c. report any loss or damage to equipment d. report any identified hazards within the work area e. return all consumables and materials to their correct location f. complete any documentation as required 1.3 separate equipment, components, and materials for re-use from waste items and materials 1.4 store reusable materials and equipment in an appropriate location 1.5 correctly label and store four the following resources: a. finished products/components b. components requiring overhaul/repair c. surplus materials/components d. tooling, jigs, fixtures or other equipment used e. drawings requiring actioning/adjusting f. scrap components g. measuring and test instruments h. finished drawings i. finished documentation j. documentation requiring actioning/adjusting 1.6 dispose of waste materials in line with organisational and environmental safe procedures

- 1.7 deal with waste materials, in line with company and environmental regulations, to include two of the following:
 - a. correctly segregating waste materials
 - b. correctly dispose of waste materials
 - c. disposing of joining compounds, sealants and adhesives
 - d. disposing of other chemical products
 - e. removing non-hazardous materials
 - f. disposing of fluid waste
- 1.8 restore the work areas to a safe condition in accordance with agreed requirements and schedules
- 1.9 carry out reinstatement activities on two work areas from:
 - a. workshops/hangers
 - b. airside
 - c. areas at height
 - d. internal areas of aircraft
 - e. office environment
 - f. computer aided design (CAD) environment
 - g. technical/clean room environment
 - h. other appropriate environment
- 1.10 deal promptly and effectively with problems within their control and report those that cannot be solved.

Learning outcome
The learner will: 2. know how to reinstate the work area on completion of activities
Assessment criteria
The learner can: 2.1 explain the specific safety practices and procedures they need to observe when reinstating the work area 2.2 explain the health and safety requirements of the work area where they are carrying out the activities, and the responsibility these requirements place on them 2.3 describe the hazards associated with reinstating the work area, and explain how to minimise them and reduce any risks 2.4 explain the safe working practices and procedures to be followed when carrying out the various activities 2.5 explain what personal protective clothing and equipment needs to be worn, and where this can be obtained 2.6 explain why work areas need to be restored to a set standard, and what these requirements are 2.7 describe the types of work area that will need to be restored 2.8 explain the importance of tool and equipment control, and why this is critical within the aerospace industry 2.9 explain the meaning of 'foreign object debris', and why it is vital to ensure that this does not occur or is removed 2.10 describe the stores procedures for tools and equipment, documentation and surplus or waste materials 2.11 explain what materials will need to be stored and disposed of, and why they need to be segregated, correctly identified and labelled 2.12 explain how the various disposal bins can be identified 2.13 explain the procedures for disposing of hazardous materials 2.14 explain what documentation needs to be used on completion of the reinstatement activities 2.15 describe the extent of their own responsibility and explain to whom they should report if they have problems that they cannot resolve.

Unit 404 Reinstating the work area on completion of activities

Supporting information

Guidance

1.7 disposing of fluid waste (such as oil, hydraulic fluids, fuel)

1.9 (such as platforms, staging, lifts), internal areas of aircraft (such as wings, tanks, fuselage sections)

2.1 (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials)

2.4 (such as lifting and handling techniques)

2.7 (such as office environments, computer aided design (CAD) environment, technical/clean room environment, workshops, test areas, stages and platforms and aircraft areas such as wing, tank, fuselage, airside section areas)

2.12 (such as colour coded, labelled)

2.13 (such as chemicals, adhesives, oil, hydraulic fluids, fuel)



Appendix 1 Relationships to other qualifications

Links to other qualifications

Mapping is provided as guidance and suggests areas of commonality between the qualifications. It does not imply that candidates completing units in one qualification have automatically covered all of the content of another.

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

This qualification has connections to the:

- Level 2 NVQ in Performing Engineering Operations (7682)
- Level 2 NVQ Diploma in Fabrication and Welding Engineering (1782)
- Level 3 NVQ Diploma in Fabrication and Welding Engineering (1782)
- Level 3 NVQ Extended Diploma in Fabrication and Welding Engineering (1782)
- Level 3 NVQ Extended Diploma in Mechanical Manufacturing Engineering (1712)
- Level 3 NVQ Extended Diploma in Engineering Technical Support (1786)
- Level 3 NVQ Extended Diploma in Engineering Maintenance (1788)
- Level 3 NVQ Diploma in Aeronautical Engineering (1789)

Literacy, language, numeracy and ICT skills development

This qualification 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 such 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.

Useful contacts

UK learners General qualification information	T: +44 (0)844 543 0033 E: learnersupport@cityandguilds.com
International learners General qualification information	T: +44 (0)844 543 0033 F: +44 (0)20 7294 2413 E: intcg@cityandguilds.com
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