

# SHELL ERECTION SCHEDULE

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## SCHEDULE RELATING TO THE ERECTION AND COMPLETION OF THE SCANDIA-HUS TIMBER FRAME

### INTRODUCTION

This Schedule outlines the work carried out by the entire building team, comprising the customer, the main contractor and the timber-frame erectors. It is intended to provide both valuable and essential guidance to the whole team. Each member of the unit has a vital role to play although, in order to ensure that the project runs smoothly, they must unite to form one team. The complete team may be together only during the “main” timber-frame erection period but, as this constitutes singularly the largest and arguably the most important aspect of the build, it is vital that each member of the team fully understands his or her respective role. It is this understanding that forms the basic requirement for the overall success of the project.

The level of information relating to the main timber frame erection provided in this Schedule assumes a basic understanding on the part of the builder, an in depth knowledge by the shell erection team and more limited knowledge by the customer. This format ensures that the most important member of the team (the customer) is not disadvantaged by his or her lack of knowledge.

### REQUIREMENTS PRIOR TO THE DELIVERY OF THE TIMBER FRAME

Preparation for the arrival of the timber frame is essential and these areas are set out in separate ‘Fact Sheets’ that should be read in conjunction with this document :-

- Fact Sheet no. 14 – Delivery Day and Shell Erection – Programme & Arrangements
- Fact Sheet no. 15 – Site Welfare
- Fact Sheet no. 16 – Materials – Delivery, Storage, Protection & Quantities
- Fact Sheet no. 17 – Scaffolding
- Fact Sheet no. 18 – Pre-Delivery Arrangements
- Fact Sheet no. 19 – Site Security

Additional information relating to the construction of the building is given in more detail within this document as well as in the Builder’s Manual, which will be issued together with the final working drawings.

### TIMBER FRAME ERECTION

#### Slab / Supporting Structure

When all materials have been successfully unloaded and stored, the shell erection team will begin erecting the timber frame. As the accuracy of the whole timber frame is reliant upon the exactness of the structure upon which it bears, it is vital that the precision of the slab is determined prior to any timber-frame components being placed upon it. The accuracy must be checked and assessed by the builder / customer, and the information recorded on the ‘Slab Certificate’, which will be forwarded to the customer prior to delivery. This Certificate records all dimensional and level errors in both lengths and diagonals and must be verified, signed and returned to the Scandia-Hus Limited at East Grinstead no later than 7 days prior to delivery of the building set to site.

The maximum acceptable tolerances of the slab are set out in NHBC Standards 6.2.

This is an essential part of the construction as, once the panels are placed on the supporting structure, it is very difficult - if not impossible - to confirm or verify problems with structural tolerances discovered at a later stage.

### **Dry-packing of Soleplates**

Prior to the sole plates being fitted, the shell team foreman will double-check the accuracy of the slab / foundations upon which the timber frame will bear. If the structure is badly out of level or square, remedial work will be required to be undertaken by the builder / customer before work on the shell erection can commence. However, provided the tolerances do not exceed the working tolerances set out above, and the Slab Certificate has been duly signed and returned to the Company, the shell erection foreman may nevertheless decide to proceed with the timber frame erection, inserting minimum packing as required to enable the team to proceed. However, it remains the builder's / customer's responsibility to ensure that solid packers are subsequently fitted beneath every stud to the full depth of the sole plate, i.e. 147mm.

Should the levels be found to fall outside acceptable tolerances and the shell erection team be forced to abandon the shell erection and leave site, additional costs incurred in rescheduling a return visit to site will be charged to the customer. will proceed to erect the timber frame.

## **SHELL ERECTION SCHEDULE OF WORKS**

### **Soleplates - Non Joist-Frame Construction**

- Position the DPC in continuous lengths below all external walls and internal load-bearing walls, as shown on the final working drawings.
- Position the impregnated sole plates (supplied in random lengths) below all external wall panels and internal load-bearing walls (placed directly on the previously laid DPC), as applicable.
- 'Square up' the sole plates and place temporary packing below any 'low spots' prior to the panels being placed upon them. Additional 'dry-packing' required below sole plates is the responsibility of the builder / customer and should be carried out in accordance with NHBC standard.
- Fix the sole and cill plates to the supporting structure @ approximately 1200mm centres, using the supplied fixing plates and fixings, ensuring that strips of DPC have been placed under the fixing clips. **Note:** Additional wind-restraint straps are required to be fitted in Scotland, see Construction Manual for details.

### **Soleplates - Joist-Frame Construction**

- Position the DPC in continuous lengths below all external walls and internal supporting walls, as shown on the final working drawings.
- Position the impregnated sole plates (supplied in random lengths) below all external wall panels and internal supporting walls (placed directly on the previously laid DPC), as applicable.
- 'Square up' the sole plates and place temporary packing below any 'low spots' prior to the joist frame being assembled. Additional 'dry-packing' required below sole plates is the responsibility of the builder /customer and should be carried out in accordance with NHBC standard.
- Fix the sole plates to the supporting structure @ approximately 1200mm centres, using the supplied fixing plates and fixings, ensuring that strips of DPC have been placed behind the fixing clips. **Note:** Additional wind-restraint straps are required to be fitted in Scotland, see Construction Manual for details.

### **Structure - Joist-Frame Construction**

- Assemble and fix joist frame components in accordance with the final working drawings.
- Lay OSB sheets between joists on top of factory-fitted battens
- Fit all solid blocking and strutting as defined on the final working drawings.
- Fit all internal load-bearing wall support timbers as defined on the final working drawings.
- Fit factory-prepared external OSB skirt cover-strip to perimeter of joist frame and fix to sole plates.

### **Wall Panels - All Construction Types**

- Locate, plumb and fix all external wall panels to sole plates (or edge beam on joist frame construction.)
- Locate, plumb and fix all internal load-bearing wall panels to sole plates.
- Fix each panel to the adjoining panel using the factory-positioned screw fixings. (This is vital to the performance of the system and must be undertaken with care.)
- Fit all 'head-binders' to tops of external and internal wall panels, ensuring that all corners and intersections of internal/external wall panels have head-binders crossing over the joints and fixings into the adjacent panel.
- Ensure that each internal and external corner panel is assembled correctly in accordance with the Shell Erection Manual.

### **First Floor Joist-Frame - Two-Storey Structures Only**

- Assemble and fix joist-frame components in accordance with the final working drawings.

- Builder to supply and lay safety platform, as required, in compliance with Health & Safety Regulations.
- Fit all solid blocking and strutting, as defined on the final working drawings.
- Fit all internal load-bearing wall support timbers, as defined on the final working drawings.
- Fit factory prepared external cover-strip to perimeter of joist frame.

#### **First Floor Zone - Chalets Only**

- Refer to the section 'Truss Installation' below for this element of the construction.
- Fit intermediate joists accurately in the positions defined on the final working drawings.
- Builder to supply and lay safety platform, as required, in compliance with Health & Safety Regulations.
- Fix intermediate joists to all external and internal wall plates using the truss clips supplied, and fix with correct number and type of fixings as specified in the Construction Manual.
- 'Trim out' any openings (such as stair wells, etc.) and fit any joist hangers, as shown on the final working drawings, ensuring that the correct number and types of fixings are used.
- Fit all solid blocking and strutting as defined on the final working drawings.
- Fit all internal load-bearing wall support timbers – where applicable - as defined on final working drawings.

#### **Roof Trusses**

Attic trusses for chalets or other roof areas with habitable accommodation are usually constructed from 47 x 220mm impregnated and structurally graded timber. These trusses are usually provided with a 45° pitch to facilitate standard room heights.

Depending upon their size, attic trusses will arrive on site either in one piece, or more often than not, in several pieces for ease of transportation. Where trusses arrive in one piece they are crane-lifted from the delivery vehicle directly into position and fixed. Where the trusses arrive in two or more sections, they are off-loaded to a suitable location (pre-determined by the builder) for assembly on the ground prior to being lifted into position and fixed.

Fink trusses for bungalow, two-storey and other designs which do not incorporate 'liveable' areas are generally not as large (or as heavy) as attic trusses. Therefore, they will usually arrive on site in one piece. However, if the span is particularly large, the trusses may have to be delivered in two or more sections for off-loading and assembly on site as described above.

The trusses will arrive on site as sequenced during the shell erection period. Depending upon the truss type, size and configuration, they will be off-loaded either for erection or for assembly. If the supporting structure has been completed, they will be hoisted direct into position.

#### **Truss Installation**

- The trusses are positioned on the wall plates and fixed to the plates using the truss clips provided, and secured with the correct number and type of fixings.
- Where the trusses bear on internal load-bearing walls, the trusses have to be fixed to the internal load-bearing wall plate using the truss clips provided, and secured with the correct number and type of fixings. However, at the time of the shell erection completion, before the roof trusses have been 'loaded out' with roof tiles, the bottom chord of the truss will not necessarily be bearing directly onto the wall plate. If this is the case, the truss chord must not be fixed or 'spiked' to the wall plate. It should be left unfixed in this location to allow the bottom chord to 'pull out' as the roof is loaded and the truss chord to settle onto the internal load-bearing wall plate, prior to fixing the truss clips. This then, becomes the responsibility of the builder/customer, as the roof will not become loaded until the roof tiling has been completed, which may be several weeks after the shell erection team has left site.

#### **Sarked Roof Structure**

- When all the trusses have been erected, squared, plumbed and fixed, 18mm OSB is fixed to the top face of the truss rafters. The sarking must be fixed in accordance with the Construction Manual. It is **VITAL** that the correct type, size and number of fixing nails be used, as all the fixings will be covered up at the time of the shell inspection.
- If the building has roof lights, these will be fitted by the builder/customer. The shell erection team will not make any provision for their installation as customers' requirements with regard to the height of the roof lights vary from site to site.
- Upon completion of the sarking, a breathable roofing membrane is applied over the complete surface of the roof boarding. It is held in place by vertically fixed counter-battens, which are fixed at each rafter positioned at 1200mm centres, with a further two intermediate vertical counter-battens fixed equally spaced between the two. On completion, the nails used for fixing the vertical counter-battens will be protruding on the underside

of the sarking. These nails **MUST** be bent over by the shell erection team. They must not be cut off, as they are designed to be bent over. This is not the responsibility of the builder/customer.

(NOTE: It is very dangerous to have exposed nails anywhere on site, but these are particularly dangerous, as they are at head height and will be in a dark area where they may not easily be seen and avoided.)

#### **Eaves and Gable Fascia Rail & Boards/ Barge Boards and Soffit Boarding**

- The fascia rail and fascia boards are fitted to the ends of the trusses by the shell erection team. The ends of the trusses must be accurately aligned to ensure that they are vertical and in the same plane prior to fixing the fascia boards. The truss 'feet' should be levelled to ensure that the soffit boarding does not waver. Although this is not a structural item, wavering soffits will show up against the horizontal coursing of the brickwork.
- The shell erection team will leave the fascia boards 'over length' to be trimmed on site to suit the eaves box detail completed by the builder/customer.
- The gable fascia boards/barge boards should be fitted by the builder/customer, per detail.
- Eaves and gable soffit-boards should be fitted by the builder/customer, per detail.

#### **OSB Tilting Fillet and Gutter Drip**

- The shell erection team will fit the OSB and 150mm DPC gutter drip at the fascia position. Daltex Roofshield roofing membrane to be dressed over the top edge of the tilting fillet to enable any water to shed into the gutter.
- Install over-fascia vents in accordance with details. (If shown.)

#### **Dormers and Roof Lights**

- Dormers are delivered to site partially assembled. All the panels (cheeks, gables and front panels) are supplied to site as 'open cell' panels, which means that the insulation, vapour control layer (VCL) and plasterboard have not been factory-fitted. This is to enable the panels to be fitted correctly to the roof structure.
- The lower OSB sheet on the front panel has been stopped short of the base of the panel to allow easy access for follow-on trades and for fitting the insulation and VCL behind the panels.
- Dormer roofs and associated fascias and soffits to be constructed per the main roof detail.
- All work associated with the installation of the roof lights to be carried out by builder/customer, including the supply and fixing of 25mm expanded polystyrene and 12.5mm plasterboard linings around the roof lights.
- Any additional supports required at junctions/board ends to be formed by builder/customer.

#### **ADDITIONAL ITEMS COMPLETED BY THE SHELL ERECTION TEAM**

*Upon completion of the main frame, the **shell erection team** will also undertake the following :-*

- Overlap breather paper on all external panel joints.
- Where necessary, affix cavity-battens and cover front face of battens with DPC.
- If window installation has been specified, off-load and install windows and patio doors.  
See separate Window Fitting Schedule.
- Construct structural elements of the balcony. (If applicable).
- Construct bay window structures. (If applicable).
- Fit vertical 9mm OSB upstand to soffit box zone.
- Clean site, making use of skip provided by builder/customer.

#### **Shell-Erection Hand-Over Inspection**

On completion of the shell erection, the work undertaken by the shell erection team will be inspected by Scandia-Hus Manufacturing's Site Operations Manager or another member of the Operations Team. The purpose of this inspection is to ensure that the erection has been undertaken correctly to the drawings and details supplied, and that standards are being maintained.

At the end of the inspection (which usually takes approximately 3 hours, depending upon the size and complexity of the structure) any further work found to be required to be undertaken by the shell erection team will be discussed and agreed with the shell erection team foreman who will then arrange to complete any outstanding work or carry out any amendments / rectifications, as necessary.

#### **BUILDER'S WORK UPON COMPLETION OF THE SHELL ERECTION**

##### **Suspended Concrete or Ground Bearing Slabs**

- Unless Scandia-Hus has been commissioned by the customer to off-load and install the windows and patio doors, this work should be undertaken by the main contractor. Fix windows per separate Window Installation Schedule

- Sweep clean the slab before laying the rigid insulation. This will avoid the insulation being 'kicked up' causing deformation and difficulties when later fitting the chipboard flooring.
- Lay 65mm rigid insulation to ground floor slab, ensuring that each sheet is laid flat with edges abutting.
- Lay vapour control layer (VCL) over the insulation, ensuring that a 150mm upstand is left at all external and internal load-bearing wall positions. This will enable the VCL to be tucked behind the skirting board in order to eliminate draughts.
- Lay under-floor heating, if applicable.
- Lay gas or water pipes, as applicable.
- Slab ready for sand / cement screed.

#### **Ground Floor Joist-Frame (If supplied)**

- Fix internal non load-bearing wall-support timbers below all non load-bearing walls that run parallel with floor joists. See final working drawings.
- Lay 9mm pre-cut OSB insulation support sheets between joists on top of factory-fitted battens.
- Insert 100mm rigid insulation with 120mm Rockwool on top between all joists, ensuring that there are no gaps between the joists and the insulation.
- Ensure that the external wall panel VCL 'flap' at the base of the panel is folded under the decking and sandwiched between this and the 45 x 70 mm chipboard flooring supports. Fix the 22mm tongue and grooved, V313 chipboard decking to the joist frame, ensuring that all joints are fully glued.
- All pipe/service penetrations, should be sealed with a silicone sealant (supplied) to avoid draughts.

#### **Ground Floor Walls - General**

- Fit insulation to all load-bearing walls.
- Construct all non-load-bearing walls and insulate.
- VCL strip on top of external wall panels to be folded up onto the underside of the ceiling and stapled into position.
- Install services. Drill / cut service channels into the external and internal wall panels, as necessary.
- Fit secondary mineral wool insulation and VCL. Tape VCL joints with tape provided.
- Before fixing the plasterboard to external walls, check that there are no tears in the VCL. Repair if required.
- Screw-fix plasterboard to all external and internal walls and fit service outlets, as appropriate.
- Dryline or skim walls, as appropriate.

#### **Ceilings - Bungalows and First Floor of Two-Storey Buildings (not Chalets)**

- 'Frame out' loft hatch and ladder position.
- Install vapour control layer (VCL) to underside of entire ceiling, ensuring minimum laps of 150mm and making sure that all laps/abutments are taped.
- Fit any blocking or support noggins as defined on final working drawings.
- Install any bearers for tank stands or catwalks. See Construction Manual for details.
- Double-nail counter-battens to the underside of ceilings @ 400mm centres.
- In 2-storey designs, install 120mm sound insulation in intermediate joist frame. Rest the insulation on top of the plasterboard support battens.
- Screw-fix plasterboard to counter-battens with required number of screws, per Construction Manual.
- Lay 150mm roof insulation between roof trusses. The VCL will support the insulation if the ceiling plasterboard below has not yet been fitted at this stage.
- Lay a further 150mm roof insulation at 90 degrees to the first layer of insulation, providing a total insulation depth of 300mm. The insulation can be pushed up tight against the pre-fitted OSB upstands, spanning between the ends of the trusses. The upstands ensure that a 25mm air gap remains for ventilation of the roof space. Ensure that the insulation does not block this ventilation gap.
- Dryline and skim ceilings, as appropriate.

#### **Intermediate Floor Zone – Chalets and Two-Storey Buildings**

- Fit truss clips to truss ceiling chords at load-bearing wall junctions (after the building has been loaded out).
- Insert 120mm insulation between each of the bottom truss chords.
- Lay a 600mm wide strip of 100mm thick Rockwool insulation around perimeter edge of joist frame floor.
- Glue tongued and grooved, V313 chipboard decking, ensuring that the boarding extends to the extremity of the lower truss chord on chalets.
- Double-nail counter-battens to underside of ceilings @ 400mm centres.
- Screw-fix plasterboard to counter-battens.
- Dryline and skim ceilings, as appropriate.

**First Floor Zone - Chalets and Two-Storey Buildings**

- Construct all non load-bearing walls in positions shown on final working drawings and fix to all abutments and ceiling counter-battens.
- All services should be installed prior to the fitting of the plasterboard to ceilings and walls. The gap formed by the counter-battens can be used for service routing, if required. Ensure all service work is carried out in accordance with good design practice and current codes of practice.
- Fit 80mm sound insulation into first-floor walls and screw-fix plasterboard to all faces.
- Double-nail counter-battens to the face of the oxters and rafters @ 400mm centres, as appropriate.
- Screw-fix plasterboard to oxters and skeilings.
- Dryline and skim ceilings and skeilings, as appropriate.

**Sloping Ceilings**

- Cut and fit 100mm rigid and 120mm Rockwool insulation between the rafters, ensuring a tight fit, and ensuring that the rigid board is fitted tightly against the underside of the roof sarking up to the apex.
- Install polythene VCL to underside of roof rafters from eaves to eaves, passing beneath ceiling collar.
- Take VCL under eaves floor boarding.
- Check that no gaps or breaks exist in the VCL, that all laps are a minimum of 150mm and that all joints and abutments are taped. (For vaulted ceilings, continue up to the apex.)
- Screw-fix plasterboard to counter-battens.
- Dryline and skim sloping ceilings, as appropriate.

**Ceilings – First Floor of Chalets**

- Lay 120mm Rockwool insulation across truss ceiling collar on VCL.
- Fit any blocking or support noggins as defined on final working drawings.
- Double-nail counter-battens to underside of ceilings @ 400mm centers.
- Screw-fix plasterboard to counter-battens.
- Dryline and skim ceilings, as appropriate.

**Attic Area - Chalets**

- Cut and fit 100mm rigid insulation between rafters, ensuring a tight fit, and ensuring that the board is positioned tight against the underside of the roof sarking up to the apex.
- Check that no gaps or breaks exist in the VCL, that all laps are a minimum of 150mm and that all joints and abutments are taped. (For vaulted ceilings, continue up to apex.)

**Dormers**

- Fit all plasterboard support noggins to dormer ceilings, as appropriate.
- Install 70mm rigid insulation and 80mm Rockwool insulation to dormer cheeks and front panels.
- Fit polythene VCL to underside of rafters, cheeks and front panels, ensuring that any overlaps are a minimum of 150mm and tape all joints and abutments.
- Screw-fix plasterboard to ceiling, cheeks and front panels.
- Dryline or skim walls and ceilings, as appropriate.
- Mark and trim ends of fascia boards to provide required gap between the proposed face of the roof tile and the cut end of the fascia board. These boards will usually have been left 'long' by the shell erection team for trimming by the builder to suit the cladding.

**Roof Lights**

- Fix roof lights trimmers in correct position, as shown on final working drawings and as agreed with the customer on site.
- From below, drill through at each corner to mark the roof light position on the sarking/Roofshield.
- From above, carefully cut the Roofshield approximately 150mm inside the cutout for the roof light. This allows for the Roofshield to be taped against the sides of the roof light prior to its flashings being fitted.
- Fit the roof lights in accordance with the manufacturer's instructions.
- Weather and fit flashings as required. (See Construction Manual.)

**General - Internal**

- Fix all internal doors, frames, furniture and architraves.
- Fit all skirting boards, coving and other second fix timbers.
- Fit all internal window cills. This should be undertaken prior to the fitting of the plasterboard.

- Fix all spruce ceilings and support battens. (Where applicable.)
- Fit staircase, apron, handrail and balustrading. (Where applicable.)
- Construct catwalk and tank stands. (See Construction Manual for details.)
- Install wardrobes and wardrobe doors. (Where applicable.)
- Install the insulated loft hatch and ladder in position shown on final working drawings.
- Construct all 'box-outs' for pipe work. (Timber supplied.)
- Install kitchen and utility room units. (Supplied by Scandia-Hus if ordered with the building set.)
- Install ventilation system to supplier's details.
- Install heating system. (Supplied by Scandia-Hus if ordered with the building set.)

**General - External**

- Fit main entrance door and adjust height to form disabled access threshold. Adjust and fit cover strip (supplied with door) to head of door.
- Fit external cladding and support battens, if applicable. (Supplied by Scandia-Hus if ordered with the building set.)
- Fit external window cills and metal flashings.
- Fit external timber reveals to all windows and doors.
- Complete construction of balcony. (Where applicable.)
- Construct entrance porch. (Where applicable.)
- Fit soffit boarding to eaves as well as gable, dormer, porch and balcony soffits, as applicable.
- Form all eaves box junctions with gables in accordance with final working drawings.

**Product Data Sheets**

In line with current safety regulations and EU directives, as well as Section 6 of the Health & Safety at Work Act, 1974, Data Sheets on all products incorporated within Scandia-Hus' building sets are available from our office. For further information with regard to the composition or properties of any materials or components incorporated within our building sets and their toxicological or ecological effects (if any), or in respect of the handling, storing, disposal, first aid, etc. of materials supplied by us, please contact our Technical Department who will be pleased to provide copies for your reference.

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