FTMA TECH TALK

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# FASTENERS VS NAILPLATES IN LAMINETED VENEER LUMBER (LVL)

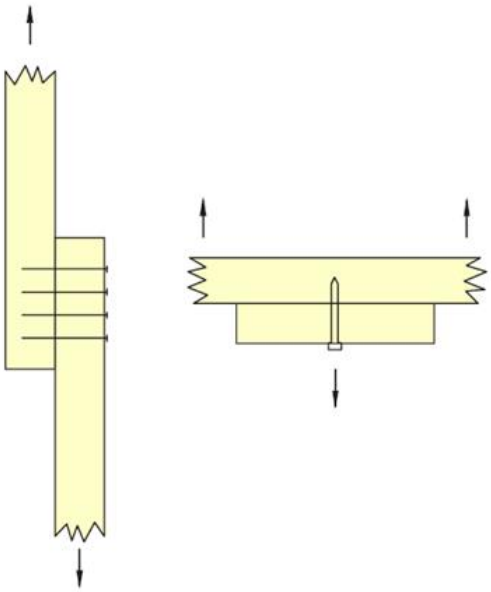
With the increasing adoption of LVLs in the Truss and Frame industry, there is a growing concern about which Joint Group to apply for the design of connections (bolts, nails, screws, or nail plates) and whether the substitution of products is permissible in a designed connection.

## What is 'Joint Group'?

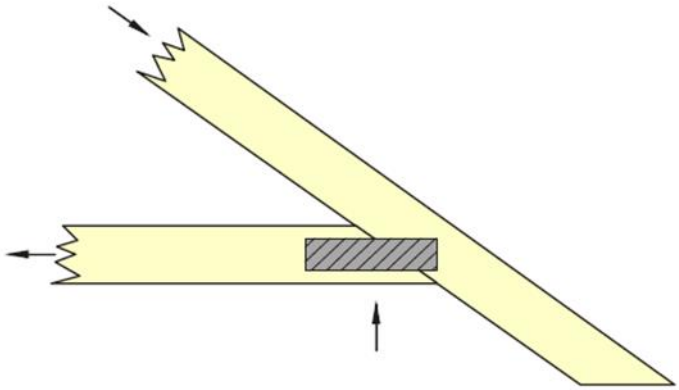
A 'Joint Group' or 'Joint Strength Group' is the classification of various species of sawn timber into six groups, each for seasoned (JD1 to JD6) and unseasoned (J1 to J6) timber in AS 1720.1: Appendix H. Each joint group has a minimum fastener capacity tabulated in Section 4 of AS 1720.1. In other words, when any of the listed fasteners (nails, screws, bolts, etc.) from AS 1720.1 are used to design a joint/connection in timbers belonging to a certain joint group, these fasteners provide a minimum joint/connection capacity as tabulated in Section 4 of AS 1720.1.

- Joint Groups are applicable to listed sawn timbers in AS 1720.1: Appendix H.
- Joint Groups are relevant to the fasteners listed in AS 1720.1.
- Nail plates are not listed fasteners in AS 1720.1.

Now, AS 1649.1 prescribes methods for ascertaining fastener capacities in timber. Hence, LVLs (as well as non-listed timber species) can be tested in accordance with AS 1649 to determine an equivalent Joint Group (validated against Section 4 of AS 1720.1) but only for fasteners listed in AS 1720.1. However, the behaviour of fasteners in LVLs is not the same as in sawn timber. Especially for nails and screws, which transfer loads in axial pull or in shear at the contact surface, and for nail plates, which transfer loads from the face of one member to the face of another member.



*(Nails or Screws)*



*(Nail-plates)*

**[AS 1649.1 Figure 1.1 and Figure 1.3]**

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## Nails or Screws:

LVLs comprise laminates, which may be selected from one or more species of timber (potentially belonging to different Joint Groups). Nails or screws may penetrate these laminates in two ways, as seen in the illustration. As such, fasteners would yield different performances depending on their penetration in various laminates of LVL.

To facilitate this deviation, the governing standard for LVLs, AS 4357.0, requires LVL manufacturers to specify the equivalent Joint Group in both the face and edge of LVL for nail and screw connection design (AS 4357.0: Clause 3.3.2 (a)). This information is specific to an individual product and is not transferable.

## Nail Plates:

Unlike nails or screws, nail plates transfer loads through gripping the face of timber. In the case of LVLs, this primarily involves the external veneers only. Consequently, the behaviour and performance of nail plates is unique and is not standardised by Australian Standards.

Each LVL (including sawn timbers by grading or joint groups) must undergo testing to determine the performance of nail plates, and this capacity is referred to as 'nail-plate tooth capacity' or simply 'tooth capacity.'

This tooth capacity is specific to the individual timber/LVL and is not transferable.

## Key Takeaways

1. Joint Groups are applicable to listed sawn timbers in AS 1720.1: Appendix H and only for listed fasteners as in AS 1720.1. For connection design in LVLs:
    - AS 1720.1 listed fasteners: Refer to the LVL manufacturer's literature for the nominated equivalent Joint Group for face and edge applications of fasteners and refer to Section 4 of AS 1720.1 for fastener capacities.
    - Non-listed fasteners: Refer to the LVL manufacturer's literature for the nominated equivalent Joint Group for face and edge application of the fastener and consult the fastener technical literature for capacities in the nominated Joint Groups.
    - Nail-plate design: Refer to your nail-plate supplier for the applicable 'tooth capacity' in face and edge applications.
2. Properties assigned to LVLs are non-transferable as they are proprietary products. No two F17 LVLs or E14 LVLs are the same. Hence, if you are substituting, please redesign.

For further discussion, contact your timber design specialists.

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