

Practice Advisory 3: Beware of limitations – cold-worked wire mesh

If you are a designer or construction contractor you need to understand the limitations of cold-worked mesh and how it can affect the performance of a structure where ductility is needed.

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Of interest to Building consent authorities, Builders, Designers, Engineers

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Issues of concern

In some situations where ductility in an earthquake may be required, cold-worked wire mesh may seriously affect the performance and integrity of the structure.

As the commonly specified standard mesh has a very limited ductility, it may not be able to withstand the strains imposed as a result of the design actions (displacements, forces). This can cause the mesh to fracture and reduce the capacity of the structural element and the overall performance of the structure.

Designers must ensure they specify seismic-grade steel reinforcing bars in areas requiring ductile performance of the steel. Construction contractors must ensure the design requirements are correctly implemented on site and that care is taken when using mesh on site.

Background

Concerns have been expressed about the use of low ductility mesh in floor diaphragms that are expected to undergo large displacements requiring a high level of ductile performance from the steel.

Amendment 3 (March 2004) to the Concrete Structures Standard, NZS 3101: 1995, Clause 7.3.1.2, requires welded wire fabric to have a uniform elongation of at least 10 percent unless the yielding of the reinforcement will not occur at the ultimate limit state or the consequences of yielding or rupture will not affect the structural integrity of the structure.

Further information: AS/NZS 4671 Steel Reinforcing Materials, NZS 3101 Concrete Structures, NZS 3109 Concrete Construction.

Don't

- don't use cold-worked (standard) wire mesh in seismic diaphragms or as primary flexural reinforcement in slabs where there is the potential for yielding of the reinforcement
- don't use standard cold-worked mesh if high ductility mesh is specified
- don't use Grade E (Earthquake) machine welded wire mesh unless it has been shown that the mesh in its welded condition is suitable for use in ductile demand situations (in particular the elongation requirements).

Do

- do use Grade E (Earthquake) 6, and 10 or 12 mm diameter bars instead of mesh in areas of high ductility demand in floor slabs
- do obtain a copy of NZS 3109 concrete construction and AS/NZS 4671 steel reinforcing materials
- do obtain a copy of Amendment 3 to NZS 3101 concrete structures.

Figure 1: Separation of floor slab.

Figure 1: Separation of floor slab putting high strains on topping reinforcement.

Source: University of Canterbury Civil Engineering Department, J Matthews

All guidance related to B1 Structure (<https://www.building.govt.nz/building-code-compliance/b-stability/b1-structure/>)



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