

December 2019

Shearcrete Ltd  
131 Victoria St  
Christchurch

To Whom it may concern.

Project Ref: 1940772

**RE: Shearcrete™ Limited – Steel Fibre concrete mix design FC2519TC2.**

We have been engaged by Shearcrete™ Limited to undertake testing of steel fibre concrete mix design **FC2519TC2**

This mix has been designed for use in waffle slab foundations in Terrain Category 2 (TC2) floors on liquefiable soils. It is a 25 MPa, 19 mm mix containing proprietary high strength steel fibres, with all materials and concrete statistical properties conforming to relevant New Zealand & European standards. The Mix is to be supplied via Ready Mixed Concrete plants authorised by SHEARCRETE™ and monitored by a suitably qualified Registered Engineering Associate or Chartered Professional Engineer, and annually audited by an independent Chartered Engineer, assessing to standard NZS3104:2003 "Specification for Concrete Production"

Testing has been undertaken for the purposes of investigating the use of steel fibres to resist shear forces and to remove the minimum shear reinforcement (stirrups / links) requirements in reinforced concrete beams in accordance with C5.A6.1 of NZS3101:2006.

Testing has been undertaken in accordance with NZS3101:2006 "Concrete Structures Standard", Appendix C5 "Test and Design methods for steel fibre reinforced concrete subjected to monotonic loading" and follows the methodology as outlined in European Standard EN 14651 "Test method metallic fibred concrete".

Thirty-two concrete samples have been manufactured and cured under supervision of a Chartered Professional Engineer and tested in an IANZ accredited laboratory, in accordance with the aforementioned standards.

The Crack Mouth Opening Displacements (CMOD's) at 0.5, 1.5, 2.5 and 3.5mm where recorded for each sample and the corresponding Characteristic Residual Tensile Strengths ( $f_{Rk,1}$ ,  $f_{Rk,2}$ ,  $f_{Rk,3}$ ,  $f_{Rk,4}$ ) calculated. These are summarised in table 1 below and are calculated in accordance with the methodology outlined in NZS3101 – Appendix C5, and statistical analysis with the most conservative of the values presented.

| CMOD (mm) | Characteristic Residual Tensile Strengths |
|-----------|---|
| 0.5       | $f_{Rk,1}$ 4.90 MPa                       |
| 1.5       | $f_{Rk,2}$ 1.61 MPa                       |
| 2.5       | $f_{Rk,3}$ 1.31 MPa                       |
| 3.5       | $f_{Rk,4}$ 1.14 MPa                       |

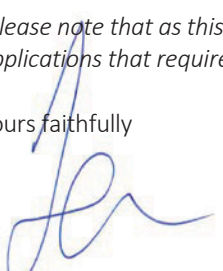
Table 1 – Characteristic Residual Tensile Strengths

As the Characteristic Residual tensile strength ( $f_{Rk,4}$ ) is greater than 1.0MPa, the minimum shear reinforcement requirements of section 7.5 of NZS301:2006 do not apply.


Drawings and specifications should specify **"Shearcrete FC2519TC2 concrete"** to ensure that this is supplied to site.

*(Please note that as this mix contains metallic steel fibres, the structural concrete may not be suitable for architectural applications that require concrete surface to be coloured, abraded, ground or polished.)*

Yours faithfully



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