Unit 315: Erect roof structure carcassing components

# Delivery guide

Unit information

This unit is about preparing and carrying out carcassing for roofs with gables, hips, valleys and dormers.

Learners may be introduced to this unit by asking themselves questions such as:

* How do I form a valley?
* What is a back gutter?
* How do we trim out to form openings in roofs?
* How do we construct dormers?
* What types of roofs do dormers have?

Learning outcomes

1. Understand resource selection
2. Understand working to a contract specification
3. Comply with the given contract information to carry out the work safely and efficiently to the required specification

Suggested resources

Textbooks

* Jones, S., Redfern, S., Fearn, C. (2019) *The City & Guilds*

*Textbook: Site Carpentry and Architectural Joinery for the Level 2 Apprenticeship (6571), Level 2 Technical Certificate (7906) & Level 2 Diploma (6706)*. London: Hodder Education.

ISBN 978-1-5104-5813-0

* Burdfield, M., Jones, S., Redfern, S., Fearn, C. (2020) *The City & Guilds Textbook: Site Carpentry & Architectural Joinery for the Level 3 Apprenticeship (6571), Level 3 Advanced Technical Diploma (7906) & Level 3 Diploma.* London: Hodder Education.

ISBN 978-1-5104-5815-4

Websites

* [BRE | Certification and Listings](https://www.bregroup.com/services/certification-and-listings/)
* [BWF | Homepage](https://www.bwf.org.uk/)
* [CADW | Conservation Principles in Action](https://cadw.gov.wales/advice-support/conservation-principles/conservation-principles-action)
* [NHBC Standards | Homepage](https://nhbc-standards.co.uk/)
* [TRADA | Publications](https://www.trada.co.uk/publications/)
* [TRADA | List of British Standards June 2021](https://www.trada.co.uk/publications/british-standards-lists/list-of-british-standards-june-2021/)

British Standards

* BS 8000-5:1990 *Workmanship on building sites. Code of practice for carpentry, joinery and general fixings*.
* BS EN 13647:2021 *Wood flooring and wood panelling and cladding. Determination of geometrical characteristics*.
* ISO 19049:2016 *Timber structures. Test method. Static load tests for horizontal diaphragms including floors and roofs*.
* BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings*.

Legislation

* [HSE | ACOPs](https://www.hse.gov.uk/legislation/legal-status.htm)
* [HSE | Construction dust: Cutting and sanding Wood](https://www.hse.gov.uk/construction/healthrisks/hazardous-substances/cutting-and-sanding-wood.htm)
* [HSE | COSHH](https://www.hse.gov.uk/coshh/)
* [HSE | Health and Safety at Work etc Act (HASAWA) 1974](https://www.hse.gov.uk/legislation/hswa.htm)
* [HSE | PPE](https://www.hse.gov.uk/toolbox/ppe.htm)
* [HSE | PUWER](https://www.hse.gov.uk/work-equipment-machinery/puwer.htm)
* [HSE | RIDDOR](https://www.hse.gov.uk/riddor/)
* [GOV.UK | The Building Regulations 2010 (as appropriate to roof structures)](https://www.legislation.gov.uk/uksi/2010/2214/contents/made)
* [GOV.UK | The Manual Handling Operations Regulations 1992](https://www.legislation.gov.uk/uksi/1992/2793/made)
* [GOV.UK | The Control of Noise at Work Regulations 2005](https://www.legislation.gov.uk/uksi/2005/1643/made#:~:text=SCHEDULE%203%20Revocations%20%20%20%20Regulations%20revoked,2%20Part%20IX%20%202%20more%20rows%20)
* [GOV.UK | Structure: Approved Document A](https://www.gov.uk/government/publications/structure-approved-document-a)
* [GOV.UK | Fire safety: Approved Document B](https://www.gov.uk/government/publications/fire-safety-approved-document-b)
* [GOV.UK | Protection from falling, collision and impact: Approved Document K](https://www.gov.uk/government/publications/protection-from-falling-collision-and-impact-approved-document-k)
* [GOV.UK | Access to and use of buildings: Approved Document M](https://www.gov.uk/government/publications/access-to-and-use-of-buildings-approved-document-m)
* [GOV.UK | Material and workmanship: Approved Document 7](https://www.gov.uk/government/publications/material-and-workmanship-approved-document-7)

| **Learning outcomes** | **Criteria** | **Delivery guidance** |
| --- | --- | --- |
| 1. Understand resource selection | * 1. Characteristics of the resources | * Learners to understand: * the range of resources used in the process of erecting roof structure carcassing components to drawings, specifications and schedules * the characteristics of the materials used to erect timber roof carcassing structures and to know how to determine suitable materials for the given task * how resources should be selected, moved and stored * the measuring, marking out, fitting, finishing, positioning and securing of timber roof carcassing components * the use of resources to establish hips and/or valleys, roof verges and eaves, parapet finishings, false chimneys, openings (including windows, hatches, dormers, roof lights and vents), positions and how to establish dimensional accuracy for roof structure carcassing components * the use of steel roof squares, roof squares, ready reckoners, Pythagoras theorem, levels, lines and trigonometry to find lengths and bevels for roofing components * the importance of design for manufacture, off-site construction and modern methods of timber construction * the concept of fabric first principles and building performance in terms of thermal performance (including airtightness, U-Values and cold bridging) * the importance of quality control, quality assurance, certification and warranties in reducing the performance gap * the role of different materials, components and assemblies * the importance of moisture control and minimising waste. * In groups, learners to complete the following task, using the construction of a hand-cut hipped-end roof as an example: * specify all the materials required * consider how the construction will conform to current building regs * write a risk assessment and method statement for the work * write a fixing procedure * determine – using one of the above listed methods – the true lengths and bevels required for the common and hip rafter of a roof with a span of 7.2 m and a rise of 3.1m. |
| * 1. Use of resources | * Learners to sketch and describe the different types of roof structure, including: * traditional cut roof (single, double, hipped, valley, gable, flat, lean to, couple, close couple and collared) * modern truss roof (mono, double, king post, queen post, fan, fink, attic, diminishing). * Learners to understand the methods used to establish the different components used to construct roof structure carcassing for both traditional cut and modern truss roofs. * Learners to label drawings with the following components and then describe the function/role of each, including: * wall plates, ridge boards, hips, valleys, common rafters, jack rafters, valley jacks, cripple rafters, purlins, lay boards, hangers, struts and bracings/binders, flying hips, eaves, verges, fascias, bargeboards and soffits. * Learners to identify and describe the role/function of modern truss roofs, including: * spandrel panels, longitudinal bracings, diagonal bracings, chevron bracings, trusses, truss fixings, truss bracings and specifications. * Learners to know: * the procedures for reporting problems related to resources * the access equipment required for the work and associated legislation * how to protect the work and its surrounding area from damage in accordance with the given specification when erecting roof structure carcassing components * the machinery and plant (crane) required to work alongside when erecting roof structure carcassing components. * In pairs, learners to state, from a given scenario, how each of the above is facilitated and compare this with other groups. These should be collated by the tutor and discussed as required. |
| * 1. Organisational procedures to select resources | * Learners to research and write a report as to who is responsible for undertaking the following tasks, and the benefits gained from each:: * planning the sequence of materials and labour requirements * the use of bills of quantities, programmes of work, stock systems, stock control lead times, schedules, Gantt charts and critical path analyses. |
| * 1. Hazards | * In small groups, learners to identify the hazards that are present when setting out and erecting roofs and compare these with their peers. * Learners to identify the hazards within construction of timber roofing structures and understand the purpose of and how to follow risk assessments and method statements to carry out the work in a safe manner, including: * preventing falls from heights * minimising exposure to hazardous substances * moving plant and vehicles * lifting * mechanical and manual handling * avoiding muscular/skeletal injuries from poor working practices. * Learners to understand their responsibilities in relation to the hazards. * In groups, learners to be given a number of tasks associated with this unit and asked to select the correct personal protective equipment (PPE) required, including: * harnesses * lanyards * helmets * boots * Hi-viz * collective protective measures requirements. * Learners to know how hazards can be created by changing circumstances in the workplace, including construction site developments and ongoing work, plant and vehicles and periods of extreme weather. |
| 1. Understand working to a contract specification | * 1. Methods of work | * Learners to understand how to: * measure, mark out, cut, fit, align, finish, position and secure a range of roof structure carcassing components for trussed and traditional cut roofs.   Truss roofs   * In groups, learners to each identify a different component from the given list, explain its function and state how it is fixed to the rest of the group: * trusses * diminishing trusses * truss rafter roof hips * valleys * gables * ladders * wall plates * eaves * verges * straps (wall plate and restraint, bracing, lateral, diagonal and chevron, truss clip, temporary bracing). * Learners to know how to measure, mark out, fit, align, finish, position and secure a range of truss rafter roofs, including: * fink * fan * king post * queen post * attic * girder * mono.   Traditional cut roofs   * Learners to sketch the assembly details of the following roof types, label the components of each and state common section sizes used: * single * double * hipped * gable * flat * lean to * couple * collared. * Learners to know how to measure, mark out, fit, align, finish, position and secure a range of traditional cut roofs including the following components: * hips and/or valleys (and dihedral angles) * roof verges and eaves * parapet finishings * false chimneys * openings (to include windows, hatches, dormers, roof lights and vents) * rafters (common, crown, jack, cripple, hip, valley, flying hip, barn hip) * ceiling joists * ridge boards * lay and valley boards * purlins * dihedral angles. * Learner to sketch the following types of eaves and verges, showing their construction and labelling all parts: * types of eaves: open, closed, flushed and sprocketed; materials used: hardwood, softwood and unplasticised polyvinyl chloride (uPVC) * types of verges: closed, flush, plastic and dry/cement systems. * Learners to understand the importance of working to drawings, specifications and schedules and the interaction of the documentation. * From given working drawings and specifications, learners to extract information to determine component sizes and required fixings. * Learners to understand the correct methods used to establish dimensions accurately and to establish the setting out details from drawings, specifications and verbal instructions. |
| * 1. Tools and equipment | * Learners to research how to safely sharpen, maintain and store hand tools, power tools and equipment required to install roof structures. * Learners to check their centre’s tool cupboards and report any faults found. Tools and equipment to include: * saws * hammers * chisels * screwdrivers * tape measures * try squares * roofing squares * spirit levels * plumb bobs * chalk lines * string lines * electric drills * cordless drills * drill bits * powered nailers * power supplies (mains, battery, pneumatic). |
| 1. Comply with the given contract information to carry out the work safely and efficiently to the required specification | * 1. Demonstrate work skills to measure, mark out, fit, align, finish, position and secure | * Learners to determine the true lengths and bevels of a cut roof component using at least two of the following methods and compare the results with their peers for consistency. Range of methods include: * geometrical * scale drawing * ready reckoner * Pythagoras. * Learners to be given tasks to install structural carcassing components and materials to given specifications, including: * measuring * marking out * cutting * fitting * finishing * positioning and securing. * Learners to be given appropriate tasks to set out, cut and pitch inclined roofs with hips and valleys and dormers including the following features: * roofing components: rafters (crown, common, hip, jack, valley, cripple), purlins, wall plates, ridge boards, binders, struts, bracings * roof verges and eaves finishes (facias, soffits, bargeboards, soffit brackets, ventilation spacer trays, soffit vents including open, closed, sprocketed and cloaked) * parapet finishings (coping stones, pre-cast concrete, metal copings, bricks, flashings) * false chimneys (glass-reinforced plastic (GRP), brick slips, back gutters, flashings) * openings (windows, hatches, dormers, roof lights and vents), double rafters * dormer windows (gabled, flat, shed (mono pitch), hipped) including dormer cheeks, lintels, insulation, moisture and vapour barriers. * Learners to be able to select and use: * measuring equipment (rulers, tape measures, digital measuring equipment) * saws (hand and PPT to include chop saw, circular saw, table saw) * squares (including roofing, adjustable bevel and 90-degree) * hammers, claw hammers * framing nailers * string lines, straight edges * levels (optical, laser, 600mm, 1000mm and 1800mm level). * Learners to be able to select, safely set up, use and maintain the different types of hand tools, power tools and associated equipment. * Learners to select, safely handle, stack and store resources using correct manual handling techniques in order to carry out their given tasks. |
| * 1. Use and maintain hand tools, portable power tools and ancillary equipment to incorporate at least two of the following to given work instructions on timber frame roofs: * hips and/or valleys * roof verge and eaves * parapet finishings * false chimneys * openings (e.g. window, hatches, dormers, roof lights and vents)   and determine the specification of cut roof component bevels and lengths |