 QUESTION
Which factors should be taken into account when designing and installing spandrel panels over party walls and gable walls with cold roof voids?

 ANSWER
1) GENERAL CONSIDERATIONS
Spandrel panels are generally factory-made, transported to site in one or more sections, and craned into position on to timber framed or masonry support walls. Panel framing is usually formed from vertical studs at 600mm centres, with head and soleplates. Typical timber sizes are:

89 x 38mm or 97 x 47mm with nailed connections or
72 x 47mm where joints are plated, as in trussed rafter plated joints.

Spandrel panels should be designed by the manufacturer in accordance with the building designer’s details and requirements and manufactured in accordance with guidance from the Structural Timber Association (www.structuraltimber.co.uk) or Trussed Rafters Association (www.tra.org.uk).

The top of party wall panels should be slightly lower than the level of adjacent trusses, to allow the trusses to deflect on application of the roof tiles, without causing hogging of the tiles over the panel. Gable panels are installed level with the top of the trusses with flush roof verges; or to underside of gable ladders with boxed verges.

Party wall panels require tying back into the roof structure on BOTH sides, so that they remain in place in the event of the roof on one side burning away. Gable spandrel panels must resist wind loads acting on the gable end walls and any loads from applied cladding, e.g. tile hanging. These loads are transmitted through the panel to the roof structure via lateral restraints. In accordance with masonry codes, wall ties to masonry cladding should be increased in number at the top of a wall. Wall ties should also be increased at potential slip planes, e.g. horizontal cavity tray locations. Detail 10 below shows where wall tie frequency should be increased.

Any impervious weather protection, e.g. polythene sheeting, should be removed once the roof is watertight, sufficient to allow the panel to breathe, identify stud positions for fixing restraints, and checking for any damage during erection. Breathable protective membrane may require removal for inspection if there are signs of trapped moisture or damage to the panel. Where membranes are retained, e.g. on gable panels, the position of the studs should be marked on the membrane for fixing of wall ties.

2) LATERAL RESTRAINT
Spandrel panels require lateral restraint at rafter level and along the base of the panel. Tall panels may also require lateral restraint in line with any intermediate longitudinal bracing to the roof trusses. Lateral restraint can be provided by:

- timber members (e.g. the longitudinal bracing secured to the spandrel with timber ledgers/noggings), fixed into at least two studs within the panels,
- metal restraint straps fixed to the panel and to noggings, or timber bracing fixed between or across the trusses.

Multiple fixings into narrow studs, e.g. 38mm wide, at the end of restraint straps, should be avoided by fixing the straps into timber ledgers, fixed across and into two studs within the panel - see below.

3) FIRE STOPPING
Fire stopping is required between the top of the party wall spandrel panel and the roof covering, and between the spandrel and the masonry supporting wall. This is typically achieved with flexible rock fibre mineral quilt. The fire stopping should extend into any boxed eaves in the form of fire-resisting board or wired rock fibre quilt, screwed or nailed in place (see diagram in NHBC Standards clause 7.2.16).
4) FIRE PROTECTION

The building designer/architect should agree fire protection requirements with the NHBC building control surveyor for the project (or local authority building control in Scotland and Northern Ireland), particularly for panels clad with weatherboarding or tile hanging, where lack of fire resistance to external face can be affected by fire spread from below. Requirements should be clearly illustrated on the working drawings.

Generally party wall spandrel panels should provide 60 minutes fire protection, which can be achieved with two layers of 12.5mm plasterboard on both sides of the framing. Plasterboard joints in each layer and between layers should be made over a stud or nogging and staggered. With twin leaf spandrel panels the same fire protection is applied to one side of each leaf, usually the side facing the roof void.

Alternatively, single layer board drylining may be used if supported by suitable test reports to show compliance with the fire and sound requirements.

Fire protection to gable end spandrel panels is dependent on the dwelling type, e.g. house or flat, its height, and distance from relevant boundaries. Based on Approved Document B1 (England) and 100mm thick masonry tied to the gable spandrel panel, the following fire protection generally applies:

i) Three storey houses and two storey flats.
External spread of fire (Requirement B4) may apply if the building is close to a boundary and the area of the gable wall is larger than the ‘allowable unprotected area’ for the plot. Where a 30 minute period of fire resistance is needed, an unlined spandrel panel with 100mm masonry wall is considered to meet this requirement.

ii) Houses and flats with height exceeding (i) above.
External spread of fire (Requirement B4) may apply if the building is close to a boundary and the area of the gable wall is larger than the ‘unprotected area’. A 60 minute period of fire resistance is needed. An unlined spandrel panel and 100mm masonry wall is NOT considered sufficient to meet this period. Consideration should be given to fire protection of the spandrel panel, such as a lining to the internal face of the panel.

Panel-to-panel butt joints should maintain the required fire protection. This can be achieved by covering the joint with strips of plasterboard to the same thickness as used on the main panel - see detail below. Other panel to panel jointing methods may be accepted if supported by an appropriate fire test report. Jointing methods which rely on the use of intumescent sealants are difficult to inspect for correct installation, so should generally be avoided.

5) ACOUSTICS

The spandrel panel should meet the sound insulation requirements set out in the National Building Regulations. One way of achieving this is to follow the guidance in Robust Details; the guidance in this document follows that approach. Designs which do not adopt Robust Details will require sound testing on completion.

6) TYPES OF SPANDREL PANELS AND WORKED EXAMPLES

The types of spandrel panel covered by this guidance are as follows:

- Type One       - Twin leaf panels supported on a timber framed party wall
- Type Two       - Single leaf panel supported on a timber framed party wall
- Type Three     - Single leaf panel supported on a masonry party wall
- Type Four      - Single leaf panel supported on a timber framed gable wall
- Type Five      - Single leaf panel supported on the inner leaf of a masonry cavity gable wall
- Type Six       - Single leaf panel supported on the outer leaf of a masonry cavity gable wall

The following drawings show commonly accepted practice and are included to help illustrate the points described in this guidance. The actual design and restraint of the panels may vary depending on the site conditions. The design, manufacture and provision of lifting points for the erection of the spandrel panels should be undertaken by the panel manufacturer. The restraint of the panels, once erected, should be designed by the building designer/architect to suit the structural and fire requirements for each project. Erection procedures and temporary restraint requirements are outside the scope of this guidance.
**TYPE ONE**

Twin leaf spandrel panel supported on a timber framed party wall (generic twin wall system)

- Continuous ledger to support plasterboard edge and for connection of lateral restraint binder
- Lateral restraint (see detail 1)
- Panel-to-panel joint (see section A-A)
- Insulation to avoid cold bridging unless shown by calculation as unnecessary
- Lateral restraint (see detail 2)

**TYPE TWO**

Single leaf spandrel panel supported on a timber framed party wall

- Continuous ledger to support plasterboard edge and for connection of lateral restraint binder
- Lateral restraint (see detail 1)
- Panel to panel joint (see section B-B)
- Insulation to avoid cold bridging unless shown by calculation as not required
- Lateral restraint (see detail 2)
**TYPE THREE**

Single leaf spandrel panel supported on a masonry party wall

- Fireproofing (see detail 3)
- Lateral restraint (see detail 1)
- Panel-to-panel joint (see section B-B)
- Cavity insulation to depth of ceiling insulation to reduce cold bridging
- Cavity closer and mineral wool quilt
- Lateral restraint (see details 4 & 5)
- Continuous ledger to support plasterboard edge and for connection of lateral restraint binder
- 300mm min. (for sound-proofing)
- 150mm min.

**Section-view A-A of joint in spandrel panel**

- Cover strips of double layer 12.5mm plasterboard across butt joint between panels
- First and second layers of plasterboard individually fixed into each stud with screws at 300mm max. vertical centres or nails at 150mm max. vertical centres
- Screws/nails to penetrates studs by at least 25mm
- Joints in cover strips to be staggered

**Section-view B-B of joint in spandrel panel**

- Screws/nail fixings to join panels
- Skew nail/screw fixings

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**TYPE FOUR**
Single leaf spandrel panel supported on a timber framed gable wall

**TYPE FIVE**
Single leaf spandrel panel supported on the inner leaf of a masonry cavity gable wall

**TYPE SIX**
Single leaf spandrel panel supported on the outer leaf of a masonry cavity gable wall
**Detail 1**  
Options 1 and 2 – Lateral restraint to the top of spandrel panel(s) over timber framed or masonry party wall

<table>
<thead>
<tr>
<th>Section C-C</th>
<th>Option 1</th>
<th>Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>timber ledger fixed to spandrel panel</strong></td>
<td><strong>timber ledger typically 63mm x 38mm or 72mm x 47mm</strong></td>
<td><strong>metal restraint strap fixed to minimum 38mm x 63mm noggings fixed between at least three trusses with eight 3.75mm x 30mm square twisted nails evenly spaced</strong></td>
</tr>
<tr>
<td></td>
<td><strong>ledger to be applied across face of spandrel and nailed to at least two studs and minimum two nails per stud</strong></td>
<td><strong>noggings to be fitted at apex and maximum 2m centres along the rafters and ceiling joists (no more than 1.25m centres for dwellings over three storeys or over two storeys in Scotland)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>length of nails to provide a minimum 30mm penetration into studs</strong></td>
<td><strong>end of restraint strap to be fixed to studwork</strong></td>
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</tbody>
</table>

**Detail 2** – Options 1 and 2 – Lateral restraint to the bottom of spandrel panel(s) over timber framed party wall

- **noggings**
- **timber ledger typically 25mm x 100mm**
- **binder/longitudinal bracing fixed to at least three trusses with 3.1mm x 65mm machine driven nails or 3.35mm x 65mm (10 gauge) ordinary nails**
- **binder to be fixed to ledger with nails or screws driven squarely into ledger**
- **lateral restraint to be provided at maximum 2m centres along rafters and ceiling joists (no more than 1.25m centres for dwellings over three storeys or over two storeys in Scotland) with first restraint as close to apex as possible**

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**Detail 3** – Fire stopping between top of party wall spandrel panel and roof covering

- Roof tile underlay
- Fire stopping to be provided by compressible rock fibre quilt
- Quilt to extend beyond both faces of either single or twin leaf spandrel panel
- Compressible rock fibre quilt (typically 60mm) fitted between tiling battens, roof underlay and roof tiles/slates
- Keep spandrel down from the top of rafter (typically 25-50mm, measured perpendicular to the top of the rafters)
- 600mm max. centres

**Details 4 and 5** – Lateral restraint to the bottom of single leaf spandrel panel on a masonry party wall

- Detail 4: Panel location straps at 1.2m centres face fixed into studs with a minimum of two 65mm screws and a minimum of three plug and screw fixings into at least two masonry blocks
- Detail 5: Lateral restraint straps to masonry wall at 1200mm centres, on both sides of the wall, fixed to noggins between at least three trusses using four 3.75mm x 30mm square twist nails
  - Last fixing into third truss or into nogging beyond third truss
  - Alternatively, in place of noggins use 25mm x 100mm binder fixed to at least three trusses with 3.1mm x 65mm machine driven nails or 3.35mm x 65mm (10 gauge) ordinary nails
  - Straps fixed to binder with eight 25mm x 4mm steel screws
  - Straps fixed to wall with three plastic wall plugs and 4mm diameter (No8) screws
**Detail 6 – Lateral restraint to top of gable end spandrel panel**

- Option 1

**Detail 7 – Lateral restraint to bottom of gable end spandrel panel**

**Option 2**

**Detail 8 – Lateral restraint to bottom of gable end spandrel panel onto masonry wall**

**KEY**

1. ladder truss securely fixed to first roof truss with soffit board overlapping and tight to outer wall (allow for settlement gap between masonry and gable ladder for timber framed buildings)

2. nominal 25mm x 100mm longitudinal binders or additional timber bracing fixed across at least three trusses and butted tight against panel (for centres see note 4)

3. noggings minimum 38mm wide fixed between at least three trusses (for centres see note 4)

4. metal restraint straps fixed to binders with eight 25mm x 4mm steel screws, or to noggings with four steel screws or four 75mm x 4mm (8 SWG) round nails with last fixing into third truss or nogging beyond

   end of each restraint strap to be fixed to a panel stud with fixings capable of resisting 8 kN force based on restraint straps at maximum centres

   restraint straps/binders located at, or near to apex and down the rafters and along ceiling joists at maximum 2m centres (no more than 1.25m centres for buildings over three storeys or over two storeys in Scotland)

5. alternative location for metal restraint strap

6. timber blocking piece between truss and spandrel panel

7. nominal 25mm x 100mm longitudinal binders, or additional timber bracing, fixed across at least three trusses and into nogging fixed between panel studs (for centres see note 4), nogging to be securely fixed to framing including fixings through sheathing board, fixings to resist 8kN force based on restraint straps at maximum centres

8. with larger trusses intermediate longitudinal bracing may be provided across struts, such bracing should extend to the spandrel panel and be fixed to a timber ledger minimum 72mm x 47mm or 63mm x 38mm nailed or screwed to at least two studs with two nails/screws per stud, length of fixings to provide a minimum 30mm penetration into the studs

9. restraint strap built into masonry wall either through core drilled hole, e.g. 38mm diameter, or slot cut through inner leaf with slot mortared up after installation of strap

10. timber ledger minimum 72mm x 47mm or 63mm x 38mm

11. additional timber cross member fixed to trusses to support raised binder

**note:** holding down straps between panel and masonry have been omitted for clarity. Such strapping should be designed to suit the specific site conditions.
**Detail 9** – Gable spandrel supported on inner leaf masonry wall extended above ceiling level with cavity insulation

- breather membrane
- cavity tray/high bond DPC
- weep vent
- partial fill insulation or full-fill insulation
- 50mm min. clear cavity

**Note:** A cavity closer may be required subject to the National Building Regulations that apply to the project.

**Detail 10** – Positioning of wall ties at the top of spandrel panels at gable ends

- **Wall tie key**
  - Timber frame wall ties
  - Masonry wall ties

- Stud centres shown as 600mm
- 225mm maximum for blockwork or 75-150mm for brickwork

- Set of two wall ties with at least one tie within 225mm of top of gable spandrel
- Stud positions to be indicated on face of sheathing membrane for wall tie fixing purposes.
- 225mm maximum for blockwork or 75-150mm for brickwork

- 225mm
- Top row of masonry wall ties provided at half studs centres, i.e. 300mm

**Notes:**
- Wall ties for general wall area within spandrel panel should be positioned at every stud centre and 450mm max. vertical centres.
- Block coursing shown
- Outline of spandrel panel