

# Application Note

## 7 Strand Wire Cable used for Prestressed Concrete

### **Background:**

Strand manufactured to ASTM A416 is defined as a group of wires having a center wire enclosed tightly by six helically placed outer wires with uniform pitch of not less than 12, and not more than 16 times the nominal diameter of the strand.

Strand is normally available in two grades and types: Grades 250K and 270K, and types low-relaxation and normal-relaxation. In today's industry, low-relaxation strand is the standard. There are other considerations when ordering strand, such as its 'lay' (which is the direction in which the outer layers are laid around the center wire). Typically, the standard in the US is Left Hand Lay (as opposed to Right Hand Lay).

**Samples:** Typically samples are taken from a coil in 5 foot long sections. The samples must be clear of surface damage such as scratches, cuts, abrasions etc which can significantly impair the performance of the stranded cable.

### **Measurements:**

*Surface Condition* – where the surface is evaluated for corrosion and pitting.

*Wire Diameter* – where the diameter of each of the 7 wires is measured.

*Strand Diameter* – where the strand diameter is determined across the crown of the wires.

*Pitch* – the pitch or lay length is determined by measuring the distance covered by a single wire spiral.

*Minimum Difference* – this is calculated by subtracting the diameter of each outer wire in turn from the center wire. The smallest difference is then recorded as the minimum difference..

### **Typical Requirements of a Tensile Test Machine:**

Load capacity of 600kN/120,000 lbf

Minimum free span test length of approx 610mm/24 inches

Maximum free span test length of approx 965mm/38 inches.

Open faced crossheads with hydraulically actuated grips

Anti-rotational device on piston (see Fig. 2)

Ruggedised levers

Special 10inch long sample grips with replaceable inserts.

### **Testing Procedure**

1. Insert replaceable special inserts into the grip bodies. (See Fig 3.). Note that these replaceable inserts are typically made from a soft steel and are typically designed to be sacrificial.



Fig 1. Typical machine configuration for test 7 strand cable



Fig 2. Anti-rotational device fitted to the test platform to prevent the piston from spinning as the cable unwinds.



Fig 3. Showing the special 10 inch grips with replaceable inserts.



Fig 4.

2. Take the sample and wet the ends (See Fig 4.)

3. Roll the wet ends in a bath of alumina so that a paste is formed and covers the ends. This paste helps with the adhesion of the sample in the replaceable insert. (See Fig 5.)



Fig 5.



Fig 6

4. Place the sample in the grips, ensuring that there is no bowing of the sample when the grips are closed. (See Fig 6.)

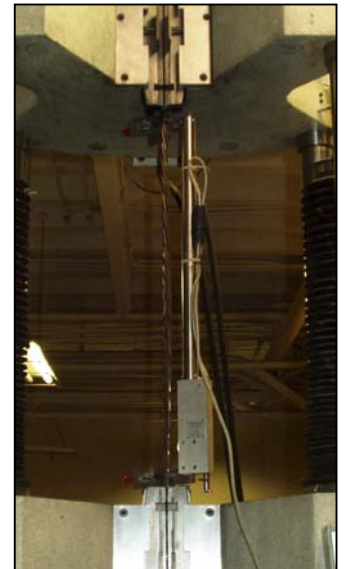


Fig 7

5. Attach the special long gauge length (24 inch) extensometer which also has special clamps to accommodate the shape of the cable. (See Fig 7 and Fig 8 for a close-up look at the clamps)



Fig 8

6. Start the test.
7. Once the strain has reached 1%, the extensometer can be removed and the test allowed to continue.
8. Once the test is complete, the test sample should create what is affectionately referred to as 'a birdcage' shape.

