Mechanical Strength of Knitted Wire Mesh

0.28mm Ø and 0.50mm Ø Stainless Steel

KnitMesh Technologies

Protecting People, Property and our Planet

High-Strength Stainless Steel Mesh

Knitted mesh has high mechanical strength and inherent flexibility, allowing it to withstand heavy shock loads and sudden impacts. Despite the fine wire diameter (typically below 0.5 mm), the interlocking loop structure and the ability of the wires to move over each other provides exceptional flexibility and strength.

Test Procedure

A 1m x 1m piece of knitted mesh was produced from stainless steel wire with stitch patterns as shown in Figure 1, and attached to a test frame structure (Figure 2).

The knitted mesh was secured to the frame on two parallel sides and left unconstrained on the others. A thin (unconstrained) plastic sheet was then placed over the knitted mesh.

Sand was incrementally added and removed, and the loaded and unloaded deflection or "sag" of the knitted mesh was measured at three points, L, C and R, under the mesh in the unconstrained axis.

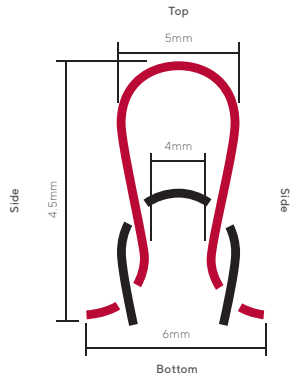

Figure 1. Schematic diagram of stitch pattern used in this test.

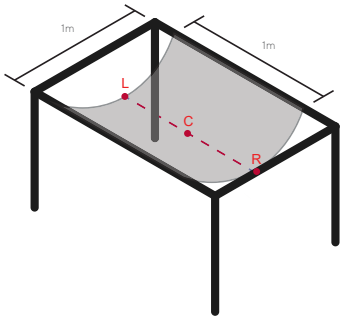

Figure 2. Schematic diagram of structure used to constrain wire mesh under test, indicating measuring points.

Results

The deflection data generated during the loading and unloading of sand demonstrated the mesh's ability to withstand significant mechanical loads without failure at fixing points or within the mesh sheet itself.

0.28mm Ø stainless steel mesh:

- Each individual wire has a tensile strength of ~5 kgf
- Tested successfully to ~200 kgf of distributed load - see charts below
- A 1m x 1m sheet typically withstands up to ~650 kgf before breaking

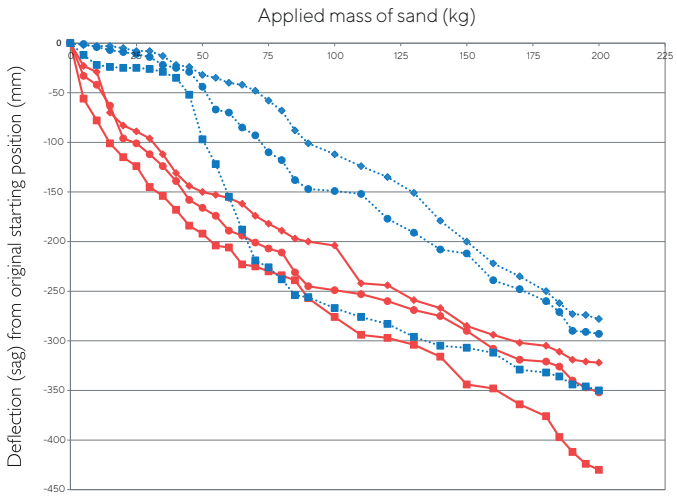

Figure 3. Loaded and unloaded deflections of the knitted wire mesh sheet as sand was added and removed.

The chart shows how the mesh behaved when fixed to the test structure "with the stitch" (constrained along its top and bottom edges).

The solid red lines show the deflection under load, while the dotted blue lines show the deflection after unloading (relaxed position).

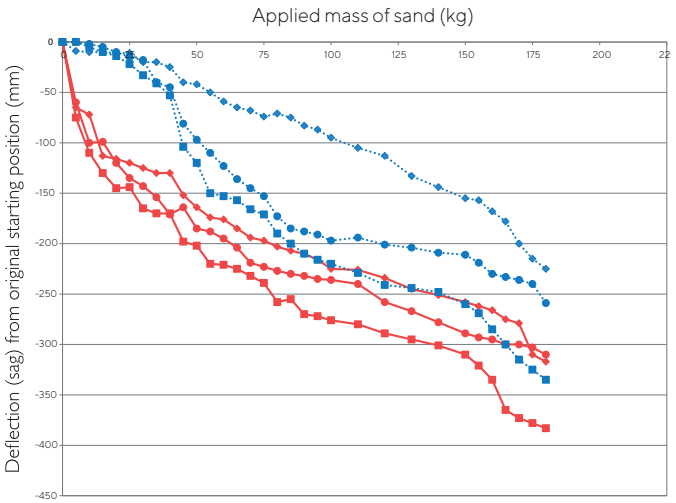

Figure 4. Loaded and unloaded deflections of the knitted wire mesh sheet as sand was added and removed.

The chart shows how the mesh behaved when fixed to the test structure "against the stitch" (constrained along its side edges).

The solid red lines show the deflection under load, while the dotted blue lines show the deflection after unloading (relaxed position).

0.50mm Ø stainless steel mesh:

- Higher tensile capacity per wire
- Tested successfully to ~500 kgf of distributed load - see charts below
- A 1m x 1m sheet successfully loaded to ~2,000 kgf before breaking

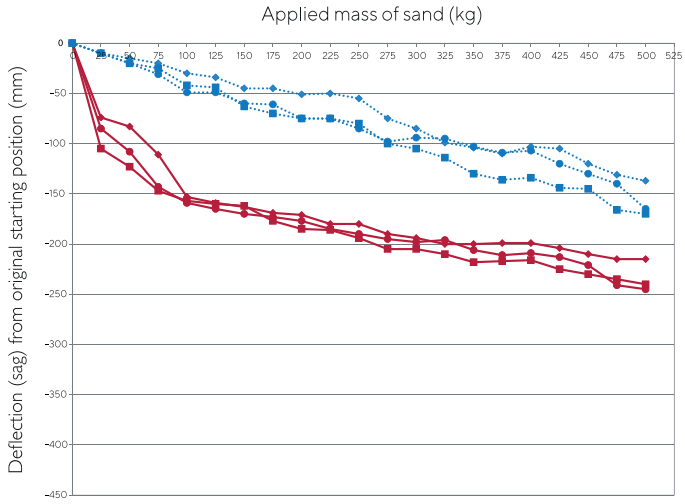

Figure 5. Loaded and unloaded deflections of the knitted wire mesh sheet as sand was added and removed.

The chart shows how the mesh behaved when fixed to the test structure "with the stitch" (constrained along its top and bottom edges).

The solid red lines show the deflection under load, while the dotted blue lines show the deflection after unloading (relaxed position).

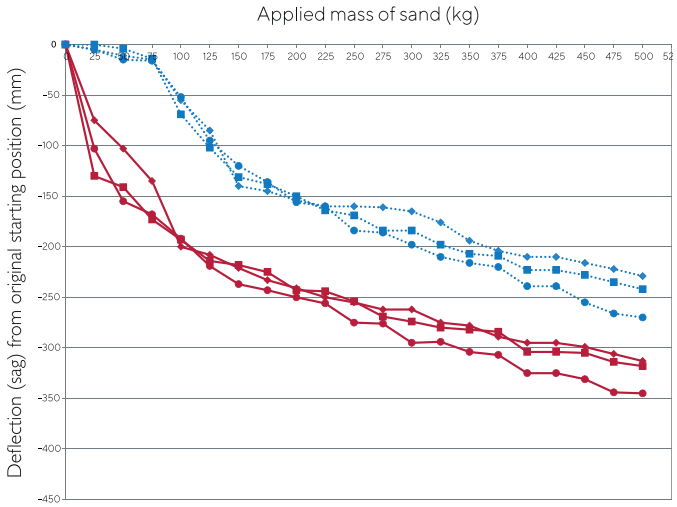

Figure 6. Loaded and unloaded deflections of the knitted wire mesh sheet as sand was added and removed.

The chart shows how the mesh behaved when fixed to the test structure "against the stitch" (constrained along its side edges).

The solid red lines show the deflection under load, while the dotted blue lines show the deflection after unloading (relaxed position).

Deflection Behaviour

During testing, the knitted mesh exhibited progressive deflection as load was applied and showed high resilience after unloading. The orientation of the stitch influenced the deflection profile but did not compromise overall strength.

- With the stitch – mesh constrained along its top and bottom edges
- Against the stitch – mesh constrained along its side edges

Quality Assurance

KnitMesh Technologies is accredited to: ISO 9001, ISO 14001, ISO 45001, PAS 99, and IATF 16949.

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