

Type I vs. Type II: Use the Right Type

Standard specifications for steel fibers for fiber reinforced concrete are spelled out in ASTM A 820. This specification describes five general types of steel fibers. The five types of fibers are indentified for purposes of this specification based upon the product or process used as a source of the steel fiber material.

The two most common types of fiber used in construction is a Type I, cold drawn wire and Type II, cut sheet. The difference in the two types of fibers is the shape. The common shape of a Type I fiber is circular while the Type II fiber is rectangular in shape.

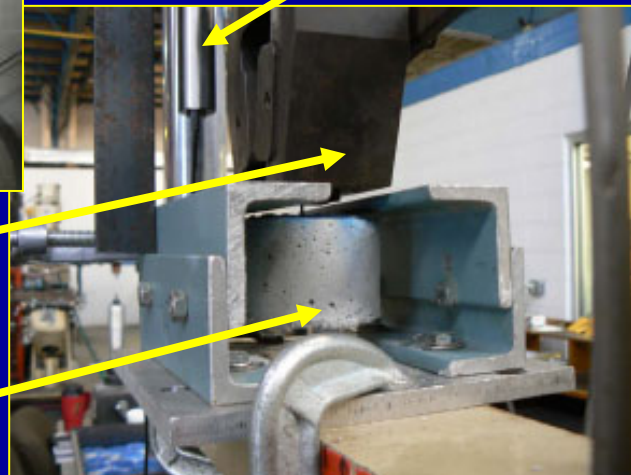
All five types of fibers must meet the same requirements as outlined in ASTM A820.

Why does Fibercon manufacture a Type II fiber? The shape. The bond between the fiber and concrete matrix is important. This bond is influenced by the friction between the steel fiber and matrix. This bond friction depends on the surface area and texture of the steel fiber.

Which shape gives the greatest surface area? It is well known fact that a rectangular fiber of the same equivalent diameter as defined in ASTM A820 has more surface area than a circular fiber of the same diameter. Fibercon has conducted fiber pull-out tests to verify that a rectangular fiber has a higher bond strength based on the shape only.



LVDT to measure displacement during fiber pullout



Tension grip

3 inch by 3inch grout cylinder with fiber embedded

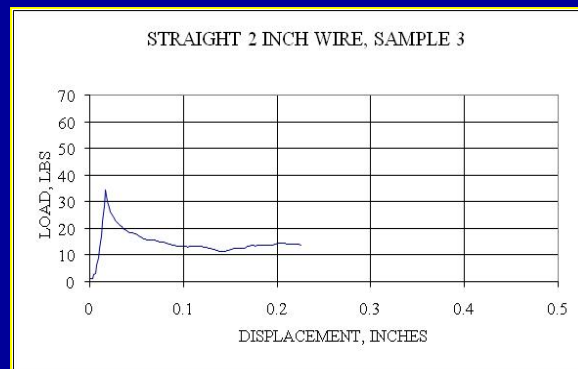
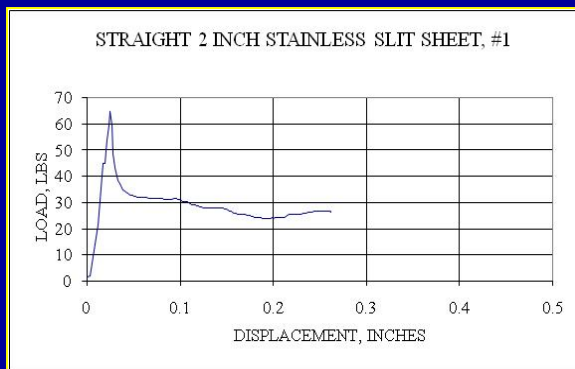
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Straight cut sheet fibers 2" long and straight cold drawn wire fibers 2" long were both embedded into a 5800psi grout. The fibers were then pulled out of the grout. The pullout bond strength of the cut sheet fiber was higher than the cold drawn wire fiber. The higher bond is due to the larger surface area available to develop the strength of the fiber.

Bond is important and everything should be done to improve this bond.

One way is by increasing the surface for an equivalent diameter. Following ASTM A820 guidelines and based on testing and research, a rectangular shape will increase this surface area.

By ASTM A820, if you want to use a rectangular shape, the manufacturer must use a Type II fiber. This the reason Fibercon manufactures a Type II steel fiber.



- ◆ The slit sheet fiber has a smaller equivalent diameter and smaller area than the wire fiber.
- ◆ The pullout bond strength of the slit sheet fiber is higher than the wire fiber. Once the fiber is in motion, the slit sheet fiber has a higher bond to the grout than the wire fiber.
- ◆ The higher bond in the slit sheet fiber is due to the larger surface area available to develop the strength of the fiber.



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