

Supplier Provides Solutions

by Jon Cornelius, Sumiden Wire Products Corporation

Sumiden Wire Products Corporation has been supplying prestressing steel to the U.S. prestressed concrete industry for over 40 years, providing high-quality ASTM A416¹ prestressing strand, ASTM A882² epoxy-coated prestressing strand (see Concrete Bridge Technology article in the Spring 2020 issue of *ASPIRE*[®]), and, more recently, ASTM A1114³ stainless steel prestressing strand (see two Concrete Bridge Technology articles in the Spring 2018 issue of *ASPIRE*).

In 2019, Sumiden Wire became aware of a concerning development in the U.S. steel-fiber supply chain for Buy America-compliant ASTM A820⁴ Type I chopped steel fibers for ultra-high-performance concrete (UHPC). The primary supplier of these Buy America-compliant chopped steel fibers announced its intention to exit the market, creating a supply problem for those working to advance UHPC technology in the bridge industry. (For details on Buy America requirements see the Perspective article in the Fall 2020 issue of *ASPIRE*.) Because Sumiden Wire is a member of a global network of steel wire manufacturing companies, it was able to reach out to an overseas sister plant and gather the necessary technical know-how to quickly enter this market. As of January 2021, Sumiden Wire has officially started production of 0.2 mm diameter × 13 mm long (0.008 × 0.5 in.), high-tensile strength (greater than 2800 MPa [400 ksi]), brass-coated ASTM A820 Type I steel fibers in its centrally located Dickson, Tenn., manufacturing plant. These fibers are currently offered in 20-kg (44-lb) bags.

At present, Sumiden Wire's capacity to supply steel fibers is about 360 metric tons (800,000 lb) per year. The manufacturing systems are modular and can be expanded easily if marketplace demand supports the additional investment. Currently, the focus is on supplying the 0.2 × 13 mm (0.008 × 0.5 in.) steel-fiber product. Variations on the standard product can be easily accommodated if other fiber lengths are needed.

As a long-term U.S.-based supplier to the U.S. prestressed concrete industry, Sumiden Wire has been fortunate to witness firsthand the evolution of prestressing steel reinforcement technologies. Whether the changes were increasing tensile strengths, the evolution from stress-relieved to low-relaxation strand, or the more recent developments in corrosion-resistant prestressing technologies, Sumiden Wire has participated in each of these phases of the industry's development. Now, with the continued research, development, and commercialization of UHPC mixtures and technologies, the company is excited to participate as a supplier of the steel fibers critical to this innovative technology.

As a further expansion of its product line and to meet marketplace demand for higher-strength prestressing steels, Sumiden Wire is now also able to supply the 0.6-in.-diameter Grade 300 strand shown in **Table 1**. To achieve this strand's higher-strength, Sumiden Wire currently supplies this product using a combination of higher-strength wire rods as a raw material, in addition to increasing the actual area to greater than the area of the normally supplied 0.6-in.-diameter strand, while still staying well within the overall diameter tolerances specified in ASTM A416. Due to limited demand, this product is not currently kept in inventory; it is produced when an order is received. The



In January 2021, Sumiden Wire began producing 0.2 mm diameter × 13 mm long (0.008 × 0.5 in.) high-strength steel fibers for ultra-high-performance-concrete mixtures. Photo: Sumiden Wire.

addition of this higher-grade strand is well timed to meet expected future demand as state departments of transportation, such as the Minnesota Department of Transportation, start specifying this grade.⁵

References

1. ASTM International. 2018. *Standard Specification for Low-Relaxation, Seven-Wire Steel Strand for Prestressed Concrete*. ASTM A416/A416M-18. West Conshohocken, PA: ASTM International.
2. ASTM International. 2020. *Standard Specification for Filled Epoxy-Coated Seven-Wire Steel Prestressing Strand*. ASTM A882/A882M-20. West Conshohocken, PA: ASTM International.
3. ASTM International. 2020. *Standard Specification for Low-Relaxation, Seven-Wire, Grade 240 [1655], Stainless Steel Strand for Prestressed Concrete*. ASTM A1114/A1114M-20. West Conshohocken, PA: ASTM International.
4. ASTM International. 2016. *Standard Specification for Steel Fibers for Fiber-Reinforced Concrete*. ASTM A820/A820M-16. West Conshohocken, PA: ASTM International.
5. Minnesota Department of Transportation (MnDOT). 2021. "Transmittal No. 2021-01—Memo to Designers #2021-01: Use of 300 ksi Prestressing Strand in Precast Pretensioned Concrete Beams." MnDOT LRFD Bridge Design Manual Update. St. Paul: MnDOT. <https://www.dot.state.mn.us/bridge/lrfd.html>. 

Jon Cornelius is the executive vice president and general manager of the PC strand division for Sumiden Wire Products Corporation in Dickson, Tenn.

Table 1. Material properties for 0.6-in.-diameter Grade 300 prestressing strand

Nominal Diameter, in.	Grade, ksi	Diameter Tolerance, in.	Minimum Breaking Strength, lbf	Minimum Yield Strength, lbf	Nominal Area, in. ²	Relaxation at 1000 hr	Nominal Weight, lb per 1000 ft
0.6	300	+0.026, -0.006	65,100	58,590	0.217	<2.5% at 70% GUTS (guaranteed ultimate tensile strength)	740

Table: Sumiden Wire.