

TECHNICAL BULLETIN

STRUCTURAL FLOOR DESIGN



JULY 2023



INTRODUCTION

This bulletin is intended to assist in structural floor design and clarify sheet orientation and laying sheets in brick pattern. It also gives further physical properties to allow for specific design of cassette floors.

KOPINE FLOORING SYSTEMS

Generally, Kopine flooring sheets should be laid in “brick pattern” perpendicular to the joists.

The reasons for this are:

1. To offer load sharing across the joists.
2. Where diaphragms are required, to prevent “unzipping” of joints.

Unlike plywood, Kopine Particleboard has no orientated grain and consequently has the same stiffness (MOE) and strength (MOR) in both directions within the sheet. Consequentially orientation of the sheet itself does not have any effect on stiffness or deflection between joists.

However, continuous joints along joists will not be offering any load sharing and may result in unacceptable deflection at that joist, should that joist have a lower stiffness than the adjacent joist.

Where design dictates that continuous joints along joists are required, deflection of the joist at the joint must be considered to have less load sharing capability. Situations where this may occur includes “cassette” floor design or where orientation of joists changes. The following methods can be considered:

1. Forming a double joist to support the joint.
2. Increasing the joist depth appropriately to limit deflection at isolated joists, by assuming lower bound stiffness for the joists.
3. Use of enhanced stiffness engineered timber joist such as LVL, which have lower variability in stiffness

Where diaphragms are specified to follow NZS 3604, diaphragms must be installed in strict accordance with NZS 3604 2011 Section 7 for Structural Floor Diaphragms. All other diaphragms must be by specific design by a suitably qualified professional using the material properties given in this bulletin.

In order to carry out specific design for structural floors, Kopine engaged Scion to carry out panel shear tests in accordance with ASTM D2719 and KCL Engineering Services to analyse the results for average Panel Shear Strength and Panel Modulus of Rigidity.

The results of the tests, together with existing manufacturing and fastener properties, will support specific engineering design for structural diaphragms and cassette flooring outside the scope of NZS3604:2011 and within the scope of NZS3603:1993.

The following table gives the material properties for both Kopine Tongue & Groove particleboard flooring and the Kopine Ultralock flooring system. Note that the Tongue & Groove edge support details do not provide in-plane shear resistance which must be taken into account in specific design floor diaphragms.

Physical properties of Kopine Flooring

Panel shear (fps) average	3.4 MPa
Panel shear modulus of rigidity (G)	978 MPa
Modulus of rupture (MOR) ¹	> 17 MPa
Modulus of elasticity (MOE) ¹	> 2650 MPa
Density	> 670 kg/m ³
Internal bond	> 500 kPa