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Hot-Dip Galvanized Steel Strand for Prestress

预应力热镀锌钢绞线

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Hot-Dip Galvanized Steel Strand for Prestress

1 Scope

This Standard specifies the terms and definitions, classification and sign, ordering contents, size, weight and permissible deviation, technical requirements, test methods, inspection rules, package, marking, and quality certificate, etc. of hot-dip galvanized steel strand for prestress.

This Standard is applicable to the low-relaxation prepressed steel strands (hereinafter referred to as “steel strands”) consisting of seven hot-dip galvanized round steel wires, with diameters of 12.7mm, 15.2mm, 15.7mm, 17.8mm, and strength levels of 1770MPa, 1860MPa, 1960MPa, used for bridge cables, anchoring tensile members, buildings for lifting or fixing tensile members, and other prestressed structures not directly in contact with the concrete mortar.

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this document.

GB/T 470 Zinc Ingots

GB/T 1839 Test Method for Gravimetric Determination of Mass per Unit Area of Galvanized Coatings Steel Products

GB/T 2972 Test Method for Uniformity of Zinc Coating on Zinc-Coated Steel Wire by the Copper Sulphate Dip

GB/T 2976 Metallic materials - Wire - Wrapping test

GB/T 21839 Steel for Prestressed Concrete - Test Methods

GB/T 24238 Hot-rolled wire rod for prestressed steel wire and strand

3 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

7.2.3 Requirements for relaxation test

Use 70% of the nominal breaking force of the hot-dip galvanized steel strand as the initial force of the relaxation test. The duration of the relaxation test shall be 1000h. On the basis of ensuring the 1000h relaxation qualified, the test value of the shorter period of at least 120h may also be used to estimate the relaxation value of 1000h.

7.2.4 Other special requirements

After the negotiation between the supplier and the purchaser, the galvanized steel strands with other special requirements can be supplied.

7.2.5 Slanting tension coefficient

For the hot-dip galvanized steel strand used for general purpose, its slanting tension coefficient shall be no greater than 28%.

For the hot-dip galvanized steel strand used for cables, its slanting tension coefficient shall be no greater than 20%.

7.2.6 Fatigue performance

7.2.6.1 The hot-dip galvanized steel strand for general purpose shall not break after being applied a load of 2 million times $0.7F_m \sim (0.7F_m \sim 2\Delta F_a)$. The fatigue stress amplitude shall be calculated as per the Formula (1):

$$\frac{2\Delta F_a}{S_n} = 190 \text{ MPa} \quad \dots\dots\dots (1)$$

Where:

S_n – nominal cross-sectional area of the hot-dip galvanized steel strand, in mm^2 ;

$2\Delta F_a$ – load value of the fluctuating stress amplitude, in N.

7.2.6.2 The hot-dip galvanized steel strand for cables shall not break after being applied a load of 2 million times $0.45F_m \sim (0.45F_m \sim 2\Delta F_a)$. The fatigue stress amplitude shall be calculated as per the Formula (2):

$$\frac{2\Delta F_a}{S_n} = 300 \text{ MPa} \quad \dots\dots\dots (2)$$

Where:

S_n – nominal cross-sectional area of the hot-dip galvanized steel strand, in mm^2 ;

$2\Delta F_a$ – load value of the fluctuating stress amplitude, in N.

test is invalid, and shall take samples again to do the test.

8.1.2 Maximum force total elongation

8.1.2.1 Determination of maximum force total elongation, A_{gt} , shall be carried out as per GB/T 21839; the gauge length is no less than 500mm.

8.1.2.2 The actual measurement may be performed by adding 1% of the yield elongation plus the percentage between elongation of the jaw spacing and the new spacing of the clamps.

8.1.3 Specified non-proportional extension force

8.1.3.1 Determination of the specified non-proportional extension force shall be carried out as per the provisions of GB/T 21839; the applied force, $F_{p0.2}$, when the non-proportional extension using the gauge length of the extensometer to reach the 0.2% gauge-length of the extensometer.

8.1.3.2 When the supplier performs the production inspection, the load, F_{t1} , may be measured, if the total extension reaches 1% original gauge length; if such value conforms to the provision of Table 2, the product can be delivered; however, the $F_{p0.2}$ shall be measured during arbitration.

8.1.4 Elastic modulus

Measurement of elastic modulus shall be carried out as per the provisions of GB/T 21839.

8.2 Relaxation test

8.2.1 The stress relaxation test of the steel strand shall be carried out as per the provisions of GB/T 21839.

8.2.2 The galvanized layer on the sample surface at the clamping part of the anchorage shall be cleaned with dilute acid before test; and corrosion of the steel base shall be avoided.

8.3 Slanting tension test

The slanting tension test shall be carried out as per the provisions of GB/T 21839.

8.4 Fluctuating tensile fatigue test

The fluctuating tensile fatigue test shall be carried out as per the provisions of GB/T 21839.

8.5 Zinc layer weight

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