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**High-strength structural anchor bolting assemblies
for steel structures**

钢结构用高强度锚栓连接副

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High-strength structural anchor bolting assemblies for steel structures

1 Scope

This Standard specifies high-strength structural anchor bolting assemblies (hereinafter referred to as structural anchor bolting assemblies) for steel structures made of carbon steel and alloy steel with screw thread specification of M20~M64.

This Standard applies to high-strength structural anchor bolting assemblies for steel structures for anchoring of building and structure foundation.

2 Normative references

The following documents are indispensable for the application of this document. For the dated references, only the editions with the dates indicated are applicable to this document. For the undated references, the latest edition (including all the amendments) are applicable to this document.

GB/T 90.2 Fasteners - Marking and packaging

GB/T 193 General purpose metric screw threads - General plan

GB/T 228.1 Metallic materials - Tensile testing - Part 1 : Method of test at room temperature

GB/T 230.1 Metallic materials - Rockwell hardness test - Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T)

GB/T 1237 Designation system for fasteners

GB/T 3098.1 Mechanical properties of fasteners - Bolts, screws and studs

GB/T 3098.2 Mechanical properties of fasteners - Nuts

GB/T 3103.1 Tolerances for fasteners - Bolts, screws, studs and nuts

GB/T 3103.3 Tolerances for fasteners - Plain washers

GB/T 4340.1 Metallic materials - Vickers hardness test - Part 1: Test method

GB/T 5267.3 Fasteners - Hot dip galvanized coatings

GB/T 5276 Fasteners - Bolts, screws, studs and nuts - Symbols and descriptions of dimensions

GB/T 5779.1 Fasteners - Surface discontinuities - Bolts, screws and studs for general requirements

GB/T 5779.2 Fasteners - Surface discontinuities - Nuts

GB/T 9145 General purpose metric screw threads - Limits of sizes for the screw threads of medium quality and preferable plan

GB/T 22028 Hot-dip galvanized screw threads - On internal screw threads there is the clearance for accommodating the hot-dip galvanized coat

3 Type dimensions

3.1 Structural anchor bolting assemblies

The structural anchor bolting assemblies consist of anchor stud, nut, and washer.

3.2 Anchor stud

3.2.1 Type of anchor stud

The types of anchor stud are Type A and Type B (see Figure 1). Type B is only applicable to specification less than or equal to M39 and property level 8.8.

3.2.2 Dimensions of anchor stud

3.2.2.1 The dimensions of anchor stud are shown in Table 1. The symbols and descriptions of dimensions shall conform to GB/T 5276.

Table 4 -- Combination of property level of anchor stud, nut, and washer

Products	Anchor stud	Nut	Washer
Property level	10.9	10	35 HRC~45 HRC
	8.8	8	35 HRC~45 HRC

4.2 Technical conditions of anchor stud

The technical conditions and reference standards for anchor stud are shown in Table 5.

The mechanical properties of anchor stud specimen are shown in Table 6.

The tensile load of physical anchor stud is shown in Table 7.

Table 5 -- Technical conditions and reference standards for anchor stud

Material		Steel
Screw thread	Tolerances	6g ^a
	Standards	GB/T 193, GB/T 9145
Mechanical properties	Property level	8.8 ^b or 10.9 ^b
	Standard	GB/T 3098.1
Tolerances	Product grade	C
	Standard	GB/T 3103.1
Surface treatment ^c		Not treated; Technical requirements for hot-dip galvanized coating shall be in accordance with GB/T 5267.3; For other technical requirements or surface treatment, it shall be agreed upon by the supplier and the purchaser ^d
Surface discontinuities		GB/T 5779.1

^a Hot-dip galvanized anchor studs shall be threaded and shall be used in conjunction with nuts with increased tapping dimensions.

^b The mechanical properties of the specimen are shown in Table 6. The physical tensile load is shown in Table 7. The rest of the mechanical properties shall be in accordance with GB/T 3098.1.

^c When choosing a suitable surface treatment method (such as cleaning and coating), it is necessary to consider the risk of hydrogen embrittlement of anchor studs with a property level of 10.9; see the relevant coating standards.

^d Without compromising mechanical properties or functional characteristics, according to the agreement between the supplier and the purchaser, other coatings can be used. It is not allowed to use cadmium or cadmium alloy coatings.

provisions of GB/T 3098.1.

5.4 Guaranteed load test of nut

The guaranteed load test of nut shall be in accordance with the provisions of GB/T 3098.2.

5.5 Hardness test of nut and washer

The hardness test of nut and washer shall be in accordance with GB/T 230.1 or GB/T 4340.1. In case of dispute, the Vickers hardness HV30 shall be used as the arbitration test.

5.6 Surface treatment test

5.6.1 Hot-dip galvanized coating

The test of hot-dip galvanized coating shall be in accordance with the provisions of GB/T 5267.3.

5.6.2 Other anti-corrosion coatings

The test of other anti-corrosion coatings shall be subject to the agreement between the supplier and the purchaser and shall be indicated in the contract.

5.7 Surface discontinuities

The test of surface discontinuities of anchor studs and nuts shall be in accordance with GB/T 5779.1 or GB/T 5779.2.

The hook portion of Type B anchor stud shall be inspected using a 10x magnifying glass.

6 Inspection rules

6.1 Exit-factory inspection shall be carried out in lots. The anchor studs of the same material, furnace number, screw thread specification, length (When the length of the anchor stud is >1000 mm, and the length difference is ≤ 100 mm, it may be regarded as the same length), machining, heat treatment process, and surface treatment process shall be regarded as the same lot. Nuts of the same material, furnace number, screw thread specification, machining, heat treatment process, and surface treatment process shall be regarded as the same lot. Washers of the same material, furnace number, specification, machining, heat treatment process, and surface treatment process shall be regarded as the same lot. Structural assemblies consisting of the same lot of anchor studs, nuts, and washers respectively shall be regarded as the same lot

The designation of hot-dip galvanized (tZn) Type A anchor stud for steel structures with screw thread specification M42, nominal length L=1200 mm, and property level 10.9 is:

Anchor stud GB/T 33943 M42×1200 tZn

The designation of hot-dip galvanized (tZn) Type B anchor stud for steel structures with screw thread specification M39, nominal length L=1200 mm, and property level 8.8 is:

Anchor stud GB/T 33943 M39×1200 B 8.8 tZn

7.2.3 Nut designation

When the large hexagon nut complying with the requirements of this Standard is required for other connections, such as bolts, it is necessary to order separately.

The designation of hot-dip galvanized (tZn) large hexagon nut with screw thread specification M42 and property level 10 is:

Nut GB/T 33943 M42 tZn

7.2.4 Washer designation

When the plain washer complying with the requirements of this Standard is required for other connections, such as bolts, or the matching quantity is required to be increased, it is necessary to order separately.

The designation of hot-dip galvanized (tZn) washer with screw thread specification 42 and hardness 329 HV30~436 HV30 (35 HRC~45 HRC) is:

Washer GB/T 33943 42 tZn

7.3 Product marking

For anchor stud and nut products, it shall, in accordance with the provisions of GB/T 3098.1 or GB/T 3098.2, make the marks for property level and fastener manufacturer identification.

7.4 Packaging and packaging marking

7.4.1 Unless otherwise specified, the packaging method shall be determined by the manufacturer.

7.4.2 When the hot-dip galvanized nut and the anchor stud are in the same order, they shall be in the same package. The purchaser may determine the

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