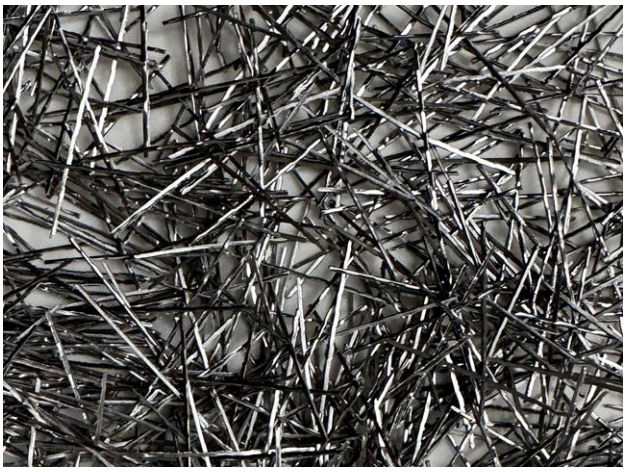
The Respective Advantages and Disadvantages of Steel Fibers Manufactured by the Shearing Method and the Melting Drawing Method

Shearing Method Steel Fiber



Production process:

1. Stainless steel or alloy steel strips are processed through mechanical operations such as shearing and stamping, commonly shaped into flat or indented forms;

2. Cut stainless steel or alloy steel wires into common shapes such as end hook, double hook, corrugated paper, and other curved forms.

Advantages:

1. High strength: The material is made of cold-rolled steel strips, with a tensile strength typically exceeding 1,000MPa, ensuring stable mechanical properties;

2. Shape controllable: The anchoring force with refractory castables can be enhanced by designing structures such as end hooks and corrugations, reducing the risk of pull-out;

3. High dimensional accuracy: Uniform fiber length and diameter with good mass consistency;

4. Good fluidity: The surface is relatively smooth, with excellent fluidity during construction, making it resistant to agglomeration;

5. Excellent bonding performance: The surface can undergo indentation or various bending shape treatments to enhance mechanical interlocking with the substrate.

Disadvantages:

1. High production costs: Relies on precision processing of steel plates and steel wires, resulting in significant energy consumption;

2. Smooth surface (untreated): If no indentation or bending shape treatment is applied, the bonding strength with the casting material may be insufficient

Melting Drawing Type Steel Fiber

Production process:

The molten steel is spun out by a rotating wheel and rapidly cooled into shape, with the fiber cross-section typically forming a crescent or irregular shape.

Advantages:

1. Low production cost: Directly made from molten steel, eliminating the need for rolling and shearing processes, resulting in lower energy consumption;

2. Surface roughness: A naturally formed oxide layer and uneven texture during solidification provide strong bonding with concrete;

3. Good high-temperature resistance: Due to rapid cooling, the internal structure of the fibers is uniform, making certain models suitable for high-temperature environments;

4. Environmental Friendliness: Recyclable scrap steel is used as raw material.

Disadvantages:

1. Lower strength: The tensile strength is generally lower than that of shear-mixed fibers (approximately 400-800MPa), with limited toughness;

2. Poor shape consistency: Significant fluctuations in dimensions and cross-sectional shapes may affect the uniform dispersion in the refractory material;

3. Weak end anchorage: The fiber end is typically a natural fracture surface, lacking mechanical anchorage structures (such as end hooks) and relying on surface bonding;

4. Limited application scope: Primarily used for reinforcing non-structural or ordinary castables, not suitable for scenarios requiring high strength or toughness.

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MCR Metal Fiber Co., Limited
OEM Production Base: Dainan, Xinghua, Taizhou City, Jiangsu Province
Organized by: Luoyang Siamatec Co., Ltd
1202-1203, Guobao Building, 261 Kaiyuan Avenue, Luoyang 471026, China
Tel: +86-379-6333-8196/8 Fax: +86-379-6333-8197 Email: mcr@mcrmetalfiber.com Website:www.mcrmetalfiber.com