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

**GB/T 27651-2023**

Replacing GB/T 27651-2011

**Use category and requirements for preservative-treated wood**

防腐木材的使用分类和要求

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### 1 Scope

The document lays down the use classification of preservative-treated wood for different use environments and different degrees of hazard from fungal and insect attack, together with the retention and the penetration that the wood is required to reach after treatment.

It applies to the quality supervision of the preservation treatment of wood.

### 2 Normative references

The content of the following documents becomes, through normative reference in the text, an indispensable part of the document. For a dated reference only the edition bearing that date applies; for an undated reference the latest edition, including all amendments, applies.

GB/T 14019, Terminology of wood preservation. GB/T 23229-2023, Analytical methods for waterborne wood preservatives. GB/T 27654-2023, Wood preservatives. GB/T 33021-2016, Analytical methods for organic wood preservatives - Triazoles and benzimidazoles. GB/T 33041, Zoning of the hazard of wood decay and termite attack in inland China. LY/T 3195-2020, Quality requirements for preservative-treated bamboo.

### 3 Terms and definitions

The terms and definitions delimited in GB/T 14019, together with those below, apply to the document.

3.1 wood biodeterioration agents: the organisms that cause the deterioration, that is the degradation and the damage, of wood. Note: they take in micro-organisms, mainly decay fungi, stain fungi and moulds; insects, mainly wood pests; and marine boring animals.

3.2 retention, also called absorption or preservative retention: after preservation treatment, the mass of the active ingredients of the preservative retained in unit volume of the wood.

Note: the unit is kilograms per cubic metre.

3.3 penetration: the extent to which the preservative, that is its active ingredient, penetrates into the wood. Note: it takes in both the depth to which the preservative penetrates the wood and the penetration percentage of the preservative in the sapwood.

3.4 penetration percentage in sapwood: the percentage of the depth to which the preservative, that is its active ingredient, penetrates into the sapwood of the wood over the total depth of the sapwood on the same side of the wood.

## 4 Classification

According to the final use environment and the exposure conditions of the wood and its products, and to the degree of hazard the biodeterioration agents present under those conditions, the use categories run from C1 to C5, C3 and C4 each being split into two sub-categories, C3.1 and C3.2 and C4.1 and C4.2. The use classification of preservative-treated wood and its products is given in Table 1.

Table 1 has five columns - use category, use condition, application environment, main wood biodeterioration agents and typical uses. C1 is indoor, used in a dry interior environment sheltered from weather and moisture, with wood borers and drywood termites as agents, and building interiors, decoration and furniture as typical uses. C2 is indoor, used in an interior environment sometimes subject to damp and moisture but sheltered from weather, with wood borers, moulds and stain fungi, termites and decay fungi as agents, and building interiors, decoration, furniture, basements and bathrooms as typical uses.

C3.1 is outdoor but not in contact with soil, with the surface protected, used outdoors and exposed to all weathers including wetting, but with paint or another protection that keeps it from direct exposure to rainwater; the agents are wood borers, moulds and stain fungi, decay fungi and termites, and the typical uses are outdoor furniture and the external doors and windows of buildings. C3.2 is outdoor but not in contact with soil, with the surface unprotected, used outdoors and exposed to all weathers including wetting but kept from long immersion in water; the agents are the same as for C3.1, and the typical uses are the decking of platforms, walkways and boardwalks, outdoor furniture and the external doors and windows of buildings.

C4.1 is outdoor and in contact with soil or immersed in fresh water, used outdoors and exposed to all weathers, in contact with the ground or immersed in fresh water for long periods; the agents are wood borers, moulds and stain fungi, decay fungi, termites and soft rot fungi, and the typical uses are fence posts, supports, the foundations of wooden houses, cooling towers, poles and mine props. C4.2 covers the same conditions but the members are hard to replace or are key structural members; the agents are the same, and

the typical uses are fresh water wharf fenders, piles and mine props. C5 is immersion in sea water, used in long immersion in sea water; the agents are wood borers, moulds and stain fungi, decay fungi, soft rot fungi and marine boring animals, and the typical uses are sea water wharf fenders, piles and wooden vessels.

## 5 Requirements

5.1.1 The retention of the preservative is the minimum retention, calculated on the total of the active ingredients of the preservative, and it is required to reach the values of Table 2. The retention of the active ingredients of the preservative in the treated wood is measured by the analytical methods of GB/T 23229-2023 and GB/T 33021-2016.

Table 2 gives, for each preservative and its active ingredients, the minimum retention in kilograms per cubic metre across seven use category columns, C1, C2, C3.1, C3.2, C4.1, C4.2 and C5, the entry NR marking a combination that is not recommended. The preservatives listed run from borates through the alkaline copper quat formulations ACQ-1 to ACQ-4, the copper azoles CuAz-2 to CuAz-7, micronised copper azole MCA-4, chromated copper arsenate CCA-C, copper citrate, the azole preservatives PT, TEB, HEX, CY and triazole, prothioconazole, CuHDO, DCOI, copper 8-hydroxyquinolate and copper naphthenate. Eight footnotes qualify the table, among them that the boron compounds take in boric acid, borax, disodium octaborate and sodium pentaborate and their mixtures; that CCA-C at the C4.1 retention may be used only in zone Z4 of GB/T 33041; that the azole entries hold where there is no hazard from termites or other insects, an insecticide being added otherwise; and that DCOI calls for a water repellent to be added.

5.1.2 For the wood of poplars such as *Populus tomentosa* and of other non-durable poplars, the retention under use conditions C1 to C3.2 is required to meet the C1 to C3.2 retention of Table 2, and under use condition C4.1 to meet the C4.2 retention of Table 2; treated poplar is not to be used for C4.2 or C5.

5.1.3 For preservative-treated moso bamboo, the retention of the preservative is required to meet the corresponding requirement of Table 2. 5.1.4 The use category of outdoor bamboo laminated material is C3.1 or C3.2, and its retention is required to meet the C3.1 and C3.2 retentions of Table 2.

5.1.5 The number of test samples is fixed by taking as one lot the wood of the same species and the same thickness in each treatment cylinder: for a lot of less than 5 cubic metres, 5 samples are drawn; for a lot of 5 cubic metres or more, 10 samples are drawn.

5.1.6 The test samples are taken from the middle of the wood along its length, the exact position avoiding knots, cracks and reaction wood; once the position is fixed, a block is cross-cut from the middle of the wood or a core is drilled with a hollow bit.

5.1.7 The retention may be measured on the test samples left over from the penetration test of 5.2. 5.1.8 The test samples may be ground and mixed before testing, in which case the

result is required to meet Table 2; they may also be tested separately, in which case the mean of the results is required to meet Table 2. When the total retention of the active ingredients of the preservative in the treated wood meets the retention of Table 2, the retention of each active ingredient is required to be not lower than 80 percent of the value calculated from the proportion of that ingredient in GB/T 27654-2023 where an ACQ preservative is used, and not lower than 90 percent of that value where a CuAz, PT, CuHDO or CCA preservative is used.

5.1.9 The wood preservatives listed in Table 2 are required to meet 4.1 and 4.3 to 4.9 of GB/T 27654-2023.

5.2.1 The penetration of the preservative is expressed as the penetration percentage in sapwood, the penetration percentage of the preservative in the sapwood of the wood being the minimum sapwood penetration percentage, expressed as a percentage. 5.2.2 The minimum value of the penetration percentage of the preservative in the sapwood is required to reach the requirement of Table 3, no requirement being made for knots or defects; the measurement method is that of Clauses 14 and 15 of GB/T 23229-2023.

5.2.3 For the wood of poplars such as *Populus tomentosa* and of other non-durable poplars used under C4.1, the penetration is required to meet the C4.2 penetration of Table 3. 5.2.4 The penetration of the preservative in preservative-treated moso bamboo is required to meet LY/T 3195-2020.

5.2.5 Outdoor bamboo laminated material is produced in two ways, with penetration requirements as follows: where the bamboo strips are preservative treated, the penetration of the preservative in the strips is required to meet LY/T 3195-2020 with a penetration percentage of 85 percent or more, the laminated material then being given a post-treatment against decay; where the strips are not preservative treated, the laminated material being given an anti-decay and anti-mould post-treatment instead, the penetration percentage of the preservative within 2 mm of the surface of the laminated board is required to be 85 percent or more, and the adhesive used in producing the laminated material is required to meet the provisions for outdoor adhesives.

5.2.6 The test samples are taken from the middle of the wood along its length, the position avoiding knots, cracks and reaction wood; a block is then cross-cut from the middle of the wood or a core is drilled with a hollow bit. 5.2.7 The number of test samples is fixed by taking as one lot the wood of the same species and the same thickness in each treatment cylinder: fewer than 5 cubic metres, 5 samples; 5 cubic metres or more, 10 samples. 5.2.8 The penetration is measured on the cross section of the wood or along the length of the core.

5.2.9 The pass rate of the test results is required to be 80 percent or more. 5.2.10 Where the result fails, the test may be repeated, but the sample is to be doubled and the pass rate is then required to be 80 percent or more.