

MANUFACTURING SPECIFICATION

Design

Gang-Nail Trusses are to be designed in accordance with the AS1720.1 - 1997 Timber Structures Part 1: Design Methods, and the joints are to be designed using the methods and design criteria supplied by MiTek Australia Ltd.

The Engineering drawings and/or data should specify member sizes and grades, permissible timber undersize, Gang-Nail connector sizes, locations and orientations at each joint, and truss camber if required. Web cutting details must be defined where the connector contact area will be effected.

Joint details, including chord and web cuts, connector plate size, location and orientation are to be as specified on MiTek20/20, DataTRUSS & RoofFAB outputs, unless other wise detailed on engineering drawings.

Connectors

All connectors to be patented "Gang-Nail" as manufactured by MiTek Australia Ltd.

Steel used for the manufacture of connectors will be Galvanized Coil to AS1397.

Zinc coating class to be Z275 on connectors where normal conditions prevail. Stainless Steel connectors are available for additional protection where trusses may be subjected to corrosive conditions, or where treated timber is used.

Timber

All timber used for truss purposes shall be visually or mechanically stress graded to the appropriate Australian Standard Specification. Refer AS1720 AS1720.1 - 1997 Timber Structures Part 1: Design Methods.

The strength, grade and size of each member in the truss shall comply with MiTek Software designs or engineering drawings, or be a higher grade. Truss members must not be substituted with wider timber if by doing so, the contact area of Gang-Nail connectors into other members will be reduced.

Timber must be of at least the specified nominal size, less any undersize specified by the designer. However, in no case should the difference in thickness of any two members meeting at a joint exceed 1.5mm.

In addition to the requirement of the Australian Standard Grading Rules, the following requirements apply:

- Sloping grain should be avoided in trusses manufactured from green timber, particularly in the top chord panel of gable trusses adjacent to the heel joint.
- Brittle heart in hardwoods should be excluded. Pith is permitted in timber subject to compliance with current visual and mechanical grading rules. Trusses manufactured using "pith included" pine shall be designed for joint Group JD5 timber to make allowance for the reduced tooth shear capacity of this timber.
- Loose knots shall be avoided under Gang-Nail connectors. Sound, tight knots are permitted at joints provided they comply with the relevant structural grading rules for the timber grade specified.
- Untreated Lyctus susceptible sapwood is not permissible under a "Gang-Nail" connector.

Where significant spring is present in a truss chord, the member should be sawn such that the spring best conforms to the camber being set into the truss.

Fabrication

Trusses are to be fabricated on jigs approved by MiTek Australia Ltd., and capable of ensuring uniformity of truss shape.

Pressing equipment must be capable of pressing connectors into timber without damage to the connector or the timber.

Gang-Nail connectors shall be pressed home so that the sum of the gaps on either side of the joint does not exceed 1.5mm.

The maximum gap between any two adjacent members at a joint is 2mm.

Trusses are to be strapped into packs of five or more to improve stability during handling. Packing or other suitable protection should be used under straps to avoid damage to the outer members. Trusses must always be handled so as to avoid excessive lateral bending. Any truss which incurs set after such bending should be rejected.

The fabricator shall clearly label each truss showing its "mark", and identify internal support points if applicable.

Camber as specified by the designer is to be achieved with a maximum tolerance of 3mm.

IMPORTANT NOTES

Where large cambers are required, e.g. 15mm or more, it is the building designer's responsibility to ensure that this camber will not create difficulties for finishing grades or cause damage to cladding material. Instead, special designs with internal supports should be considered as a means of reducing camber.

All cambers shown for green timber assume a timber moisture content of approximately 70%, and hence a creep factor of 3. For immediate moisture contents toward the dry condition of approximately 15%, a reduction in camber should be made appropriate to the creep factors of 3 and 2 which apply for *green* and *dry* timber respectively.

For trusses manufactured from green timber and supporting metal deck roofs, the recommendations given in MiTek software designs may be over estimated. *Shrinkage* of the top chord may be effectively restrained by modern fixing techniques and the use of long continuous sheet lengths. As the majority of calculated truss camber is caused by reduction of top chord length, the recommended cambers may be reduced by approximately 50% in such cases.

For sheet roofs incorporating well fixed and continuous material, even further reduction of recommended camber should be considered where the slope of the roof is conducive to *arching* or *shell* action.

ORDERING TRUSSES

All relevant details including building plans, specifications and loadings should be provided to the truss fabricator prior to ordering trusses. This will ensure the roof truss system is designed, manufactured and installed to suit specific job requirements.

Wind load is an important factor in the design and performance of roof trusses. Ensure that you have correctly advised the truss fabricator with regard to wind load requirements, and that adequate provision has been made to fix trusses to support structure to withstand wind uplift forces.

The effect of wind on a roof is predominantly uplift forces. The degree of uplift varies and is dependent on a number of factors including design wind velocity, roof pitch, building shape, roof and ceiling material, and degree of venting to ridge and eaves.

When specifying design wind velocities for a particular project, the following minimum information should be provided:

- Regional Basic Design Wind Velocity - this is the town, city or area where the project is used for housing.
- Mean Return Period - is dependent on the type of building, e.g. farm, domestic or hospital. Normally a 50 year return is used for housing.
- Geographical Location - some areas such as cyclonic prone areas requires special consideration.
- Terrain Category - is an allowance for the type of terrain in the immediate vicinity of the project.
- Shielding - in some cases a reduction in design wind velocity can be made by use of surrounding buildings and landscape.
- Height Above Ground - generally wind loads increase with height above ground level.

Trusses are designed for normal roof, ceiling and wind loads to suite specific jobs and conditions. Additional loading such as solar units, hot water tanks, air conditioning, etc. require special consideration. Advice should be sought from a fabricator prior to commencing construction.

Wall frames and beams supporting trusses must be designed for the correct roof loads. Refer to AS1684-1999 Residential Timber Framed Construction for details.

Trusses are generally designed to be supported on the outer wall with inner walls being non load bearing. Where it is necessary to use internal walls for load bearing, these walls will be clearly shown on layouts.

For environments where the atmosphere may be conducive to corrosion, such as some types of industrial and agricultural buildings, or building near the ocean and subject to salt spray, consideration should be given to the use of G8S stainless steel connector plates.

Trusses are designed for specific loading, geometry and support conditions. Under no circumstances should truss timber be cut, removed or trusses be modified in any way without prior approval from the truss fabricator.

Make sure all bracing is permanently fixed and all bolts and brackets are tightened prior to the loading of the roof.

TRANSPORT, STORAGE & LIFTING

Transport & Job Storage

Trusses shall be fully supported when being transported in either the horizontal or vertical plane. Care must be taken when tying down not to damage chords or webs.

On their delivery to site, trusses shall be inspected by the builder or his representative. Any shortages or damaged trusses shall be reported to the fabricator immediately. Damaged trusses shall not be site-repaired without prior approval from the truss fabricator.

Where it is anticipated that trusses will be stored on site for an extended period of time before use, adequate provision should be made to protect them against the effects of weather. Trusses manufactured from seasoned timber should be covered to avoid wetting and protective covers where used, should allow free air circulation.

When stored on the job site, trusses shall be on timber billets clear of the ground and in a flat position to avoid distortion.

Lifting

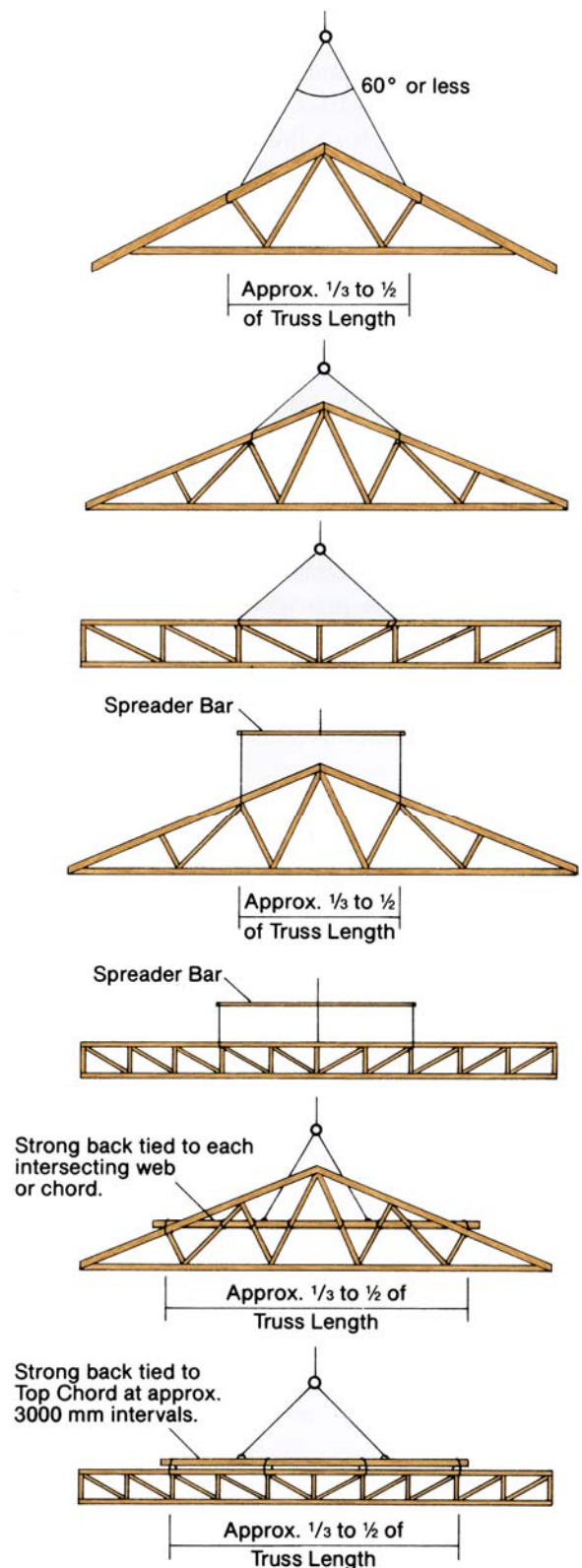
When lifting, care must be taken to avoid damaging of joints and timber. Spreader bars with attachment to the panel point should be used where span exceeds 9000 mm. Never lift by the apex joint only.

The trusses may also be placed on the top plates by pulling them up skids, spread at 3000 mm, taking the same precaution as described above. Ensure that the trusses are not distorted or allowed to sag between supports.

The recommended method of lifting trusses will depend on a number of factors, including truss length and shape.

In general, sling truss from top chord panel points as shown below. Slings should be located at equal distance from truss centreline and be approximately 1/3 to 1/2 truss length apart

The angle between sling legs should be 60° or less and where truss spans are greater than 9000 mm a spreader bar or strong back should be used. Some typical examples are shown below.



SUPPORTING STRUCTURE

Footings and sub-structure supporting trussed roofs should be designed with the additional loads on the external walls taken into account. Unless otherwise noted, truss designs assume the supporting structure is adequate to resist all horizontal and vertical loads. Where wall construction does not comply with local building regulations, a special design should be carried out by the building designer.

Footings should be in accordance with local building regulations. Where large concentrated loads occur such as supports for girder trusses, a special check should be made by the building designer.

Sizes of studs, bearers and external walls should be in accordance with AS1684 -1999 "Residential Timber Framed Construction", or as specified by local building regulations. Where large concentrated loads such as those due to girder trusses occur, a special design check should be made by the building designer.

Trusses should ideally be positioned directly over wall studs at the centres specified on the drawings. Where this is not possible, wall plate sizes shall be as given in AS1684 -1999 "Residential Timber Framed Construction", or in accordance with local building regulations.

Lintel sizes and support details shall be a minimum of those given by AS1684 -1999 "Residential Timber Framed Construction". Attention is also drawn to the lintel size charts published by MiTek Australia Ltd.

INSTALLATION

Trusses should be handled and installed in such a way as to avoid damage and permanent sets. To this end, truss installation bracing and truss fixing details, should comply with recommendations given in MiTek's "Fixing and Bracing Guidelines for Timber Roof Trusses" publication.

Trusses should be installed in line with the intentions of the designer. Truss centres, cladding material and design wind velocities should all be in accordance with the truss design data given on relevant design drawings or MiTek Software output. Roof layouts should comply with the drawings (where thereon indicated) and in no case shall the trusses be at greater centres than specified by designs.

Temporary bracing (MiTek Truss Spacers) shall be provided during installation to hold trusses plumb and stable and should not be removed until permanent bracing purlins and battens have been attached. Temporary bracing should be in accordance with drawings (where thereon indicated) or in accordance with the MiTek "Fixing and Bracing Guidelines for Timber Roof Trusses".

Permanent bracing shall be in accordance with recommendations given in MiTek's "Fixing and Bracing Guidelines for Timber Roof Trusses", or in accordance with relevant drawings. In all cases, permanent bracing shall comply with requirements of local building regulations.

Alterations or modifications to trusses of any sort (including cutting, checking, etc.) shall not be made. Consult the Design Engineer.

Fixing of trusses to the support structure should be adequate to withstand all vertical and horizontal forces given by truss designs. Suggested fixing methods are given in MiTek publications, including the "Fixing and Bracing Guidelines for Timber Roof Trusses". These details should be used as a guide only, as it is the building designer's responsibility to determine the fixing requirements necessary to suit the overall building design, and to provide adequate bearing and hold-down for trusses.

INSTALLATION cont'd

Trusses shall be supported on external load bearing walls only unless otherwise specified by the designer. Special provision shall be made to ensure significant vertical loads are not transferred between truss and non-load bearing walls. To this end, load bearing walls should be a minimum of 12 mm higher than non-load bearing walls. Attention is drawn to the recommendations given in MiTek “Fixing and Bracing Guidelines for Timber Roof Trusses”.

Roof and ceiling battens should be at centres specified by design and be sized and fixed in accordance with codes and/or manufacturer’s recommendations. Refer to MiTek “Fixing and Bracing Guidelines for Timber Roof Trusses” for further details

Longitudinal ties, where required, should be sized and fixed to web or chord in accordance with MiTek “Fixing and Bracing Guidelines for Timber Roof Trusses” or as specified on design drawings.

Roof trusses shall not be subjected to loads other than the following, unless noted otherwise on drawings.

Loads imposed by components of the roof such as those due to roof cladding, member self weight, etc. as set out in AS 1170-Part 1 “LOADING CODE, Dead and Live Loads and Load Combinations”.

Loads applied for short duration, such as roof live loads encountered during installation and maintenance operations as set out in AS 1170-Part 1 “LOADING CODE, Dead and Live Loads and Load Combinations”.

Trusses supporting loads from services such as hot water and air conditioning units shall be designed specifically for these additional loads. Units, where installed, shall not impose heavier loads or be located at positions other than those indicated by design. In no case shall trusses be cut or modified to accommodate units or ducts.

Roof material should be fixed to trusses within one or two weeks after installation to provide protection against the weather. Prolonged exposure to rain and sun should be avoided as repeated wetting and drying has a detrimental effect on the strength of both timber and connection.

BRACING

Roof trusses will support their design loads when they are:

- installed in a vertical position,
- supported at the designed bearing points,
- braced to prevent over turning,
- braced to prevent sideways buckling,
- tied down to support to prevent uplift,
- undamaged during handling and erection.

Trusses, particularly large spans, need to be handled with care. The incorrect location of lifting slings can cause trusses to buckle under their own weight. With long, low pitch trusses, lifting spreaders or strongbacks may be required.

Permanent Roof Bracing

When trusses are designed, a truss layout of the roof is prepared. This will be supplied by the truss fabricator along with the MiTek “Fixing and Bracing Guidelines for Timber Roof Trusses” booklet either at the time of placing the order or with the delivery of the trusses. This layout will specify the location of each truss and bracing, and will note any special requirements.

MiTek “Fixing and Bracing Guidelines for Timber Roof Trusses” booklet gives detailed instructions on erection procedure and fixing of bracing.