

## What is knitted wire mesh?

Knitted wire mesh is a metal wire or plastic strand knitted into a mesh structure in very much the same way as stockings or sweaters. It is in no way related to the woven metal materials familiar to us as fly screens.

Knitting produces mesh of interlocking loops. These loops can move relative to each other in the same plane without distorting the mesh, giving knitted mesh a two-way stretch. This cannot be done with woven meshes, as there is always some form of connection between the wires at the corners of the square openings. From a functional point of view, it is this flexibility that gives knitted mesh its unique advantages for industrial uses.



### Forms of Knitted Mesh

Knitted mesh is produced on a cylindrical machine. The output of this machine is a continuous “stocking” of mesh, which is pulled through the knitter by take-up rollers. It can be used directly in this flattened form as an insulation covering or it can be further processed into several other basic forms.

Flattened mesh is sometimes run through corrugating rolls to create crimped mesh. In this form, the corrugations act like springs for resiliency and give the mesh thickness.

Crimped mesh is also used to create compressed units for filtration, shock mounts and flame arrestors. In this case, the mesh is formed in a custom made die. These units are made in densities (% metal by volume) ranging from 10% to 70%. Compressed mesh is also made in a continuous strip form by running the mesh through calendaring rollers.

Mesh can be knitted directly into a hollow tube used by itself or knitted over wound-up mesh to make a cable or gasket core. It can also be rolled or padded to create filters, separators or flame arrestor, demister pads etc. In all of the forms of mesh, density and wire dispersion are controlled closely to ensure optimum product performance and repeatability.

### Properties of Knitted Mesh

Knitted metal has distinct advantages over most competitive materials. Because each loop acts as a small spring when subjected to tensile or compressive stress, knitted metal has an inherent resiliency. If it's not distorted beyond its yield point, the material will resume its original shape when the stress is removed. Even when it's compressed into a special shape, a high degree of resiliency is retained. Varying the knitted structure, wire diameter, wire material and forming pressure used to create the part can control this characteristic.

Knitted metal also provides high mechanical damping characteristics and non-linear spring rates. Vibration and mechanical shock can be effectively controlled to eliminate the violent resonant conditions and provide ample protection from dynamic overloads.

In compressed form, knitted metal can handle shock loadings up to the yield strength of the material itself. The load may be applied from any direction—up, down or in from all sides.

Our application engineers have the experience to determine the optimum density of compressed units within the range of 10% to 70%. This is important in applications such as liquid filtration and noise attenuation where flow resistance is critical.

When compressed, layered, calendared or wound knitted metal presents a “tortuous” path to liquids or gasses flowing through it. This increases filtration capability and particle retention capacity.

Among the most important property of knitted mesh units is the material itself. By careful selection of the material or combinations of materials, SHREE WiRE can custom engineer solutions best suited for our customer's application—be it corrosive, ultra-high or cryogenic temperature, high pressure, radioactive, dirty, oily or other extreme conditions.

#### **Most Commonly Knit Materials**

› Stainless Steel (300 and 400 series)	› Tantalum
› Plain Steel	› Platinum
› Galvanized Steel	› Gold Alloy
› Aluminum	› Gold Plated Copper
› Copper	› Silver Plated Copper
› Tinned Copper	› Silver Plated Brass
› Inconel™	› Polypropylene
› Monel™	› Polyethylene
› Hastelloy™	› Nylon™
› Tungsten	› Teflon™

"Inconel", "Monel", "Nylon", "Hastelloy", and "Teflon" are registered product names of their respective trademark holders

#### **Mesh Diameters**

Mesh is normally knit from wires ranging in diameter from 0.08 mm to 0.5 mm. In special applications, SHREE WiRE has knit wires ranging in diameter from 0.02mm to .8mm. These wires can be round or flat such as those used in copper gauze for cleaning and in air-filtration applications where large surface areas of wire are needed. A round wire when flattened has approximately twice as much surface area.

In filtration applications, wire diameter is perhaps the most important design variable. It directly affects flow, dirt holding capacity, pressure drop and cost. In general, larger diameter wire allows for higher flow but provides lower dirt holding capacity. Also, larger diameter wire is less expensive. Therefore, a balance must be struck between using a higher density filter of higher cost fine wire or a lesser density filter using lower cost heavy wire.

#### **Density**

Density refers to the mass of material per unit volume. It is related to the density of the original mesh and the amount of forming pressure used to compress the mesh into its final form. Determining the required mesh density to produce the specified final product density is a critical step in the design process. Proper density ensures optimal performance of the sealing, gasketing, filtration, heat transfer and separation applications.

SHREE WiRE engineers are expert at determining proper density for specific requirements.

#### **Applications**

Knitted mesh is used in a variety of applications, including the following:

- › Vibration & Shock Absorption
- › Air & Liquid Filtration
- › Noise Suppression
- › Heat Transfer & Insulation
- › EMI/RFI Shielding
- › Mist Elimination & Process Separation
- › Flame Arrestors
- › Engine Catalysts