

Hard Drawn Steel Wire for Prestressed Concrete*

1. Scope

This standard specifies the hard drawn steel wire for prestressed concrete, hereinafter referred to as "wire", which is applied to the prestressed concrete tank and pipe being fabricated with wire being cold worked.

This wire also can be applied to such as a prestressed concrete pipe.

2. Class, Symbol and Sizes

2.1 Class and symbol of wire shall conform to Table 1.

Table 1. Class and Symbol

Class	Symbol	
	Class A	SWCR A
Round wire	Class B	SWCR B
	Class C	SWCR C
Deformed wire	Class A	SWCD A
	Class B	SWCD B
	Class C	SWCD C

2.2 Sizes of wire shall conform to Table 2.

Table 2. Sizes

Class	Sizes
Round wire and deformed wire	3 mm, 3.5 mm, 4 mm, 4.5 mm, 5 mm, 6 mm, 7 mm, 8 mm, 9 mm

3. Manufacturing Process

3.1 Wire shall be made out of the wire specified in JIS G 3506-Hard Drawn Steel Rod, or equivalent, or superior by cold working after heat treatment.

3.2 Wire shall be free from joints.

4. Mechanical Properties

Mechanical properties shall conform to Table 3.

Table 3. Mechanical Properties

Symbol	Sizes	Tension test			Relaxation test
		Permanent elongation of 0.2 % kg	Tension load kg	Elongation %	
SWCR A and SWCD A	3 mm	570 min.	710 min. 63.3	2.5 min.	5.5 max.
	3.5 mm	770 min.	960 min.	2.5 min.	5.5 max.
	4 mm	1000 min.	1250 min.	2.5 min.	5.5 max.
	4.5 mm	1250 min.	1600 min.	3.0 min.	5.5 max.
	5 mm	1550 min.	1950 min.	3.0 min.	5.5 max.
	6 mm	2250 min.	2850 min.	3.0 min.	5.5 max.
	7 mm	3100 min.	3850 min.	3.5 min.	5.5 max.
	8 mm	4000 min.	5050 min.	3.5 min.	5.5 max.
	9 mm	5100 min.	6350 min. 63.4	3.5 min.	5.5 max.
SWCR B and SWCD B	3 mm	710 min.	920 min. 82.6	2.5 min.	5.0 max.
	3.5 mm	960 min.	1250 min.	2.5 min.	5.0 max.
	4 mm	1250 min.	1650 min.	2.5 min.	5.0 max.
	4.5 mm	1600 min.	2050 min.	3.0 min.	5.0 max.
	5 mm	1950 min.	2550 min.	3.0 min.	5.0 max.
	6 mm	2850 min.	3700 min.	3.0 min.	5.0 max.
	7 mm	3850 min.	5000 min.	3.5 min.	5.0 max.
	8 mm	5050 min.	6550 min.	3.5 min.	5.0 max.
	9 mm	6350 min.	8250 min. 82.3	3.5 min.	5.0 max.
SWCR C and SWCD C	3 mm	990 min.	1250 min. 12.2	2.5 min.	4.5 max.
	3.5 mm	1300 min.	1650 min.	2.5 min.	4.5 max.
	4 mm	1700 min.	2150 min.	2.5 min.	4.5 max.
	4.5 mm	2050 min.	2550 min.	3.0 min.	4.5 max.
	5 mm	2450 min.	3050 min.	3.0 min.	4.5 max.
	6 mm	3400 min.	4250 min.	3.0 min.	4.5 max.
	7 mm	4450 min.	5600 min.	3.5 min.	4.5 max.
	8 mm	5550 min.	7050 min.	3.5 min.	4.5 max.
	9 mm	7000 min.	8900 min. 88.8	3.5 min.	4.5 max.

5. Appearance and Shape

5.1 Wire shall be free from injurious defects, oil and other defects on the surface, however, it may have rust which will not create pitting.

5.2 Deformed wire shall have uniform projections or dents in sequence or at certain intervals.

6. Size and Tolerance

Basic diameter, tolerance, nominal sectional area and unit weight of wire shall conform to Table 4. Basic diameter of Table 4 shall be applied for standardizing nominal diameter of deformed wire, but the tolerance of deformed wire shall not be specified.

Table 4. Size, Tolerance, Nominal Sectional Area and Unit Weight

Sizes	Basic dia. mm	Tolerance mm	Nominal sectional area mm ²	Unit weight kg/km
3 mm	3.00	+0.04	7.069	55.5
3.5 mm	3.50	+0.05	9.621	75.5
4 mm	4.00	+0.05	12.57	98.7
4.5 mm	4.50	+0.05	15.90	125
5 mm	5.00	+0.05	19.64	154
6 mm	6.00	+0.06	28.27	222
7 mm	7.00	+0.06	38.48	302
8 mm	8.00	+0.06	50.27	395
9 mm	9.00	+0.06	63.62	499

7. Tests

7.1 Tension Test

7.1.1 Tension test shall be carried out in accordance with JIS Z 2241-Method of Tension Test for Metal, providing that the gripping distance shall be of 100 mm and more. In case that test piece would be broken off at the gripping point and not satisfy the value specified therein, the test should become invalid, and another test should be carried out again on a newly prepared test piece from the original material.

7.1.2 Tension load shall be maximum load during the test, and minimum load giving permanent elongation of 0.2 % shall be specified with intersection on load-elongation curve as a result of that line distance 0.2 % from and parallel to straight part of the curve intersects with the curve.

7.1.3 Wire elongation shall be the gauge length of the fractured test piece for original gauge length of 100 mm when the ends of the fractured test piece are fitted together carefully.

7.2 Relaxation Test Gripping the test piece at the proper distance at room temperature, the load equivalent to 80 % of minimum load giving permanent elongation of 0.2 % specified in Table 3 for about one minute shall be applied on the test piece, then holding the gripping distance as it is for 10 hours, measure the load decreased. Ratio in percentage of decreased load thus obtained versus load originally applied shall be determined as a value of relaxation.