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LIGHT INDUSTRY STANDARD

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QB/T 2625-2011

Replacing QB/T 2625-2003

Gel ink ball pens and refills

中性墨水圆珠笔和笔芯

[ISO 27668-1:2009, Gel ink ball pens and refills –

Part 1: General use, ISO 27668-2:2009, Gel ink ball pens and refills –

Part 2: Documentary use (DOC), MOD]

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Foreword

Please note that some of the contents of this document may relate to patents AND that the issuer of this document does not assume responsibility for identifying such patents.

This standard is a revision of the QB/T 2625-2003 “Gel ink ball pens and refills”.

As compared with QB/T 2625-2003, the main technical changes of this standard are as follows:

- MODIFY the standard name:
- MODIFY the scope of application (SEE 1; 1 of 2003 version);
- ADD the terms and definitions (SEE 3);
- MODIFY the product classification (SEE 4; 3 of 2003 version);
- ADD the writing performance requirements and test methods (SEE 5.1, 7.2);
- DELETE the requirements and test methods for the scribe line length, the amount of ink, and the fixation of the ball (SEE 4, 5.3, 5.4, and 5.9 of 2003 version)
- MODIFY the lightfastness item name and requirements (SEE 5.1, 7.7; 4 and 5.8 of 2003 version);
- ADD the requirements and test methods of strike through, reproducibility, shelf life, erasure resistance, ethanol resistance, hydrochloric acid resistance, ammonium hydroxide resistance, bleaching resistance, flexibility of the refills mechanism, difference between pen holder head aperture and the head outer diameter, metal pen clip elasticity, coating corrosion resistance, migration substance content, and pen cap safety (SEE 5, 7.3, 7.5, 7.9, 7.10, 7.11, 7.12, 7.13, 7.14, 7.15, 7.16, 7.17, 7.19, 7.21);
- ADD the general test instruments, materials and conditions (SEE 6);
- MODIFY the inspection rules (SEE 8; 6 of 2003 version);
- MODIFY the marking requirements (SEE 9.1; 7.1 of 2003 version);
- MODIFY the packaging requirements (SEE 9.2; 7.2 of 2003 version);

- MODIFY the Appendix A; ADD Appendix B and Appendix C.

This standard, through the redrafting method, modifies and adopts ISO 27668-1:2009, Gel ink ball pens and refills - Part 1: General use, ISO 27668-2:2009, Gel ink ball pens and refills - Part 2: Documentary use.

This standard has more structural changes as compared with ISO 27668-1 to ISO 27668-2:2009. Appendix B provides the clause number comparison list between this standard and ISO 27668-1 to ISO 27668-2:2009.

There are technical differences between this standard and ISO 27668-1 to ISO 27668-2:2009. Appendix C provides the corresponding technical differences and their causes.

This standard has also made the following editorial changes:

- INTEGRATE ISO 27668-1 ~ ISO 27668-2:2009 into a standard; CHANGE the standard name into “Gel ink ball pens and refills”;
- ADD Appendix B (informative) “Structural changes of this standard as compared with ISO 27668-1 to ISO 27668-2:2009”;
- ADD Appendix C (informative) “Technical differences between this standard and ISO 27668-1 to ISO 27668-2:2009 and their causes”.

This standard was proposed by the China Light Industry Federation.

This standard shall be under the jurisdiction of the National Pen Standardization Technical Committee (SAC/TC 378).

The responsible drafting organization of this standard: Beifa Group Co., Ltd.
The participating drafting organizations of this standard: Shanghai Pen Industry Research Institute, Qingdao Changlong Stationery Co., Ltd., Chengguang Holding (Group) Co., Ltd., Guangdong Jinwannian Stationery Co., Ltd., Wenzhou Tianjiao Pen Industry Co., Ltd., Yiwu Meineng Pen Industry Co., Ltd., Kunshan Lemei Stationery Co., Ltd., Ningbo Wenkui Holding Group Co., Ltd., Shanghai Wenzheng Pen Industry Co., Ltd., Wenzhou Aihao Pen Industry Co., Ltd., Shanghai Heye Stationery Co., Ltd., Ningbo Stationery Industry Association.

The main drafters of this standard: Yin Yongsheng, Zhou Chen, Chen Jingqiang, Shen Chunhong.

This standard shall, from the date of implementation, replace the original light industry standard QB/T 2625-2003 “Gel ink ball pens and refills”.

Gel ink ball pens and refills

1 Scope

This standard specifies the terms and definitions, classification, requirements, test methods, inspection rules and marking, packaging, transportation and storage of gel ink ball pens and refills.

This standard is applicable to the gel ink ball pens and refills (refillable and non-refillable) and refills (hereinafter referred to as “gel ink ball pen” and “refills”) for general writing and documentary writing.

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/T 191-2008, ISO 780:1997, MOD)

GB/T 2828.1 Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection (GB/T 2828.1-2003, ISO 2859-1:1999, IDT)

GB/T 6388 Transport packaging collection and delivery marking

GB/T 12654- 2008 Writing paper

GB 21027 - 2007 Request in common use of security for students articles

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

Gel ink ball pen

- b) Writing angle: $65^{\circ} \pm 5^{\circ}$;
- c) Writing speed: (4.5 ± 0.5) m/min;
- d) Writing pattern: continuous spiral line (100 mm circumference) with a pitch between 2mm and 5 mm;
- e) Backing plate: polished stainless steel plate.

6.2 Writing paper

USE the writing paper of quantitative specification 70 g/m^2 in accordance with GB/T 12654-2008.

6.3 Samples

Except for the shelf life test, USE the gel ink pen and refills which are not used within six months from the date of production as the test pen.

6.4 Environmental conditions

In the absence of special provisions, the test shall be carried out under the following environmental conditions:

- a) Relative humidity: 50% ~ 80%;
- b) Ambient temperature: $15^{\circ}\text{C} \sim 25^{\circ}\text{C}$.

7 Test method

7.1 Initial writing performance test

7.1.1 Test apparatus

60g special weight.

7.1.2 Method and procedure

7.1.2.1 TAKE a quantity of at least 10 gel ink ball pens and/or refills at random.

7.1.2.2 HANG the 60g special weight at the lower end of the pen; MAKE the test pen form an tilting angle of $50^{\circ} \sim 70^{\circ}$ to the writing paper surface; DRAW a straight line at the writing speed of $10\text{mm/s} \sim 15\text{mm/s}$; AND the inking shall be normal within 100mm.

7.2 Writing performance test

PLACE the sample paper in the copying equipment and TURN on the copying equipment.

7.6 Water resistance test

7.6.1 Instruments and materials

7.6.1.1 Distilled water.

7.6.1.2 200mL beaker.

7.6.2 Methods and procedures

PLACE the sample paper under test conditions for 2 hours; then PLACE it in the beaker to make it immerse into the distilled water, 1 h for “general writing” and 24h for “documentary writing”; TAKE it out and LET it dry naturally.

7.7 Light resistance test

7.7.1 Test equipment

UV light box (light box inner diameter of 220mm ~ 230mm, UV lamp: power 30W, wavelength $2.537 \times 10^2\text{nm}$, lamp tube length 900mm).

7.7.2 Methods and procedures

PLACE the sample paper at a location 100mm away from the UV lamp tube; MAKE it be radiated for 72h; TAKE it out.

7.8 Cap-off time test

REMOVE the cap from the unused test gel ink pen; after establishing normal ink flow, horizontally PLACE it under the test conditions for 24h; DRAW a straight line with hand.

7.9 Shelf life test

7.9.1 Test instruments

7.9.1.1 Constant temperature oven.

7.9.1.2 Constant temperature and humidity box.

7.9.2 Methods and procedures

7.9.2.1 Sample

7.12 Hydrochloric acid resistance test

7.12.1 Instruments and materials

7.12.1.1 Hydrochloric acid.

7.12.1.2 Distilled water.

7.12.1.3 200mL beaker

7.12.2 Methods and procedures

PREPARE the hydrochloric acid solution of volume fraction 10%; after placing the sample paper in the test environment conditions for 1h, PUT it in the beaker and MAKE it immerse into the hydrochloric acid solution; after 24h, TAKE it out and IMMERSE it in the distilled water for 10min; TAKE it out and LET it dry naturally.

7.13 Ammonium hydroxide resistance test

7.13.1 Instruments and materials

7.13.1.1 Ammonium hydroxide.

7.13.1.2 Distilled water.

7.13.1.3 200mL beaker.

7.13.2 Methods and procedures

PREPARE the ammonium hydroxide solution of volume fraction 10%; after placing the sample paper in the test environment conditions for 1h, PUT it in the beaker and MAKE it immerse into the ammonium hydroxide solution; after 24h, TAKE it out and IMMERSE it in the distilled water for 10min; TAKE it out and LET it dry naturally.

7.14 Bleaching resistance test

7.14.1 Instruments and materials

7.14.1.1 Chloramine T.

7.14.1.2 Distilled water.

7.14.1.3 200mL beaker.

7.14.2 Methods and procedures

The insert pieces of 3mm thickness (either wood piece, plastic sheet, or metal sheet).

7.17.2 Methods and procedures

INSERT the insert piece in between the pen cap (holder) and the pen clip; after 10min, TAKE the insert piece off; CHECK whether there is clearance between the pen cap (holder) and the pen clip.

7.18 Impact resistance test

7.18.1 Test instruments

China fir board of 30mm thickness.

7.18.2 Methods and procedures

7.18.2.1 PLACE the 30mm thickness China fir board on the ground.

7.18.2.2 The active type gel ink ball pen shall be at the restoration state (fixed type gel ink ball pen shall be capped); MAKE the test pen axis be parallel with the board surface; LET it fall down freely from the 1m height above ground to onto the board surface.

7.18.2.3 CHECK the test pen AND it shall write normally and free from line disconnection; AND the components shall be free from cracking, deformation, or fall-off.

7.19 Coating corrosion resistance test

7.19.1 Test instruments

7.19.1.1 Constant temperature water bath.

7.19.1.2 Thermometer with a resolution of not less than 1 °C.

7.19.1.3 500mL beaker.

7.19.1.4 500mL measuring cylinder.

7.19.2 Reagent

7.19.2.1 Hydrochloric acid.

7.19.2.2 Ethanol.

7.19.3 Methods and procedures

- c) Type inspection shall be conducted once a year during normal production¹⁾;
- d) In case of production restoration after production suspension for three months or more than three months;
- e) In case of major difference between the exit-factory inspection results and the last type inspection results;
- f) When the national quality supervision institute proposes to the type inspection requirements.

8.2.2 During type inspection, it shall randomly take more than 40 samples from the products as the test sample, from which 20 samples are used as the inspection samples that will be subjected to the inspection item by item as listed in Chapter 5. The inspection qualification rate is calculated on a single item basis. In each inspection item, the qualification rate of the initial writing performance, writing performance, water resistance, light resistance, erasure resistance, ethanol resistance, hydrochloric acid resistance, ammonium hydroxide resistance, bleaching resistance, refill mechanism flexibility, migration element content, and the pen cap safety shall be 100%, AND that of the other items shall be 90%.

If the type inspection fails, it shall conduct analysis to find the causes, take corresponding measures, AND conduct the type inspection again. If the type inspection fails again, it shall stop the exit-factory of the product; AND the exit-factory can be restored only after the problems are settled and the type inspection is qualified.

8.3 Exit-factory inspection

8.3.1 Batching rules

The exit-factory inspection batch is made up of products of the same model, with the batch size to be designated by the responsible department. Under the allowable conditions, it shall determine it after negotiation with the manufacturer.

8.3.2 Sampling

The exit-factory products shall be subjected to sampling inspection in batches, AND the sampling plan shall follow the requirements of GB/T 2828.1.

8.3.3 Inspection items

¹ The type inspection period for the migration element content is generally not exceeding two years.

It is preferable for the gel ink ball pen for documentary writing purposes to have the marking of “Documentary writing” or “DOC”; AND it is preferable for the gel ink ball pen having water resistance requirements to have the marking of “Water resistance” or “WR”.

9.1.2 Each refill shall have the following marking:

- a) The name of the manufacturer or its abbreviation or registered trademark;
- b) Production date (year, month).

It is preferable for the refill for documentary writing purposes to have the marking of “Documentary writing” or “DOC”; AND it is preferable for the refill having water resistance requirements to have the marking of “Water resistance” or “WR”.

9.1.3 The sales packaging of the gel ink ball pen and refill shall have the product name and trademark, manufacturer name, address, product model, reference standard number, production date (year, month), shelf life, and quantity, etc.

9.1.4 The shipping packaging shall have such markings as the product name and trademark, manufacturer name and address, product model, reference standard number, weight, volume, the number products in the package, and the exit-factory date, etc.

9.1.5 The various markings shall be eye-catching and clear. The pictorial marking and delivery/reception marking on the transportation packaging shall comply with the requirements of GB/T 191 and GB/T 6388.

9.2 Packaging

9.2.1 In the packaging it shall be attached with the product certificate or the certification marking.

9.2.2 The transportation packaging materials shall be adapted to the requirements of long-distance transportation.

9.3 Transportation

9.3.1 The products which are subjected to transportation packaging may be transported through the usual means of transport.

9.3.2 During the course of transportation, it is prohibited for the products to be exposed in sunlight and rain OR to the organic gases.

9.4 Storage

Appendix A

(Informative)

Explanatory note no gel ink

In order to assist in understanding the “degree of decrease and/or increase in viscosity of a writing fluid” in the definition of a gel ink ball pen, some provisions on gel ink characteristics from JIS S6061:2005 “Gel ink ball pen and refills” are provided below:

5.1 ²⁾ Gel ink performance

When tested in accordance with 8.3.1, the quality of the gel ink shall have a viscosity ratio $\eta_1/\eta_2 \geq 2.0$ AND an apparent viscosity $\eta_3 \geq 20$ mPa•s.

7.1 Viscometer

Cone-plate rotational viscometer (E-type viscometer) specified in JIS Z8803 or other testing apparatus equivalent in technological level.

Note: The cone rotor should have an angle of $1^\circ 34'$ between cone and plate, and standard rotor with 24 mm radius is recommended.

8.3.1 Gel ink viscosity test

Measurements shall be made according to the method in JIS Z8803, Clause 9, at temperature of (23 ± 2) °C with viscometer specified in 7.1.

- a) Apparent viscosity (η_1) is measured at any shear-rate of $(3 \sim 50)$ s⁻¹. Then, apparent viscosity (η_2) at ten times the initial shear-rate is measured, and viscosity ratio (η_1/η_2) is calculated to check whether it meets the requirements in 5.1.
- b) Apparent viscosity (η_3) is measured at any shear-rate of 383s⁻¹ to check whether it meets the requirements in 5.1.

Note: Shear-rate is the ratio of change in fluidity of liquid to laminar flow velocity at right angle, also known as a shear rate.

² It refers to the clause number in JIS S6061:2005, same as below.

Appendix C

(Informative)

Technical differences between this standard and ISO 27668-1 to ISO 27668-2:2009 and their causes

Table C.1 provides the technical differences between this standard and ISO 27668-1 to ISO 27668-2:2009 and their causes.

Table C.1

Clause number of this standard	Technical differences	Causes
2	On the normative references, this standard has made adjustment with technical differences to meet China's technical conditions, AND the adjustments are centrally reflected in Chapter 2 "Normative references", with the specific adjustments as follows: a) DELETE ISO 105-A02 and ISO 105-B02; b) USE GB/T 12654-2008 to replace the relevant international standards on papers (SEE 6.2); c) DELETE ISO 868; d) ADD the references of GB/T 191, GB/T 2828.1, GB/T 6388 (SEE 8.3.2, 9.1.5); e) ADD the reference of GB 21027-2007 (SEE 5.3)	Adapt to China's technical conditions
3	KEEP only the term and definition of gel ink ball pen	Other terms and definitions are as shown in QB/T 3651.2-2008
4	Separately LIST the categories of tip and refill into a single chapter	In accordance with the drafting rules of Chinese standard
4.3	ADD the gel ink ball pen classification based on structure	Based on the product structure
4.4	ADD the gel ink ball pen classification based on writing purposes and performances	Corresponding to ISO 27668-1 and ISO 27668-2
5.1	In the performance requirements, it is divided into general writing and documentary writing; SEPARATE the initial writing performance from writing performance; RE-WRITE the writing performance requirements; PROVIDE the light resistance value requirements; ADD the shelf life test methods (method A), PROVIDE corresponding requirements; DESIGNATE the method B as the arbitration test	Corresponding to ISO 27668-1 and ISO 27668-2, respectively; FACILITATE product inspection; USE the initial writing performance portion as an independent item; CHANGE the test method; PROVIDE fast test method. In accordance with the drafting rules of Chinese standard, it shall designate the arbitration test method