SY

NATIONAL OIL-GAS INDUSTRY STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

ICS 75.180.10
E 92
Record No.: 43183-2014

SY/T 5324-2013

Replacing SY/T 5324-1994

Pre-Stress Insulated Tubing

预应力隔热油管

Issued on: November 28, 2013 **Implemented on: April 01, 2014**

Issued by: National Energy Administration

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Foreword

This Standard was drafted as per the rules specified in GB/T 1.1-2009 *Directives for Standardization – Part 1: Structure and Drafting of Standards*.

This Standard replaced SY/T 5324-1994 *Prestressed Insulated Tubing*; compared with SY/T 5324-1994, this Standard has the major technical changes as follows besides the editorial modifications:

--- Modified the product code (see 4.3 of this Edition; 4.3 of Edition 1994);

--- Deleted the specific numerical requirements for anti-repulsion and anti-extrusion (see 5.1 of Edition 1994);

--- Modified the requirements for working conditions (see 5.1 of this Edition; 5.1 of Edition 1994);

--- Modified the basis for determining the thermal insulation life (see 5.8 of this Edition; 5.8 of Edition 1994);

--- Modified the technical requirements for product flatness (see 5.9 of this Edition; 5.9 of Edition 1994);

--- Modified the test program for apparent thermal conductivity (see 6.2.2 of this Edition; 6.2.2 of Edition 1994);

--- Modified the size requirements for drift diameter gauge (see 6.5 of this Edition; 6.3 of Edition 1994);

--- Modified the requirements for product mark (see 8.1 of this Edition; 8.1 of Edition 1994);

--- Added the health, safety, environmental control requirements (see Clause 9).

Please note that some contents of this document may involve patents. The issuing authority of this document doesn't assume the responsibility to identify these patents.

This Standard was proposed by and under the jurisdiction of Technical Committee for Standardization of Oil Tube Profession.

Drafting organizations of this Standard: Oil Production Research Institute of SINOPEC Shengli Oilfield Company, Shengli Oilfield Fleet Petroleum Equipment Co., Ltd., and China University of Petroleum (East China).

Chief drafting staffs of this Standard: Di Yong, Luan Zhiyong, Shen Jing, Zhao Yanru, Xie Jiawei, Li Shulan, and Wang Jianmin.

Pre-Stress Insulated Tubing

1 Scope

This Standard specifies the product classification, technical requirements, test methods, inspection rules, and mark, package, transportation, storage, and health, safety, environmental control requirements for the pre-stress insulated tubing for oilfield heat injection carrier.

The pre-stress insulated tubing uses viscous oil well to inject steam and produce. This Standard is applicable to the production, inspection and acceptance rules of the pre-stressed insulated tubing for steam injection.

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 3198 Aluminum and Aluminum-Alloy Foil

GB/T 3323 Methods for Radiographic Inspection and Classification of Radiographs for Fusion Welded Butt Joints in Steel

GB/T 4338 Metallic Materials – Tensile Testing at Elevated Temperature

GB/T 5117 Covered Electrodes for Manual Metal Arc Welding of Non-Alloy and Fine Grain Steels

GB/T 5118 Low Alloy Steel Covered Electrodes

GB/T 8110 Welding Electrodes and Rods for Gas Shielding Arc Welding of Carbon and Low Alloy Steel

GB/T 9253.2 Petroleum and Natural Gas Industries – Threading, Gauging, and Thread Inspection of Casing, Tubing and Line Pipe Threads

GB/T 19830 Petroleum and Natural Gas Industries - Steel Pipes for Use as Casing or Tubing for Wells

NB/T 47014 Welding Procedure Qualification for Pressure Equipment

less than 400°C.

5.2 Product insulating performance level

The product insulating performance level shall conform to the provisions of Table 1.

5.3 Material requirements

5.3.1 The tubing shall conform to the provisions of GB/T 19830. For the benefit of sand washing and vacuum pumping, the surfaces of inner and outer tubes are required to be exempted from rust.

5.3.2 The insulating material of aluminum foil shall meet the requirements of GB/T 3198.

5.3.3 The welding rods for welding the inner and outer tubes shall meet the requirements of GB/T 5117, GB/T 5118 and GB/T 8110.

5.4 Prestressed process requirements

5.4.1 According to the design requirements, separately calculate each tube's theoretical pre-elongation; the allowable deviation between the actual pre-elongation and theoretical pre-elongation is ±0.5mm.

5.4.2 The heating method shall be adopted for the prestressed treatment process rather than the mechanical method, the latter may damage the inner tube.

5.5 Processing requirements

5.5.1 After treatment, the outer surface of inner tube and inner surface of outer tube shall be exempt from the rust and dirt; all can see is metal color; weld after drying and assembling.

5.5.2 Perform welding process evaluation against the welding steel, welding material, welding method and welding process; the process evaluation shall be performed as per the provisions of NB/T 47014; and prepare the welding process procedures.

5.5.3 The width and height of weld seams shall be consistent; their appearance shall be uniform and full; smoothly transit to the base metal; the spatter around the weld seam shall be cleaned up.

5.5.4 The processing and inspection of tube body and coupling thread shall meet the requirements of GB/T 9253.2.

400°C. The test shall be performed as per the requirements of GB/T 4338.

6.1.2 The parameters of normal-temperature tensile load test, normal-temperature anti-repulsion test, normal-temperature anti-extrusion hydraulic test shall meet the requirements of actual working conditions of the steam injection well.

6.2 Insulating property inspection

6.2.1 Inspection device

The measurement of insulating property of insulated tubing shall adopt steady-state and heating method. The electric heating method is recommended. The inspection device shall have the self-control function against the temperature and heating power; in order to guarantee the measurement accuracy, it can be equipped with automatic acquiring and processing microcomputer.

6.2.2 Inspection procedures

6.2.2.1 Place the heating device into the inner tube cavity on the end of the insulated tubing with suction hole.

6.2.2.2 Install the temperature-measuring device for the outer wall of outer tube.

6.2.2.3 Connect the heating device and temperature-measuring device with the apparent thermal conductivity testing device.

6.2.2.4 Start the heating device; heat till the inner wall temperature of inner tube reaches 350°C; keep the steady-state.

6.2.2.5 The product apparent thermal conductivity is subject to the value calculated under the conditions of inner wall temperature 350°C, ambient temperature of room temperature; the calculation formula can refer to Appendix A.

6.3 Weld seam inspection

The two ends and the weld seam of suction hole shall be performed non-destructive inspection; meet the requirements of GB/T 3323; no less than Class-II is qualified.

6.4 Thread inspection

The product connecting thread shall use the corresponding thread gauge to inspect.

6.5 Drift diameter inspection

The product shall use the corresponding drift diameter gauge to drift diameter. The

sampling 5 pieces each time.

7.2.3 If there are disqualified items in the type inspection, then double the number of sampling to perform re-inspection; if there are still disqualified items, then such batch of products are judged disqualified.

8 Mark, Package, Transportation and Storage

8.1 Mark

8.1.1 The manufacturer code, product specification, material and production date shall be marked by steel seal in the range about 800mm from the coupling to the product.

8.1.2 Paint print the product code and manufacturer name on a distance about 0.5m from the coupling to the product.

8.1.3 Each batch of products shall be attached with inspection certificate, which shall at least contain the following contents such as product code, exit-factory number, length, apparent thermal conductivity, inner and outer tube grade, connecting thread, weight per meter, normal-temperature anti-repulsion and normal-temperature anti-extrusion test results.

8.2 Package

8.2.1 The outer surface of the product shall be de-rusted and decontaminated; coat the anticorrosive paint; the connecting thread shall be equipped with thread protector.

8.2.2 The product shall adopt 4-point uniform support; place thick partitions between layers; use steel strip to band firmly; indicate the lifting positions.

8.3 Transportation

8.3.1 The product shall adopt evenly-placed 4-point touch; when transporting and storing, 2-end supporting and middle suspending are not allowed.

8.3.2 When loading and unloading product, collision is strictly prohibited, handle gently.

8.4 Storage

8.4.1 The product shall be stored on the pipe bridge that is 4-point evenly supported and at a distance of 0.5m from the ground.

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