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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 2818-2014

Replacing GB/T 2818-2002

Submersible motors for deep wells

井用潜水异步电动机

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Foreword

This Standard was formulated in accordance with the rules given in GB/T 1.1-2009. This Standard replaces GB/T 2818-2002 "Submersible motor for deep well". Compared with GB/T 2818-2002, except the editorial changes, the main technical differences of this Standard are as follows: -- MODIFY the motor rated voltage (see

3.4 of this version;

3.4 of 2002-version); -- ADD 8 power levels - 0.25kW, 250kW, 280kW, 315kW, 355kW, 400kW, 450kW, and 500kW (see

3.5 of this version); -- ADD the frame size and the corresponding power levels (see Table 1 of this version); -- MODIFY the connection dimensions and tolerances of motor and submersible pump (see Table 2 of this version; Table 2 of 2002-version); -- ADD the recommended values of spurious loss P_s of rated load of cast aluminum rotor motor (see Table 8 of this version); -- DELETE the E-class insulation (see

4.4 of this version;

4.4 of 2002-version); -- MODIFY the guarantee-values of the ratio OF motor stall torque TO the rated torque (see Table 9 of this version; Table 9 of 2002-version); -- MODIFY the guarantee-values of motor maximum torque (see

4.7 of this version;

4.7 of 2002-version); -- MODIFY the tolerance table of guarantee-values of electrical performance (see Table 12 of this version; Table 11 of 2002-version); -- ADD the polypropylene-type; DELETE the polyvinyl chloride type (see Table 13 of this version; Table 12 of 2002-version); -- MODIFY the hot insulation resistance of the stator windings (see

4.12 of this version;

4.12 of 2002-version); -- ADD the the conventional withstand voltage test for the 200kW and below motors that are mass-produced, in accordance with the provisions in

9.2 of GB 755-2008 (see

4.13 of this version); -- ADD the provision - impact voltage peak in inter-turn impulse withstand voltage of three-phase motor (see Table 14 of this version); -- ADD the downward bearing capacity of thrust bearing (see Table 15 of this version); -- ADD the provision - dry motors are subject to 40°C alternating hot and humid test (see 4.15,

5.2.2.2 of this version); -- MODIFY the provisions - motor's cable length (see

4.26 of this version;

1 Scope

China's national standard for the submersible asynchronous motors used in deep wells. It specifies the models, the basic parameters and dimensions, the technical requirements, the test methods and inspection rules, and the marking and packaging of the motors that drive deep well submersible pumps. This is the companion to GB/T 2816, which specifies the pump: the motor hangs beneath it in the bore, filled with water rather than air, cooled by the water it is standing in, and connected to the surface by a single cable that also has to survive submersion. Almost everything unusual about it follows from that. The motor cannot be inspected, ventilated or serviced in place; the only way to reach it is to pull the entire assembly and the rising main out of the well. It runs continuously for years, and when it fails the cost is the crop or the water supply that depended on it plus the crane that lifts the string. So the standard specifies the connection dimensions between motor and pump to a tolerance, since the two are made by different manufacturers and mated at the well head; it specifies the electrical performance with guaranteed values and their tolerances rather than nominal figures; and it specifies the insulation, the seals and the thrust bearing that carries the weight of the water column above the pump. The 2014 revision extends the range and tightens the guarantees. Eight power levels are added, from 0.25 kW at the bottom to 500 kW at the top, with the frame sizes to match; the rated voltage provisions are revised; class E insulation is deleted; the guaranteed values for stall torque and maximum torque are revised; and recommended values are added for the stray load loss of cast aluminium rotor motors. Issued on 9 June 2014 and in force since 1 January 2015, it replaces GB/T 2818-2002.

This Standard specifies the types, basic parameters, technical requirements, test methods, inspection rules, marks and packaging for well submersible three-phase, single-phase asynchronous motor (hereinafter referred to as motor. This Standard is applicable to water-filled, oil-filled, dry and shielded structure motors that are integrated with well submersible pumps, submerged and run vertically in water.

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 Standard.

GB/T 191 Packaging - Pictorial marking for handling of goods

GB 755-2008 Rotating electrical machines - Rating and performance

GB/T 997-2008 Rotating electrical machines - Classification of types of construction, mounting arrangements and terminal box position (IM Code)

GB/T 2423.4-2008 Environmental testing for electric and electronic products - Part 2. Test method - Test Db. Damp heat, cyclic (12h+12h cycle)

3.1 Model

3.1.1 Expression method of models The model is consisted of the Pinyin capital letters and Arabic numerals, as follows:

3.2 The construction and mounting of the motor is IMV3 as specified in GB/T 997-2008.

3.3 The rating of motor is the continuous rating, taking the continuous duty (S1) as a reference.

3.4 Motor's rated frequency is 50Hz; three-phase rated voltage is 380V or 660V; single-phase rated voltage is 220V.

3.6 The correspondence BETWEEN motor's frame size, maximum outer diameter, synchronous speed AND rated power shall comply with the requirements in Table 1.

3.9 Radial runout and face runout OF flange stopper connecting the motor and pump TO the shaft centerline. for rolling bearing support, it shall not be greater than 0.08mm; for sliding bearing support, it shall not be greater than two-side clearance of bearing plus 0.1mm.

4 Technical requirements

4.1 Motors shall comply with the requirements of this Standard, and is manufactured according to the drawings and technical documents that are approved per specified procedure.

4.2 Under the following conditions, the motor shall be able to operate normally.

4.3 During the operation of the motor, the impact of supply voltage and frequency TO the rating value change and its impact TO the motor performance and temperature-rise shall

comply with the provisions of GB 755-2008.

4.5 At rated voltage, the guaranteed value of ratio of three-phase motor's stall torque TO the rated torque shall be in accordance with Table 9; the guaranteed value of ratio of the single-phase motor stall torque TO the rated torque shall be in accordance with Table 10.

4.6 At rated voltage, for those rated power is less than 100kW, the minimum torque during motor start-up shall not be less than

0.8 times the rated torque; for those rated power is 100kW and above, the minimum torque during motor start-up shall not be less than

0.5 times the rated torque.

4.8 At rated voltage, for single-phase resistance-start motor, the guaranteed value of the ration of the motor's stall current TO rated current shall not exceed 10 times; for other type of motor, it shall comply with the requirements of Table 11.

4.14 Motor's stator windings (except the wires that are directly immersed) shall be able to withstand the inter-turn impulse withstand voltage test, without breakdown; for single-phase motor, the test voltage (peak value) is 1800V; for three-phase motor, the test impulse voltage's peak value shall be according to Table 14.

4.15 For dry motor, it shall be carried out according to the 40°C cyclic damp heat test method as specified in GB/T 2423.4-2008; after 12 cycles test, measure the insulation resistance of motor stator winding; for rated voltage of 380V, it shall not be less than 1.14MΩ; for rated voltage of 660V, it shall not be less than 1.98MΩ; and it shall be able to withstand the withstand voltage test for 1min, without breakdown; for rated voltage of 380V, the effective value of test voltage is 1500V; for rated voltage of 660V, it is 1970V. Motor's withstand voltage test shall not be repeated; if it is indeed necessary, the test voltage shall be 80% of the specified value. Before the repeated test, motor shall be dried.

5 Test methods and inspection rules

5.1 Test Method The analysis and calculation of motor performance's test methods and test results shall comply with the provisions of GB/T 12785 and GB/T 22719.1.

5.2 Inspection Rules Product inspection is divided into the exit-factory inspection and type inspection.

5.2.1 Exit-factory inspection

5.2.2.2 Motor's type test items include.

6 Marks and packaging