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EDICT OF GOVERNMENT

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GB 13651 (2008) (English): Retreaded
Aircraft Tyres



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National Standard of the People's Republic of China

GB 13651-xxxx
Superseding GB 13651-1998

Retreaded Aircraft Tyres

(Draft for approval)

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Inspection, and Quarantine of the People's Republic of China

Foreword

The provisions stated in Chapters 4 and 7 of this Standard are compulsory while the rest of the chapters are recommendatory.

This Standard supersedes GB 13651-1998 *Retreaded Aircraft Tyres*.

The main changes found in This Standard compared to GB 13651-1998 are as follows:

- modified the name of the Standard (name of the Standard of the 1998 version, name of the Standard of this version);
- modified the applicable scope of the Standard (Chapter 1 of the 1998 version, Chapter 1 of this version);
- deleted 4 terminologies (Chapter 3 of the 1998 version);
- modified the contents of 4.1 (4.1 of the 1998 version, 4.1 of this version);
- deleted the contents on the physical performance of retreaded tyres (4.2.12, 5.3.2e, 6.8 of the 1998 version);
- contents about air-escape hole, balance markings, etc. in the old version are included in Chapter 7 of this version (4.2.7, 4.2.13 of the 1998 version, 7.1, 7.2 of this version);
- deleted the contents on product package (7.2 of the 1998 version);
- modified the contents on the storage and usage of retreaded tyres (7.3 of the 1998 version, 7.4 of this version);
- deleted the indicative Appendix A *Standard Verification Test* in the old version;
- adjusted Chapter 6 to become informative Appendix A (Chapter 5 of 1998 version, Chapter 6 and Appendix A of this version).

This Standard is proposed by the China Petroleum and Chemical Industry Association.

This Standard falls under the jurisdiction of the National Technical Committee for the Standardization of Aircraft Tyres.

This Standard is subject to the interpretation of National Technical Committee for the Standardization of Aircraft Tyres.

The units responsible for the drafting this Standard: Shuguang Rubber Industry Research and Design Institute of China Rubber Group, Shenyang No. 3 Rubber Factory, Yinchuan Rubber Factory

Major drafters of this Standard: Qin Mingcan, Wang Shunyi, Zhang Dashan, Qi Liping.

Previous versions superseded by this Standard:

- GB 13651-1992, GB 13651-1998.

Retreaded Aircraft Tyres

1 Scope

This Standard sets the requirements, testing methods, markings, storage, and usage of civil aircraft retreaded diagonal tyres (hereinafter referred to as ‘retreaded tyres’).

This Standard applies to the retreading and repair of civil aircraft diagonal retreaded tyres.

2 Normative References

The provisions of the following documents become provisions of this Standard after being referenced. For dated reference documents, all later amendments (excluding corrigenda) and versions do not apply to this standard; however, the parties to the agreement are encouraged to study whether the latest versions of these documents are applicable. For undated reference documents, the latest versions apply to this standard.

GB/T 6326	Tyre Terminologies and Definitions (GB/T 6326-xxxx, ISO 4223-1: 2002 NEQ)
GB 9745	Aircraft Tyres
GB/T 9746	Series of Aircraft Tyres
GB/T 9747	Testing Method for Dynamic Simulation of Aircraft Tyres
GB/T 11191	Testing Method for Burst Pressure of Aircraft Tyres (GB/T 11191-2004, ISO 3324-2: 1998 NEQ)
GB/T 11193	Measurement Method for Outer Rim Dimensions of Aircraft Tyres (GB/T 11193-1998, neq ISO 3324-2: 1979)
GB/T 11194	Testing Method for Air-tightness of Tubeless Aircraft Tires (GB/T 11194-2004, ISO 3324-2: 1998 NEQ)
GB/T 13652	Surface Quality of Aircraft Tyres
GB/T 13653	X-ray Inspection Method for Aircraft Tyres
GB/T 13654	Holographic Inspection Method for Aircraft Tyres
GB/T 13655	Testing Method for Static Unbalance of Aircraft Tyres
HG 2195	Usage and Maintenance of Aircraft Tyres

3 Terminologies and Definitions

The terminologies and definitions set by GB/T 6326 applies to this Standard.

4 Requirements

4.1 Inspections done before tyres are retreaded

The following inspections must be done to determine if the aircraft tyres can be retreated or not:

- a) appearance;
- b) air needle;
- c) non-destructive testing – this can also be done after the tyre has been retreated

4.1.1 Tyres that can be retreated;

4.1.1.1 Tyres that can be directly retreaded without need for repair

When the tyre body and bead are still in good condition and no tyre cord layer is

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showing.

4.1.1.2 Tyres that may be retreated after repair

4.1.1.2.1 High speed tyres

- a) tread portion: the length x width of the slash or crack on the outermost tyre cord layer must not exceed 38.0mm×6.5mm and the depth do not reach 40% of the actual tyre cord layer for it to still be repaired. The repaired length must not exceed 50.0mm; The length of other forms of damages must not exceed 38.0mm; its depth must not exceed 40% of the actual tyre cord layer. Furthermore, only 6 repairs are allowed with intervals of not less than 60° for each tyre;
- b) tyre side portion: there are no slashes or cracks that will harm the tyre cord fabric layers;
- c) bead portion: there is no mechanical damage that will harm the tyre cord fabric layers. Traces of the pressure after repair must not affect the bead tightness; furthermore, the bead surface and hell must be smooth;
- d) air tightness: surface damage or defects whose length is less than 50.0mm and depth less than 0.5mm may be repaired but the number of repairs must not exceed 10 and there must be no more than 3 repairs within a 1/4 circumference;
- e) tread reinforced layer: the area of each tread reinforced layer must not exceed 1% of the entire polished area of the tread. In addition, the total area of exposed stitching must not exceed 2% of the whole tyre and that the depth of the exposed stitching must not exceed 1 layer of the tyre cord layer.

4.1.1.2.2 Low speed tyres

- a) bead parts: mechanical damages of bead fabric, which is as deep as 3 layers of cord fabric but no more than 25% of the total tyre cord layers, may be repaired;
- b) tread or side parts: local repairing may be done when the length of the damage does not exceed 13.0mm and its depth does not exceed the tread or side damages shown in Table 1. Repair may be done only on the damaged area.

Table 1

Total number of tyre cord fabric layers	Maximum number of layers damaged
Total layers of tyre cord fabric<8	null
8≤total layers of tyre cord fabric≤16	Not exceeding 2 cord fabric layers
Total layers of tyre cord fabric > 16	Not exceeding 4 cord fabric layers

4.1.2 Tyres that cannot be retreated

Tyres may not be retreated if any of the following conditions exist:

- a) tyres exceeding the specifications set in 4.1.1.1~4.1.1.2;
- b) tyres that have become bloated or have deteriorated due to oil pollution or chemical erosions;
- c) tyre sides have been repaired for more than 3 times;
- d) tyres that are severely damaged by negative pressure, have loosened, tyres in aborted take-offs or that easily disintegrates;
- e) tyres with unclear markings and unknown manufacturers.

4.2 Requirements for retreaded tyres

4.2.1 Tread design

Refurbished treads must have a longitudinal groove pattern.

4.2.2 Cord fabric layers of reinforced tread

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The layers of the reinforced tread's cord fabric must not fall below of the groove pattern of the tyre's outer sides.

4.2.3 Weight

The weight of retreaded tyre must not exceed the maximum weight of a new tyre.

4.2.4 Dimensions of the inflated outer rim

Dimensions of the inflated outer rim of retreaded tyres must be based on the requirements set in GB/T 9746.

4.2.5 Dynamic performance

High speed retreaded tyres must undergo 50 times of take-off tests and 8 times of coastdown tests under the specified rated load and rated pressures. For low speed retreaded tyres, the energy absorption method in dynamic simulation tests must be adopted. Dynamic performance must conform to the standards set in GB 9745.

4.2.6 Excess pressure performance

When the tyre is inflated to 3 times its rated pressure and the pressure remains 3s, it must not burst, produce bubbles, delaminated, or have broken steel wires or cords.

4.2.7 Air tightness of tubeless retreaded tyres

Fix the tyre onto the targeted wheel rim, inflate it with the rated inflation pressure, and place it in room temperature for at least 12h; after this, adjust the pressure to the rated inflation pressure, and place it in room temperature for at least 24h, the drop in the inflation pressure must not exceed 5% of the rated inflation pressure.

4.2.8 Static unbalance

The static unbalance of the retreaded tyre must conform to the standards set in GB 9745.

4.2.9 Surface quality

The surface quality of the retreaded tyre must conform to the standards set in GB/T 13652.

4.2.10 Internal defects

The internal defects of the retreaded tyre must conform to the standards set in GB 9745.

5 Testing Methods

5.1 The outer rim of the inflated tyre must be measured according to the dimension set in

GB / T 11193.

5.2 The dynamic performance of the tyres must be tested based on the requirements set in GB/T 9747.

5.3 The excess pressure performance of the tyres must be tested based on the requirements set in GB/T 11191.

5.4 The air-tightness of tubeless tyres must be tested based on the requirements set in GB/T 11194.

5.5 The static unbalance must be tested based on the requirements set in GB/T 13655.

5.6 The surface quality of tyres will be checked and measured visually and with instruments such as steel ruler, metallic tape (without radian, accuracy \pm 1.0mm), vernier caliper (accuracy \pm 0.02mm), etc.

5.7 Internal defects must be inspected based on the requirements set in GB/T 13653 or in GB/T 13654.

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6 Rules for Inspection

Please refer to Appendix A

7 Markings, Storage, and Usage

7.1 Air-escape hole

After being retreaded, tubeless tyres and those with inner tubes and with an inflation pressure higher than 686kPa, an air-escape hole must be placed in the tire again if the old one is covered. The new air-escape hole must be marked with a white colour. The depth for tubeless tyres must not reach the layer of air tightness.

7.2 Balance marking

A new red marking indicating the balance of the tyre must be placed on the side of the retreaded tyre that is close to the upper part of the bead, and the original balance marking must be removed. The new marking must be seen clearly on the retreaded tyre within its storage period and lifespan.

7.3 Other markings

If the permanent marking on the original new tyre is damaged after retreading, this marking must be restored. In addition, There must be at least the presence of the following markings on the side of the retreaded tyres, among which, items a) ~ e) are permanent markings:

- a) name or code of the retreaded tyre manufacturer;
- b) address of the retreaded tyre manufacturer;
- c) date and serial number of the retreaded tyre;
- d) to indicate the number of times the tyre has been retreaded, use the letter “R” and add the number of times; for example, if it is the third time for the tyre to be retreaded, express it as R3;
- e) Maintenance License No. issued by the Aircraft Airworthiness Department;
- f) Seal of Inspection

7.4 Storage and usage

Tyres must be stored and used according to the requirements set in HG 2195. The sum of the storage and usage time of the tyre from the date of its production must not exceed 5 years.

Appendix A
(Informative Appendix)
Rules in Inspection

1 Approval of Product Batches

Tyres will be grouped and approved according to specifications and ply ratings. Every 500 or 1000 tyres with the same specifications and ply ratings, which are manufactured within a succeeding date and under similar manufacturing conditions, will make up one batch. However, volume in excess of 500 or 1000 will form another batch.

2 Inspection and Classification

Inspection is divided into out-of-factory inspection and comprehensive inspection.

Out-of-factory inspection refers to the various inspections done when products are delivered.

Comprehensive inspection means carrying out a complete assessment of the quality of the product, which is to inspect the tyre according to the provisions set by this Standard.

3 Out-of-factory Inspection

Out-of-factory inspection is composed of 100% inspection and sampling inspection.

3.1.1 Items for 100% inspection

- a) static unbalance;
- b) surface quality.
- c) internal defects

3.1.2 Items for sampling inspection

- a) dimensions of the inflated tyre's outer rim;
- b) weight;
- c) air-tightness of tubeless retreaded aircraft tyres

4 Comprehensive Inspection

Comprehensive inspection must be done when one of the following occurs:

- a) before retreaded tyres, with different specifications, ply ratings, and trademarks, are put into production;
- b) when large changes are made in the structure, raw materials, and techniques after formal production has begun that may affect the performance of the product;
- c) when government quality monitoring institutions require a comprehensive inspection to be carried out.

Aside from the items in listed the out-of-factory inspections, all retreaded tyres undergoing comprehensive inspection are required to test the following items:

- d) dynamic simulation performance;
- e) excess pressure performance;
- f) special inspections required by the Aircraft Airworthiness Department

5 Rules for Re-inspection

When substandard products are found during a sampling inspection, a double sampling is allowed for re-inspection. Rules for re-inspection are as follows:

- a) when the air-tightness or inflated outer rim dimension of the retreaded tyre do not fulfil the requirements, two more samples may be randomly drawn for re-inspection in the same product batch. Based on the results, when both of the two samples qualify, this product batch will be judged as having passed the inspection; otherwise, it has failed.
- b) if the retreaded tyres fail to pass the inspection after double sampling and a re-inspection of their internal defects, a 100% inspection shall be carried out for all the products.