TECHNICAL REPORT

ISO/TR 20152-3

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Timber structures — Bond performance of adhesives —

Part 3: Use of alternative species for bond tests

Structures en bois — Performance d'adhérence des adhésifs —

Partie 3: Usage des essences alternatives pour les essais de joints de collage

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2, www.iso.org/directives.

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The committee responsible for this document is ISO/TC 165, *Timber structures*.

ISO 20152 consists of the following parts, under the general title *Timber structures — Bond performance of adhesives*:

— *Part 1: Basic requirements*

— *Part 2: Additional requirements*

— *Part 3: Use of alternative species for bond tests* [Technical Report]

Introduction

This Technical Report was prepared to simplify the assessment of adhesive bonds in countries where the test species described in ISO 20152-1 and ISO 20152-2 may be difficult to obtain. It sets out procedures for selecting substitute species available locally.

Timber structures — Bond performance of adhesives —

Part 3:
Use of alternative species for bond tests

1 Scope

This Technical Report describes the procedures necessary for the recognition of new wood species by ISO 20152-1 and ISO 20152-2 for the evaluation of structural wood adhesives.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 20152-1:2010, *Timber structures — Bond performance of adhesives — Part 1: Basic requirements*

ISO 20152-2, *Timber structures — Bond performance of adhesives — Part 2: Additional requirements*

3 Test protocols

ISO 20152-1 permits adhesives to be evaluated under what are described as Method A and Method B procedures. ISO 20152-2 does not make this distinction but the alternative species introduced may also be used when applying its procedures.

3.1 Using Method A

The provisions contained in this Technical Report apply only to Method A as defined in ISO 20152-1.

3.2 Using Method B

When using Method B procedures, beech is the only substrate permitted. No provisions are available that permit new species to be introduced into the Method B procedures in ISO 20152-1.

4 Requirements

4.1 Selection of wood species

The proposing body should identify one only of each of the most commonly used softwood and hardwood species used by their local timber industry for adhesively bonded engineered wood products and produce evidence that this is the case. The species will not necessarily be the most difficult to adhesively

bond since other qualification procedures are specified in product standards that require further trials intended to establish that unusual species can be effectively adhesively bonded.

NOTE ISO 20152-1 and ISO 20152-2 provide an initial screen using standardized species, but in-house trials that test the viability of the adhesive bonds for specific products against specific species with specific manufacturing procedures must still meet the product standard requirements. Certain regions may well have difficult-to-glue species in smaller volumes which should not be used in engineered timber products if, following qualification trials, they are unable to meet the appropriate ISO product standard requirements. As a typical example, Australia uses radiata pine (pinus radiata) and mountain ash (eucalyptus regnans) respectively as its major softwood and hardwood species and these are known to bond reasonably well, but other species are not so easily bonded and are dubious propositions for use in adhesively bonded wood products.

4.2 Specific gravity of wood species

The specific gravity of the species chosen should have an oven- dry specific gravity not less than

— 0,49 for softwoods,

— 0,65 for hardwoods,

4.3 Growth rings of wood species

Cool climate species used to evaluate adhesive bond performance should exhibit at least 3 growth rings per 10 mm. This requirement does not apply to species grown in warm and tropical climates which do not display seasonal growth rings.

NOTE In cool climates, growth rates vary seasonally and this is reflected by the formation of growth rings. The warmer periods stimulate wood growth. In warm and tropical climates growth rings are less common. Softwood tracheids formed in the later stages of the growth cycle have thicker walls, often with smaller overall dimensions and in hardwoods the vessels formed early in the growing season may be larger and more numerous.

4.4 Shrink-swell characteristics of wood species

In drying from the fibre saturation point to 12 % moisture content the tangential shrinkage of the species chosen should be not less than

— 4 % for softwoods,

— 9 % for hardwoods.

4.5 Shear strength

The adhesively bonded specimens median shear strength requirements of samples following the treatments specified in ISO 20152-1:2010, 6.5.1.3.2, 6.5.1.3.5 inclusive should meet or exceed the requirements given in Table 1.

Table 1 — Median shear strength requirements for bonded specimens as a fraction of the median shear shear strength of the unbonded specimens

	Median shear strength requirements[a] for Service Class 3		Median shear strength requirements for Service Classes 1 and 2
Treatment and condition at test	**Hardwood[a]**	**Softwood[b]**	**Softwood[b] only**
6.5.1.3.2 — Dry	0,9	0,9	0,9
6.5.1.3.3 — Wet (Vacuum-pressure test)	0,5	0,5	0,6
6.5.1.3.5 — Wet (Boil–dry-freeze test)	0,3	0,3	0,35
[a] The bonded specimens should be deemed to be satisfactory if they achieve 0.9 of the unbonded shear strengths in the dry condition. The ratios for the other treatment conditions correspond to the same ratios given for Method A of ISO 20152-1.			

4.6 Wood failure

The median shear strength requirements of samples following the treatments specified in ISO 20152-1:2010, 6.5.1.3.2, 6.5.1.3.5 inclusive should meet or exceed the requirements given in ISO 20152-1:2010, Table 2.

5 Test method

5.1 Adhesive selection

The adhesive should be chosen as one already known to comply with the current version ISO 20152-1, Method A provisions. It should be mixed and applied to the wood substrate in accordance with the supplier's recommendations.

5.2 Specimen preparation

5.2.1 Block shear data should be obtained from 3 samples of wood of size approximately 3 m in length and 120 to 140 mm wide and 45 to 50 mm deep, see Figure 1, meeting the specific gravity and growth ring requirements of 4.2 and 4.3. This sample should be used to provide two matched samples one of which should be used for unbonded block shear test specimens and the second for bonded block shear test specimens.

5.2.2 Matched samples A should be machined to a depth of 40 mm from which one hundred and twenty (120) unbonded block shear test specimens should be cut.

5.2.3 Matched samples B should be machined on both sides to a depth of not less than 42 mm, as shown in Figure 1, and the machine surfaces then bonded in accordance with the adhesive supplier's recommendations within 2 h of machining. One hundred and twenty (120) block shear test specimens should be cut from the bonded assemblies as detailed in ISO 20152-1.

Dimensions in millimetres

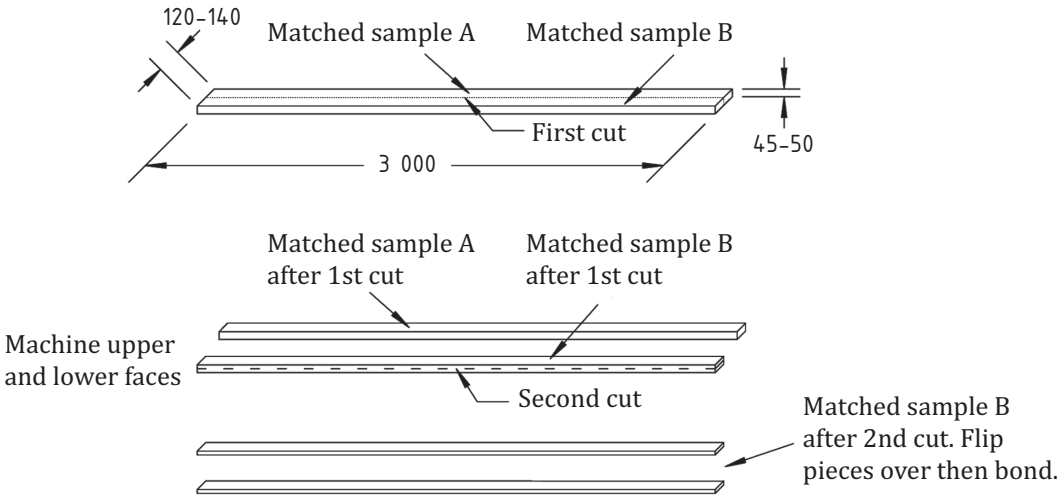

Figure 1 — Matched samples showing the cutting and bonding sequence.

5.3 Test procedures

The test procedures prescribed in ISO 20152-1 for block shear testing should be followed.

5.4 Interpretation of results

All interpretations should be as prescribed in ISO 20152-1.

6 Reporting

All details specified in ISO 20152-1:2010, 9.2, 9.3.1, 9.3.2 should be reported for the bonded specimens. Only shear strength values are required for the unbonded specimens.

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