

The Industry Association of Building and Property Inspectors in WA Inc – Inspect WA	
Position Paper 3. 2021 Title: Tie Downs Part 2 Minimum Tie Down Requirements for Soft Wood (“Pine”) Pitched Timber Framed Roofs with Metal Roof Cover Constructed from 1 January 2017.	
Subject	Tie Downs Part 2 Minimum Tie Down Requirements for Soft Wood (“Pine”) Pitched Timber Framed Roofs with Metal Roof Cover Constructed from 1 January 2017.
Association Position	See Public Release
Date Preparation Commenced	March 21
Final Approval by Committee and Release to Members	March 21
Why was the Paper Released	See Public Release
Key References	<p>NCC Building Code of Australia AS 1684 CA38-1971 Amdt 2 Oct 1973 Part 6.5(ii) UBB 1974 AS1684-1975 Part 6.5.2 AS1684-1979 Part 6.5.2 AS1684-1992 Part 6.6.3 AS1684-1999 Figure 9.5 (b), Table 9.12 &amp; Table 9.15 Building Commission IB49/2014</p> <p>AS 4349.1</p> <p>The Real Estate Institute of WA Australian Standard Pre Purchase Inspection for Major Structural Defects Annexure Form 167 10/19</p> <p><a href="https://www.youtube.com/watch?v=Nv8KtXSVFSA">https://www.youtube.com/watch?v=Nv8KtXSVFSA</a></p>
Legal Opinions	Not Obtained
Key Issues for Consideration	Some stakeholders may object to the level of clarity that this Position Paper attempts to provide.
Additional Observations	
Disclaimer	This document is not intended to be Legal Advice. The document is only intended for Members of The Industry Association of Building and Property Inspectors in WA. Where appropriate, readers of the document should seek their own independently legal advice.

Signed Chairman

The Industry Association of Building and Property Inspectors in WA – Inspect WA  
6 March 2021

## Public Release

**The Industry Association of Building and Property Inspectors in WA Inc – Inspect WA is pleased to announce the release of its Position Paper 21. 2021 Title: Tie Downs Part 2 Minimum Tie Down Requirements for Soft Wood (“Pine”) Pitched Timber Framed Roofs with Metal Roof Cover Constructed from 1 January 2017**

### 1. Background

There were a number of key issues that contributed to the release of this Position Paper:

1. Tie downs essentially relate to how a roof frame is tied down to a residential building structure. The requirements in relation to the tie downs have existed and changed substantially over the past 50 years. During the mid-1990's the introduction of soft wood timber roof frames in WA created a substantial degree of confusion and inconsistency in both the construction and subsequent assessment of residential properties.
2. The issue of Tie Downs is complex and cannot be dealt within in one Position Paper. Inspect WA has elected to break the issues down into multiple position papers which will be released over a period of time. This is the first of such Position Papers.
3. This Position Paper deals exclusively with metal roofs constructed upon soft pine wood stick (non-truss) timber frames constructed after 1 January 2017.
4. Historically metal roofs were attached to the hard wood roof frame with nails. In extreme wind events the individual metal sheets tended to pull away individually from the roof frame. During circa the mid 1990's pine timber roof framing was introduced into WA with the metal sheeting being attached to the roof frame via a large volume of tek screws, essentially locking the metal sheets to the roof frame. In extreme wind events, it became unlikely that individual roof sheets would be detached but more likely the entire roof would be subject to uplift.
5. The WA Building Commission has published several reports on this issue. Given the utilisation of softer “pine” wood timbers, the connections between the timbers and the building structures became the critical weakness point.
6. By 2014 (many would argue earlier), Regulators, Construction companies and Engineering firms were in generally greater alignment. There was a requirement for continuity in tie downs from the ridge to the walls or slab. In essence every key timber connection in a pine roof frame when metal cladding was used was required to be connected via straps or proprietary metal connectors.
7. The challenge being that the application of the requirements from the mid 1990's tended to be staggered and inconsistently applied. Full tie down provision within a pine roof frame essentially applied from circa 2012 to the majority of timber connections.
8. The issue for stakeholders is the consistency of the application of the tie down requirements. What has made this issue more complicated is that Engineers have the ability to override the requirements of the Building Code and the primary Australian Standard relating to the issue. AS 1684. Given the Building Code and Australian Standard are generic Australian wide requirements, it is appropriate that Engineers have the ability to assess the unique requirement if individual structures. The downside is that this potentially adds further inconsistency and confusion to the issues which already exists.

9. Beyond perimeter tie downs by 2010 most Engineering firms in WA were also requiring the opposing rafters be strapped across the ridge or alternatively supported by neck ties/mini collar ties.
10. Beyond perimeter ties downs AS 1684, the BCA and most engineers plans from circa 2012 called for the continuity of tie downs from the ridge to the slab. That is there must be clear continuity of the tie downs structure which included:
  - a. Tie down straps or rods imbedded into the cavity perimeter masonry walls at centres of approximately 1200 mm
  - b. Tie down straps must be connected to:
    - i. Rafters or
    - ii. The cover batten or
    - iii. Wall Plates
  - c. Proprietary connectors connecting rafters to underpurlins
  - d. Proprietary connectors connecting rafters to wall plates or top plates where underpurlins tie down straps or rods have not been utilised, assuming the top plate has been appropriate tied down.
  - e. Strapping of all struts at both top and bottom of the strut.
  - f. Tie down metal straps installed to the cavity perimeter brickwork must be installed vertically and tight.
  - g. All Rafters must be connected to the wall plate via triple grip connectors where the wall plate is tied down into the structure with tie down straps
  - h. Ridge straps or mini collar ties (neck ties) connecting opposing rafters must be installed to all opposing rafters
  - i. The above are the minimum requirements unless Engineers provide written instructions that override the above generic requirements
11. Finally, the key issue which requires consideration is the impact of a lack of tie downs on soft wood ("pine") timber framed metal clad roofs, when assessing the roof frame under AS 4349.1. Does the lack of tie downs represent a major structural defect?

## **2. The Association Position**

- a. Every residential property constructed with a pitched timber soft wood ("pine timber") frame having a metal clad roof constructed from 1 January 2017 must have a minimum of the following tie downs consisting of:
  - a. Tie down straps or rods imbedded into the cavity perimeter masonry walls at centres of approximately 1200 mm
  - b. Tie down straps must be connected to:
    - i. Rafters or
    - ii. The cover batten or
    - iii. Wall Plates
  - c. Proprietary connectors connecting rafters to underpurlins
  - d. Strapping of all struts at both top and bottom of the strut
  - e. Tie down metal straps installed to the cavity perimeter brickwork must be installed vertically and tight.

- f. All Rafters must be connected to the wall plate via triple grip connectors where the wall plate is tied down into the structure with tie down straps
  - g. Ridge straps or mini collar ties (neck ties) connecting opposing rafters must be installed to all rafters
  - h. The above are the minimum requirements unless Engineers provide written instructions that override the above generic requirements
  - i. Ridge strapping/neckties/mini collar ties must be in situ.
- b. Where a Building Inspector is able to confirm that the above minimum requirements are not, or are not substantially installed, the Inspector must consider the property to contain a Major Structural Defect(s).
- c. Where a Building Inspector is able to confirm that the majority but not all the above requirements have not been installed, the Inspector should utilise his professional judgement to determine if the missing tie downs represent a Major Structural Defect or not.

### **3. This position paper is not retrospective on previous building Inspections**

1. This Position Paper has **no** bearing or impact on any building inspections conducted prior to the date of release. Where a Members Building Inspection report was issued prior to the release of this Position Paper the Association does not believe that prior Building Inspection report should be considered defective on this issue. Inspect WA acknowledges these previous Building Inspection reports reflect the inconsistent WA building practices, confusion and lack of Regulatory action and self-assessment building practice model employed within WA.
2. Inspect WA, nor its member Building Inspectors, will not accept any liability for building inspection reports previously issued which are inconsistent with this Position Paper.
3. The Association acknowledges that historical building inspections may have been undertaken and the issue described in this Paper above was described NOT as Major Structural Defect. Further, the Association acknowledges that a subsequent building inspection may be undertaken on the residential properties where previously considered views may have indicated that the structure does not contain a Major Structural Defect but will now be considered to contain Major Structural Defects. The Association acknowledges that this will cause some property owners a degree of angst.
4. The Association notes that the WA Government Building and Energy (previously WA Building Commission) has been aware of the confusion which has existed in the past and, more importantly, that literally thousands of non-compliant roof structures have been constructed in WA without any retrospective regulatory requirements to address these non-complaint issues.
5. Inspect WA is of the opinion that a line in the sand needs to be drawn such that these significant installation deficiencies or omissions are addressed.

#### **4. Resolving a Major Structure Defect relating to Tie Downs in metal clad roofs constructed with soft pine pitched timber roof frames.**

1. The Association notes that resolving major defects relating to Tie Downs in metal clad roofs constructed upon soft pine timber roof frames as described in this paper should in the majority of cases not be an overly onerous task.
2. There are several options that the home owner can consider. These can include:
  - a. The property owner can attempt to obtain from the original builder or the Council/City a copy of the Engineers plans which supported the Building Permit. These Engineers plans should provide absolute clarity on the tie down requirements. It may be possible that these Engineers plans will negate the requirement for the aforementioned tied downs. The Association believes in the majority of cases this will be unlikely, but it is possible. Where Engineers plans are provided to a member Building Inspector post issuing a Building Inspection report indicating a Major Structural Defect relating to the issues described in this paper, the member Building Inspector should revise his building inspection report and reissue the report in light of any new information. It should be noted that Engineers Plans are rarely made available to member Building Inspections at the time of issuing their initial report.
  - b. Where there the original Engineers plans are not available the home owner may want to engage an Engineer to certify that the roof frame is compliant in its current form. While this can be possible, given current standards being applied to soft wood timber framed constructions the Association believes that this approach may generate a limited outcome in relation to the issues described in this Paper, but this possible solution it still represents a possible solution.
  - c. Ultimately, where a roof frame has not been built to the approved requirements the original builder retains residual liability. As a result where it is identified that a major structural defect exists as a result of the issues identified in this paper, the original Builder has an obligation to return and remediate the issue without costs. While theoretically possible, outside of the statutory defect liability period, unless the builder agrees to undertake the work, property owners have to resort to civil action to require the builder to return to remediate the roof frame. The costs associated with taking civil action may exceed the costs of simply remediating the issue.
  - d. The simplest solution to remediating the issue may be to simply engage a WA Resisted Builder to retro fit the required tie downs. The average 4x2 single storey home the following indicative costs are to retro fit the ties downs are provided:
    - i. Install tie down rods to permitter walls and connect to rafters - \$3,000 to \$10,000
    - ii. Installed ridge ties or mini collar ties to opposing rafters - \$500 to \$1,500
    - iii. Costs to install tie down roads to multi-level homes are likely to cost more due to potential access challenges and working at height issues.

**5. Recommendation to Residential Property Sellers where the property contains a metal clad roof constructed on a soft pine pitched timber roof frame.**

1. Given the tight time frames imposed by the Standard REIWA pre Purchase Building Inspection clause, the Association suggests that every residential property owner who is contemplating selling their soft pine wood roof frame and metal clad roof home obtain a pre Agent Listing structural inspection on their roof frame. Obtaining this pre-listing inspection may avoid issues in the subsequent sale and settlement of the home where there can be substantial challenges associated with undertaking remediation work on tie down issues during short pre settlement periods.

Signed Chairman

The Industry Association of Building and Property Inspectors in WA – Inspect WA

6 March 2021