TECHNICAL SERIES

39

RAISING THE STANDARDS

Monitoring the technical and environmental standards of tropical timber products in international markets

SEPTEMBER 2011

INTERNATIONAL TROPICAL TIMBER ORGANIZATION

TECHNICAL SERIES 39

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MONITORING THE TECHNICAL AND ENVIRONMENTAL STANDARDS OF TROPICAL TIMBER PRODUCTS IN INTERNATIONAL MARKETS

ITTO TECHNICAL SERIES #39

INTERNATIONAL TROPICAL TIMBER ORGANIZATION

Raising the standards

Monitoring the technical and environmental standards of tropical timber products in international markets

ITTO Technical Series No 39

by Jukka Tissari

The International Tropical Timber Organization (ITTO) is an intergovernmental organization promoting the conservation and sustainable management, use and trade of tropical forest resources. Its 60 members represent about 80% of the world's tropical forests and 90% of the global tropical timber trade. ITTO develops internationally agreed policy documents to promote sustainable forest management and forest conservation and assists tropical member countries to adapt such policies to local circumstances and to implement them in the field through projects. In addition, ITTO collects, analyses and disseminates data on the production and trade of tropical timber and funds projects and other actions aimed at developing industries at both community and industrial scales. All projects are funded by voluntary contributions, mostly from consumer member countries. Since it became operational in 1987, ITTO has funded over 1000 projects, pre-projects and activities valued at around US$350 million. The major donors are the governments of Japan, Switzerland, the United States of America, Norway and the European Union.

Front cover photo: Square edged and graded tropical hardwood in a UK timber importers warehouse. M. Adams/ITTO

Back cover photo: Timber warehouse in East Kalimantan, Indonesia. T. Yanuariadi /ITTO

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The views expressed in this paper are those of the author and do not necessarily reflect the views of his current employer (the Food and Agriculture Organization of the United Nations) or ITTO. The designations employed and the presentation of material in this paper do not imply the expression of any opinion whatsoever on the part of the secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers and boundaries.

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FOREWORD

Tropical forest industries create value from the use of forest resources and can contribute to their sustainable management. The potential for revenue and employment can be increased, for example, by the expansion of production and exports of further-processed products. Opportunities for tropical forest-based industrial development include growing product demand in emerging markets; new markets for secondary processed wood products; the expanded use of lesser-used species; new product and process innovations; and the commercialization of forest-based services.

Technical and environmental standards have become important in the international trade of tropical timber products. For example, phytosanitary regulations in importing countries require that wood and wood-packaging materials are subject to certain treatments to minimize the risk of exporting wood-borne pests and diseases. There are also requirements for dimensional consistency in wood exported for uses such as flooring, decking and furniture.

If they wish to maintain or increase access to international markets, producers in tropical countries need to comply with the technical and environmental standards that apply in those markets. The purpose of the study presented here was to monitor and assess major developments in technical and environmental standards, especially in selected major international markets. It was also designed to facilitate information exchange on technical and environmental standards relating to tropical timber products.

My thanks go to the author of the report, Jukka Tissari. It is my hope that the information contained in the report, most of which was current in mid-2010, and the recommendations it makes, will assist tropical producer countries in complying with the main technical and environmental standards required for tropical timber products in international markets.

Emmanuel Ze Meka
Executive Director
ITTO
August 2011

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ACRONYMS AND ABBREVIATIONS

ANSI	American National Standards Institute
ATIBT	*Association technique internationale des bois tropicaux*
BS	British Standard
CARB	California Air Resources Board
CE	*conformité européenne*
CEN	European Committee for Standardization
CPD	Construction Products Directive
DEVCO	ISO Committee on Developing Country Matters
DFV-1	Voluntary standard for sliced decorative wood face veneer (Industry Standard DFV-1 1995)
DIN	German Institute for Standardization
DIS	Draft International Standard (ISO)
EN	European Standard
EU	European Union
ft	foot (unit of measure)
F1F	FAS one face
FAO	Food and Agriculture Organization of the United Nations
FAS	firsts and seconds
FCBA	*Institut technologique* (France)
FSC	Forest Stewardship Council
g	gram
GPA	Government Procurement Agreement (WTO)
h	hour
HP-1	Voluntary American national standard for hardwood and decorative plywood (ANSI/HPVA HP-1-2004) (US)
HPVA	Hardwood Plywood and Veneer Association (US)
IHPA	International Hardwood Products Association (US)
IPPC	International Plant Protection Convention
ISO	International Organization for Standardization
ISPM	International Standards for Phytosanitary Measures
ITTA	International Tropical Timber Agreement
JAS	Japan Agricultural Standard
JIS	Japan Industrial Standard
LVL	laminated veneer lumber
MDF	medium density fibreboard
m	metre
mg	milligram
NAF	no added formaldehyde
NAUF	no added urea formaldehyde.
NHLA	National Hardwood Lumber Association (US)
OECD	Organisation for Economic Cooperation and Development
OSB	oriented strandboard
P&C	FSC principles and criteria
PCP	pentachlorophenol
PEFC	Programme for the Endorsement of Forest Certification Schemes
ppm	parts per million
PVC	polyvinyl chloride
PVC	polyvinyl chloride
SPS agreement	WTO Agreement on the Application of Sanitary and Phytosanitary Measures
SPS	sanitary and phytosanitary
TBT	Agreement on Technical Barriers to Trade (WTO)
TC	technical committee (ISO)
TR	technical report (CEN)
TS	technical specification (CEN)
TSPN	Trade Standards Practitioners Network
ULEF	ultra-low emitting formaldehyde resin
US	United States of America
WG	working group (CEN)
WTO	World Trade Organization

1 INTRODUCTION

Several tropical countries have expressed concern that evolving wood-related regulations[1] in consumer markets, such as product standards, environmental credentials and codes related to safety, health and building practices, restrict the expansion and diversification of the international trade in wood products and furniture. Technical requirements are designed to protect the health and safety of consumers and to establish product-quality conformity among producers, but they also have the potential to create obstacles to fair market access.

Technical and environmental standards have become an important issue in the international trade of tropical timber products. For example, recently introduced phytosanitary regulations in importing countries require that wood and wood-packaging materials are subject to either debarking, fumigation or drying treatments. In the United States of America, imports are subject to the Hardwood Plywood and Veneer Association (HPVA)'s voluntary plywood standards and the grading standards of the National Hardwood Lumber Association (NHLA). Imports to the European Economic Area are subject to the mandatory *Conformité Européenne* (CE) marking of timber products. Other technical standards include rules for the consistency of wood dimensions exported for various uses such as flooring, decking and furniture.

Producers in tropical countries need to comply with the requirements of the relevant technical and environmental standards in order to access international markets. To assist them to do so and therefore to promote the further processing and trade of tropical wood products, this study was commissioned to analyze, document and disseminate information on technical and environmental standards in selected international markets.

Objectives

The study had three specific objectives:

- Monitor and assess the major developments in technical and environmental standards, including through a comprehensive overview of global markets and the regulations required for tropical timber products in selected major international markets.
- Facilitate information exchange on technical and environmental standards relating to tropical timber products.
- Make recommendations on future actions that could assist tropical producer countries in better understanding and complying with the main technical and environmental standards required for tropical timber products in international markets.

The study is fully aligned with Article 27, Paragraph 3(a) of the International Tropical Timber Agreement (ITTA), 1994, Expected Outcome 1(E) of the ITTO Action Plan 2008–2011, and articles 1(b), 1(d), 1(e), 1(f) and 1(k) of the ITTA, 2006.

1 The terms 'wood' and 'timber' are used interchangeably in this report.

2 STANDARDS IN THE WORLD TRADE CONTEXT

Principles and benefits of standardization

A *standard* can be defined as a document, established by consensus and approved by a recognized body, which provides for common and repeated-use rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context. Standards should be based on the consolidated results of science, technology and experience and should be aimed at the promotion of optimal benefits. A standard becomes an *international standard* if it is adopted by an international standardizing/standards organization and made available to the public (ISO & IEC 2001). A standard has global relevance if it can be used or implemented broadly by affected industries and other stakeholders in markets worldwide.

Standards can be used as the technical basis for trade in end-products between willing buyers and sellers and as a means of facilitating compliance with technical regulations. They are also used extensively by companies in production, product, service and process environments. Ideally they are developed in a transparent, open and consensus-based process that involves interested stakeholders and defines *fitness for purpose* in the case of product standards and *good practice* in the case of processes. Management system standards assist organizations in managing their operations. The widespread use of standards is a necessary precursor to the evolution of a 'quality' culture in society (ISO and UNIDO undated). Standards can contribute directly to economic growth, environmental integrity and social equity (Table 1).

World Trade Organization

A principle of the World Trade Organization (WTO) is that products originating from other WTO member countries shall not be accorded treatment less favourable than like products of national origin. Every WTO member, while allowing imports, has the right to adopt standards it considers appropriate for human life and health, the protection of the environment or the prevention of deceptive practices. The three most relevant WTO agreements are described below with a view to understanding their contexts in regulating the setting and use of standards in international trade.

Technical barriers to trade

The Agreement on Technical Barriers to Trade (TBT) seeks to ensure that regulations, standards, and testing and certification procedures, including packaging, marking and labelling requirements, do not create unnecessary barriers to trade. However, the TBT also encourages member countries to use international standards where appropriate, without lowering their national levels of protection against defective products (International Trade Centre 2007).

The TBT contains a code of good practice for the preparation, adoption and application of standards. The basic principle is that procedures used to determine whether a product conforms to national standards should be fair and equitable. It does not approve methods that would give domestically produced products an unfair advantage and it encourages countries to accord recognition to each other's testing procedures. All WTO members are required to establish a 'national enquiry point' to respond to inquiries on standards.

Table 1 Potential role of standards

Economic growth	Environmental integrity	Social equity
Produce economies of scale	Promote ecological safety	Provide consumer protection
Promote interoperability of products and services	Assist environmental management	Enhance product safety
Encourage greater competition	Encourage energy efficiency	Support worker protection
Facilitate trade	Help reduce carbon footprint	Promote health services
	Address air, soil and water quality	Disseminate innovation

The TBT undoubtedly affords an advantage to industrialized countries, which normally have superior technologies and rigorously follow their own tightly set standards. Countries with developing or emerging economies have to work hard to achieve similar, relatively sophisticated levels of standardization. In particular, many such countries have insufficient or sub-standard laboratories with which to comply with the current best practices of industrialized countries.

Sanitary and phytosanitary measures

Sanitary and phytosanitary (SPS) measures are used to guarantee that a producer has the capacity to clean, sanitize, sterilize or by other means render an offered commodity free of unwanted dirt, seeds, pests and disease. Under the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (the SPS Agreement), WTO members are allowed to establish their own standards, but the relevant regulations must be based on science and applied only to the extent necessary to protect human, animal or plant life or health. Standards are not allowed to arbitrarily or unjustifiably discriminate between countries in which identical or similar conditions prevail (International Trade Centre 2007).

Standards in relation to plant health are generally acknowledged to be legitimate. However, the complexity and severity of the requirements may have an effect on trade and may be interpreted by exporters as impediments to trade. The SPS Agreement is designed to reduce the inspection, quarantine and treatment of imported forest products as prohibitive measures beyond those necessary to protect domestic human, animal and plant populations in the receiving country. The SPS Agreement requires that governments provide advance notice of new or changed SPS regulations. A national enquiry point to provide up-to-date information is mandatory.

The SPS Agreement makes a presumption in favour of the use of international standards, but countries may take stricter measures if there is a scientific justification or a prescribed risk assessment to justify such action. It is not envisaged, however, that SPS issues will emerge as a serious constraint to market access for tropical timber (ITTO 2003).

Government Procurement Agreement

Under the WTO's Government Procurement Agreement (GPA), technical specifications in government tenders should be "based on international standards, where such exist, otherwise on national technical regulations, recognized national standards, or building codes". A national technical regulation is any standard set by a recognized body. It is likely, therefore, that ISO 14001: Environmental Management System, and eco-labelling programs, would be acceptable under the GPA (ITTO 2003).

Government purchases make up a significant share of global markets. For example, government expenditures make up 10–25% of gross domestic product in member countries of the Organisation for Economic Cooperation and Development (OECD). The GPA has around 30 signatories, mostly from the OECD.

Defining product quality with standards

Product quality is usually defined as – but not limited to – meeting the following criteria:

- satisfaction of customer's needs
- suitability for intended end-use
- performance according to product specification and service life.

High-quality products meet the above requirements consistently and comply with applicable standards and with other norms set out by buyers and society at large according to technical, aesthetic, environmental and, increasingly, social criteria. For value-added wood products, differences in quality may imply different customer groups and price points. In that sense, standards are a tool for market segmentation and product branding. Such measures are most important for some further-processed wood products, such as furniture and flooring, but they may also assist in elevating the status of some primary processed wood products beyond the level of a commodity.

Developing-country perspective

Technical and environmental standards can have a greater impact on industry competitiveness in developing countries than in industrialized

countries for several reasons (UNCTAD 1997). For example:

- Developing countries normally play a moderate or small role in the development of such standards, and may be unable to safeguard their interests.
- The cost of adjustment to new standards tends to be higher in developing countries because of a lower baseline level.
- Developing countries are at a disadvantage in benefiting from new (and old) standards if they are late adopters.
- An undue cost burden falls on developing countries because, compared with suppliers in developed countries, they have less access to accredited certification bodies.
- Weak management systems mean that, compared with developed countries, developing countries incur larger incremental costs to achieve certifiable operations.
- A low level of funds may be directed to meeting the costs of stricter standards because of more pressing concerns that need to be addressed locally.

Accounting for the context in which environmental issues are expressed was articulated in Principle 11 of the Rio Declaration, as follows:

> Environmental standards, management objectives and priorities should reflect the environmental and development context to which they apply. Standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries.

This is of particular concern when standards are set at the international level with universal performance requirements for all countries and therefore do not take into account nationally specific conditions such as the extent of industrial development or perceptions of the need for environmental quality (IUCN 2001).

Many developing countries do not have national sets of standards and governments may resort to imposing reference to international standards. For this reason, among others, the International Organization for Standardization (ISO) and other international or regional standards are important to developing countries. Standards are under continuous change and ensuring that they are fully known and understood among tropical country producers is a significant challenge. The following chapters examine recent developments in selected key standards.

3 REVIEW OF STANDARDS FOR ROUNDWOOD AND PRIMARY PROCESSED WOOD PRODUCTS

Developing countries are struggling with a range of issues related to standards, and the wood industry is no exception. Industrial wood producers, processors and other stakeholders are increasingly seeking information and assistance to better respond to the challenges and opportunities associated with emerging standards – so that they do not translate into non-tariff measures or, in more concrete terms, real barriers to trade. Development agencies, traders and others face an enormous challenge in identifying effective ways to achieve higher compliance with increasingly demanding standards (Trade Standards Practitioners Network 2010).

National-level regulations such as product standards, building codes and other standards influence the use of tropical wood for various end-uses in consumer markets. They often fail to consider the specific characteristics and applications of tropical wood and may indirectly have a negative impact on market access. For example, product standards have been written for boreal and temperate wood but in practice are also applied to imported tropical wood. Building codes and specifications tend to favour a small number of local dominant species and grades (to keep regulations simple and manageable).

A challenge is to make such rules sufficiently flexible that they accommodate, or even give preference to, tropical wood, which may be better suited than local woods to certain purposes. It is little wonder that the potential of national building codes and regulations to pose technical barriers to trade is so high.

From an exporter's point of view it is difficult to serve more than one market from the same mill, as preferences and regulations may differ (e.g. between the Japanese, United States and European Union – EU – markets). Increasingly, organizations such as the ISO, the European Committee for Standardization (CEN) and the *Association technique internationale des bois tropicaux* (ATIBT) are attempting to harmonize the specifications and standards of major markets to address this problem. But this is not happening quickly because regulations have been built up over decades based on the long traditions prevailing in each market (ITTO 2003).

An approval system for imported wood products requires some form of testing. Testing procedures for standards can form a part of order specifications in trade. The required testing procedures often refer to an ISO-accredited laboratory, which in some countries may not be readily available or may be expensive. Code harmonization and the creation of performance-based standards will facilitate trade but their development has typically progressed only slowly.

International and national associations' work on standards

ATIBT

The ATIBT pursues work on standards and rules affecting tropical wood and products thereof in its Commission 3: Standards and Uses. It aims to speed up the progress in tropical wood standardization.

The two principal missions of Commission 3 are:

- To represent the ATIBT in the large international standardization organizations, such as ISO and CEN.
- To compile and promote the ATIBT's international grading and measuring rules.

To date, Commission 3 has:

- Published a publication titled *Terminology of round and sawn tropical wood.*
- Followed and evaluated the African sawnwood and okoume rules, in collaboration with the ATIBT arbitration chamber.
- Prepared a practical commercialization guide for peeled, sliced and sawn veneers. The object of this guide is to favour the commercialization and regulation of these products, and it integrates the existing CEN and ISO recommendations concerning plywood.

IWPA, IHPA and NHLA

The International Wood Products Association (IWPA)'s Lumber Products Committee, the Malaysian Timber Industry Board and the Malaysian Wood Moulding Council have jointly developed the *Tropical hardwood machined lumber products grading rules*. These rules provide definitions and specifications for the premium, standard and utility grades of general mouldings, surfaced-four-sides planed lumber, and door jambs. Both natural and machine defects are specified separately. The rules include a glossary of 75 terms. They were designed, in the first instance, to facilitate trade between the United States and Malaysia, but they are now an important tool for facilitating tropical timber trade to the United States market by any tropical country.

The International Hardwood Products Association (IHPA)'s *Procurement standard for imported hardwood plywood* specifies an 'IHPA grade' on the basis of, for example, thickness tolerances, and describes plywood graded and marked in thicknesses of 2.7 mm through 25 mm made from tropical hardwoods. The IHPA Standard contains quality criteria, provisions for packing, product marking and claims, and definitions.

The NHLA, which was founded more than a century ago, has developed rules and standards to facilitate trade in the United States hardwood market. Recently its reputation has grown beyond the United States, and tropical timber exporters recognize it as one of the international benchmarks in grading tropical sawnwood. Table 2 summarizes NHLA's quality standard for sawn hardwood. The NHLA also publishes illustrated guides, rulebooks for measuring and inspecting hardwoods, and grading rules and trader's manuals, and it offers a 14-week training program to sawnwood graders worldwide.

Harmonization of standards systems

There is a strong movement across the EU and the ISO membership to simplify the system of product endorsement currently carried out by independent national bodies. Although these bodies are still national they nevertheless work largely to common rules. The EU is also working (through CEN) with ISO to harmonize standards on product performance and to make them universal across the EU.

Table 2 Summary of NHLA's sawnwood standard grades

Grade	Minimum dimensions of pieces	Clear cuttings	Yield	Sound sapwood	Heart	Wane	Shakes	Knots and holes	Deformations
FAS (firsts and seconds)	Width of 6″ and wider – length of 8′ and longer	4″ x 5′ or 3″ x 7′	83.33% (10/12ths) to 100% clearwood cuttings over the entire surface of the board	Tolerated without limits	Tolerated outside cross cut if the length in inches is smaller than the surface measured	Must not exceed 1/2 of the width of the piece on each edge. Tolerated if the size does not exceed 1/2 of the surface measured	The cumulated length must be smaller than 2 times the surface measured. Not considered if not exceeding 1″ on each extremity	The diameter of each knot or hole must be < 1/3 of the surface measured	Tolerated if made straight again during process
FAS One Face (F1F)	The better face must meet all FAS requirements while the poor face must meet all the requirements of the Number 1 Common grade								
SELECTS	Width of 4″ and larger, length of 6′ and longer	This grade is virtually the same as F1F except for the minimum board size required							
No 1 COMMON	Width of 3″ and larger, length of 4′ and longer	4″ x 2′ or 3″ x 3′	From 66.67% (8/12ths) to 83.33%	Tolerated without limits	< 1/2 the length	Without limits	Without limits		
No 2 COMMON	Width of 3″ and larger, length of 4′ and longer	3″ x 2′	From 50% (6/12ths) to 66.67%.	Without limits	Without limits	Without limits	Without limits		

Source: http://www.roquevalente.com/quality%20NHLA.htm.

Modes of cooperation between ISO and CEN are agreed in the Vienna Agreement, and include the following:

- exchange of information
- mutual representation
- adoption of ISO standards as European Standards (ENs)
- parallel development and adoption of EN and ISO standards
- agreement on leadership in drafting new standards
- avoidance of duplication of work.

The most common international standards are introduced briefly below; European standards for roundwood, sawnwood and timber structures are listed in Annex 1.

CEN standard and keymark

Keymark is a newly introduced logo, owned by CEN, for a third-party certification system in conformity with ISO/IEC Guide 28: *General rules for a model third-party certification system for products*. It is entirely voluntary and can only be granted on the basis that a product meets an EN. A near-equivalent of Keymark is the EUR logo on the Europallet. The box on the next page sets out some of the characteristics of CEN.

CEN develops ENs, which are defined as "a set of technical specifications established in collaboration with and with the approval of the parties concerned in the various partner countries of CEN". ENs are based on the principle of consensus and adopted by a weighted majority voting. Adopted standards must be implemented *in their entirety as national standards, regardless of which way the national member voted*. All conflicting standards must be withdrawn. Nine new timber standards are under approval or under development and are due to be published between 2009 and 2012 (Annex 3).

CE marking

The CE mark is a third-party endorsement that has been appearing on building and construction products in the EU. The Construction Products Directive (CPD) issued by the EU calls for wood products used in construction to have the CE mark. This applies to products such as sawnwood, mouldings and panel products, including plywood, flooring and fitted furniture. The intent of EU directives regarding CE marking is to eliminate non-tariff barriers to trade and to ensure that products traded in the EU comply with technical regulations and norms on safety and environmental protection, which in the past have varied from country to country.

CE marking for construction products will be implemented in stages and as and when harmonized ENs become available. In April 2004 it became a legal requirement that all wood-based panels for use in construction comply with the requirements of the CPD. Although the mark itself is not a legal requirement in EU member countries, the easiest way for a manufacturer to demonstrate compliance with the CPD is to apply the CE mark. The route for this is described in EN 13986: 2002. Existing ENs for other timber products include those for roof trusses, structural timbers, glulam beams, doors and windows, laminated veneer lumber and structural insulated panels.

Manufacturers and their trade associations should be aware of developments in the technical specifications that apply to their products and should familiarize themselves with their technical content. To apply for the CE mark a company must be assessed by an organization known as a 'notified body' that is accredited by the EU.

International Organization for Standardization

The ISO is a worldwide federation of national standards bodies ('ISO member bodies') in more than 140 countries. Its mission is to promote the development of standardization and related activities in order to facilitate international trade and cooperation (ITTO & International Trade Centre 2004).The work of preparing international standards is normally carried out through ISO technical committees. Each ISO member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations (intergovernmental and non-governmental) may also take part in the work, in liaison with ISO.

CEN in a nutshell

- 30 national members (27 in the EU, three in the European Free Trade Association), seven associates, 16 affiliates.
- One management centre in Brussels, which is the hub of the organization and source of information and guidance.
- 13 330 publications, 12 262 ENs.
- The percentage of ENs identical to ISO standards differs from one sector to another: overall, more than 2500 ENs (27%) are identical to ISO.
- Average yearly production: 1200 documents.
- CEN technical activity occurs in 1430 committees, groups and workshops and 400 European professional organizations, and among more than 60 000 national experts. CEN publishes CEN Networking, a bi-monthly newsletter; CEN Sector News, a monthly update on technical work in the different sectors; and information brochures. In addition to EN standards, technical specifications (TSs), publicly available specifications, technical reports (TRs) and guides, and workshop agreements are issued.
- The so-called New Approach standardization process is designed to simplify legislative requirements and compliance through standard-setting and aims to adapt CEN to better reflect technical progress (including in the construction and packaging sectors).
- Standards are voluntary, and manufacturers adopting ENs have a presumption of conformity with the CE mark.
- The New Approach began 20 years ago and will be applied to new sectors. More than 25 European directives have been prepared according to New Approach principles.
- The timeframe to develop an EN ranges between 16 and 54 months, and the average timeframe is less than 36 months.

The following eleven technical committees deal most closely with wood products:

- CEN/TC 33: Doors, windows, shutters and building hardware
- CEN/TC 38: Durability of wood and derived products
- CEN/TC 112: Wood-based panels
- CEN/TC 124: Timber structures
- CEN/TC 175: Round and sawn timber
- CEN/TC 207: Furniture
- CEN/TC 250: Structural eurocodes
- CEN/TC 261: Packaging
- CEN/TC 335: Solid biofuels
- CEN/TC 350: Sustainability of construction works
- CEN/TC 351: Construction products – assessment of release of dangerous substances.

ISO Technical Committee 218

ISO Technical Committee (TC) 218 published a business plan in 2006 outlining the following two main tasks to be carried forward:

- Develop standards which will establish terminology and enable sawn and processed timber and floorings to be described, defined, classified and specified in a manner that is consistently understood by and equitable to all active and potential traders.
- Develop test method standards that will enable the physical and mechanical characteristics of hardwood and softwood round, sawn and processed timber to be determined in a globally recognized and consistent way. These test method standards will aim to provide transparency as well as 'deemed to comply' requirements where possible to facilitate broad-based acceptance and conformity.

Technical barriers to trade in wood products have been identified as:

- Differing cultural expectations of quality and performance.
- The need for wood to be considered on the same basis as non-wood products in regard to fire.
- Non-transparent approval systems for the acceptance of new wood products.

- Recognition of foreign testing methods and/or data.
- Existing prescriptive codes and standards, trading procedures and traditional preferences.

The benefits expected from the work of TC 218 are:

- Establishment of an internationally accepted terminology for roundwood and sawnwood.
- A reduction in the need for factory inventories through the adoption of preferred sizes and descriptions for sawnwood products.
- Improved use of alternative species through the establishment of objective performance-based standards of comparison.
- Reduced pressure on dwindling supplies of scarce preferred species.
- Increased market acceptability of sawnwood products with the establishment of more widely understood evaluation and acceptance criteria.
- A comprehensive suite of internationally applicable test method standards with the aim of establishing a worldwide unification of results, in turn facilitating a better interchange and correlation of data.

It is expected that ISO test methods standards will be useful as models for further customization by individual countries and will be as flexible as possible, both for laboratory and non-laboratory environments. They should also provide useful data for the development of:

- Grading rules and specifications.
- Incidents of imperfections.
- Incidents of global market access for timber via the use of transparent and internationally accepted test methods for the determination of physical and mechanical properties.

The two ISO standards families most relevant to wood products, ISO 9000 and ISO 14000, are explained next.

ISO 9000

Many wood-manufacturing companies are accredited by third-party organizations to ISO 9000: 2000 *Quality management systems*. This is a systems quality scheme rather than a product quality scheme. It does not constitute a guarantee that, for example, chemical, dimensional or strength quality controls have been carried out on a particular product.

The ISO 9000 family of international standards makes a distinction between quality system requirements and product requirements. By means of this distinction, the ISO 9000 standards apply to organizations providing products in all generic product categories and of all quality characteristics (i.e. ranging from high to low). The quality system requirements are complementary to the technical requirements of the product. The applicable technical specifications of products, as set out in product standards and process specifications, are quite separate and distinct from the ISO 9000 requirements or guidance.

The international standards do not prescribe how to achieve the objectives, leaving the decision on how to proceed to the management of the applicant organization. Many third-party product-quality certification schemes require prior ISO 9000 accreditation from an applicant company as well as the ability to meet product-quality characteristics. The reverse is never required.

ISO 14000

In a similar manner to ISO 9000, a company's accreditation to ISO 14000 *Specification for environmental management systems* may appear to assure purchasers about such things as the minimization of harmful chemicals and phytosanitary requirements. One must bear in mind, however, that it is a systems quality scheme and constitutes no guarantee that adequate chemical, environmental, sustainability or visual quality controls are in place for a given product.

By way of illustration, a surveillance visit under ISO 14000 would assess whether staff were in possession of up-to-date chemical standards, knew where to go for chemical tests, and recorded chemical results properly and passed them on to clients. It would not assess whether standards were being met. There would be no connection, for example, between ISO 14000 and the mandatory EU requirement for a 100 parts per million (ppm) upper limit on cadmium, mercury, lead and hexavalent chromium in pallet wood (International Trade Centre 2004).

The ISO 14001 standard complements the ISO 9000 series of standards on quality-management systems, which is much more widely

applied than ISO 14001. Many developing countries have promoted ISO 9000 standards as a way of improving the competitiveness of their export systems. In the wood industry, this process, with a few exceptions, is still in its initial stages, largely due to the fragmentation of the industry and the weakness of existing management systems. Note that meeting ISO 9000 and ISO 14000 standards is not equivalent to third-party product endorsement (ITTO 2003).

The national standards institutions in ITTO producer countries are either ISO members, ISO correspondents or ISO subscribers. Their capacity to implement ISO processes or take part in its standards development work is often weak. Strengthening this capacity and upgrading the status of countries to full ISO membership (if they are not currently at that level) would greatly assist in the internalization of standardization processes and the eventual adoption of international standards.

Sometimes international collaboration bears fruit in the development of standards in specific areas or for specific products. One such effort is TC 165, which deals with three standards for tropical bamboo: ISO 22156; ISO 22157-1; and ISO 22157-2. TC 165 is a project of the International Network of Bamboo and Rattan and ATIBT, two organizations that are helping to develop new directions in tropical timber standardization (ISO, personal communication, 2010).

Standards by product group

Roundwood and sawnwood terminology

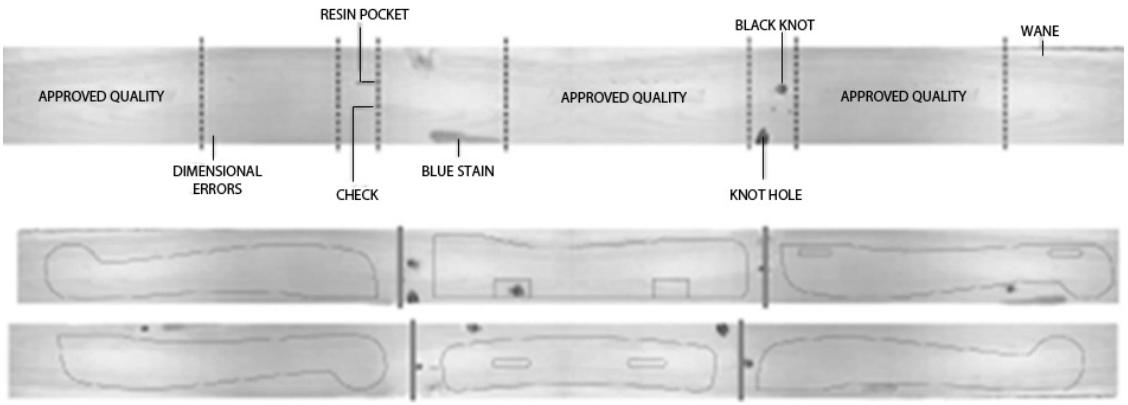
ISO Draft International Standard (DIS) 24294 establishes the terminology to be applied in the forest and wood-working sectors for the identification of a tree and its parts; measurement; grading; conditional features of sizes; and wood defects. The standard has been developed on the basis of ISO standards 4474: 1998, 4474:1989, 4476:1983, 8965:1987 (part) and 8966:1987 (part), and CEN standards 844-1 to 844-12 and is destined to replace them in consequence, completely or partially.

ATIBT log-grading rules

An elementary (but important) process for increasing wood value is improving log grading prior to sale. Certified log-graders are in short supply in many log-producing areas, even though ATIBT has produced an illustrated manual of grading rules, defined log classes I–V for most species, and provided training courses for accredited graders.

There is potential for increasing the value of log exports with investment in training in log measurement, assessment and grading. If government bases its fees on log-export value by grade, improved grading would have the potential to generate higher tax revenue. Log-grading competence also serves the future development of a value-adding processing industry.

Example of detecting defects in sawnwood for grading and further processing



Source: WoodEye®.

Several key tropical timbers are traded according to log-grading rules developed in the country of most important origin, often with the full involvement of importers. Such grading rules tend to become the norm in international trade, but they may need to be adjusted according to changes in the abundance of the resource and the size and quality of logs.

ATIBT sawnwood grading rules

There are two basic methods for grading sawnwood, adopted in slightly differing ways worldwide. According to one method, a sawnwood piece is graded on the basis of the number of standard defects it contains in proportion to the overall size of the piece. The other method involves the measurement of the defect-free surface area as a percentage of its total surface area. The figure on the previous page illustrates the identification of defects and defect-free sawnwood. Both methods are suitable for distinguishing between a premium or 'common' grade, and both serve the purpose of identifying the amount of best-quality sawnwood available for further processing.

ATIBT's grading rules for tropical sawnwood comprise two volumes. The first, *Grading rules for tropical timber logs and sawn timbers*, published in 1982, is a grading book which separately defines rules for African, Latin American and Asian tropical timbers. It identifies differences in parameters such as species composition, log size, timber mechanical properties, commercial terminology and parcel rules and consolidates them in a single guideline document. It also provides a simplified method for grading logs for export, and includes extracts from Asian log grading rules (these play less of a role today because log trade flows in Asia have changed or been phased out). The sawnwood section presents the sizes, methods and specifications that make up the grading rules for African and Latin American sawnwood, and it also reviews sawnwood grading rules in Asia.

The second volume on grading rules is *Grading of African sawn timber*, published in 1999. It defines the grading of 'traditional' African sawnwood with the following key sections:

- General remarks (e.g. reservations for shrinkage by sizes above contractual dimensions, volume tolerances, grading of the worse face as a rule, and other basic principles).
- Definitions for standard and special grades, and 'standard' defects to facilitate grading.
- Special provisions (additions and exceptions), which tend to be species-driven.
- Measurement rules and guidance.

Reference is also made to INCOTERMS[2] when shipping dryness is specified.

A separate, shorter guide lists requirements for industrial African sawnwood. It was designed at a time when African sawnwood exports were growing rapidly and is applicable to both parallel sawnwood pieces and to non-parallel sawnwood. It outlines:

- The preparation of timber (dimensional allowances, preservation, packaging, parcels).
- Timber quality (allowed and non-allowed defects).
- Dimensions and way of measurement (a contract between parties can stipulate both, but ways of measuring are defined in the rule).

The European Community has issued a CE marking regulation on structural timber entering EU markets. All structural timber must be graded for strength, fire resistance and other characteristics before it can carry the CE mark. EN 14081 is applied, stipulating that strength grading be based on the testing of sawnwood pieces with real end-use dimensions. In the past, a great majority of strength testing was carried out on small samples, which was cheaper and quicker. Entry into force of the regulation, originally scheduled for September 2008, was postponed for one year.

An effort has been launched by ATIBT and *Le Commerce du Bois*, assisted by CIRAD (a French agricultural research organization), the FCBA (a French timber-testing organization) and the Delft timber laboratory in the Netherlands to lower the cost of the CE mark by adopting a correlation table system for a large number of common tropical timbers. Under this approach, a limited number of real-size sample strength tests are combined (through the correlation tables) with a larger number of already-available small-sample, visual test results. The three regular strength grades (D30, D40 and D50) are expanded to five (adding D60 and D70) to better account for the superior

2 'INternational COmmercial TERMS' – a series of pre-defined commercial terms published by the International Chamber of Commerce that is widely used in international commercial transactions.

strength properties of many tropical timbers. The aim is to turn the challenge posed by CE marking into a gain for tropical timbers and to strengthen their credibility in the marketplace.

Another challenge for timber grading is that industries producing tropical timber for structural uses will, over time, increase their use of new, lesser-known or secondary species, the testing of which is likely to be minimal or non-existent. This is of a particular concern in tropical Africa and parts of Latin America. Producers will also be required to monitor the consistency of test results over time. An industrial production inspection system involving trained auditors will be needed to attest to conformity.

International veneer and plywood standards

European standards

There is an increasing focus on quality standards in many developed plywood markets, partly as a result of high-profile quality failures by substandard boards. Pronounced quality requirements are often seen as an attempt to sustain a domestic industry by countering the threat of competition from imported products. On the other hand, high quality requirements can favour high-quality tropical plywood, while the adoption of more stringent standards may limit competition by lower-quality non-tropical hardwood plywood. In particular, combi-ply (a form of plywood that combines hardwood and softwood layers) has competed with tropical plywood in some markets. Combi-ply is not aimed at substituting tropical hardwood plywood in the toughest applications but rather at meeting basic quality requirements to enter the larger part of the market. Nevertheless it has tended to erode the market for high-priced and higher-quality genuine tropical plywood.

In general, ENs are performance based; that is, panels are classified in terms of their intended end-use conditions. This is a different approach from that taken by, for example, past British standards, where plywood was classified according to its properties. Some test methods have also changed.

CE marking of plywood in structural applications became mandatory on 1 April 2004 in the EU states. Under the normative guidance of the CPD, plywood supplied for structural applications in the EU must conform with EN 13986 *Wood-based panels for use in construction*. Conformance with the standard requires an initial assessment and continuous surveillance of the plywood manufacturer's factory. Individual plywood products are assigned to technical classes, which are then shown on the CE mark (ITTO 2009). The technical classes are:

- EN 636-1 *Dry* – for interior applications with no risk of wetting (hazard class 1), with a moisture content corresponding to applications such as joinery, shop-fitting, exhibition stands and partitions.
- EN 636-2 *Humid* – for use in protected exterior applications (hazard class 2), with a moisture content corresponding to applications such as partition walls in bathrooms, sink-tops in kitchens, and edge boarding under roof cover.
- EN 636-3 *Exterior* – for use in unprotected external applications (hazard class 3), where the moisture content will frequently be above 20% (in exposure to prolonged weathering).

Only real tropical plywood will meet the requirements of all three classes, including the exterior class. Combi-ply and softwood plywood usually meet the dry and exterior classes.

The Engineered Wood Association in the United States has prepared a detailed assessment and guide on the major new European standards relevant to veneer and plywood and how North American products fit into the changing scenario. Similar guidance for tropical plywood would be very useful. For example, Malaysian plywood has met the Japan Agricultural Standard (JAS), the British Standard (BS) and the United States' IHPA Standard, as well as the EU's EN. Malaysia is one of the world's largest exporters of tropical plywood, with 180 mills in operation.

NF-EXTERIEUR CTB-X is a French standard set by the FCBA. It guarantees that a plywood product meets required specifications, as set by the building industry, for external applications. Tropical plywood panels that are certified by NF-EXTERIEUR CTB-X have a ten-year guarantee on their durability (ITTO 2009).

In the United Kingdom, BS 5756 *Specification for visual strength grading of hardwood* currently covers the following tropical species: balau,

ekki, greenheart, iroko, kapur, kempas, keruing, merbau, opepe and teak. Tropical exporters of sawnwood and plywood targeting the structural timber component market need to ensure that their species meet the relevant standards. This requires laboratory evaluations to establish strength parameters under visual strength grading systems.

Typically, a national standard co-exists with the corresponding international standard for a transition period before it is replaced by the international standard. For example, BS 5268 Part 2 co-existed with *Eurocode 5 – Design of timber structures Part 1.1: General rules and rules for building* (also known as EN 1995) for a transitory period. Such a situation may cause uncertainty and disputes in trade. Often, the name of the national standard indicates its association with an international standard (e.g. BS EN 636 *Plywood specifications*).

The introduction of Eurocode 5 required a significant re-thinking by timber designers because it represented a radical change in basic design philosophy compared with BS 5268. Eurocode 5 is based on *limit state* design, whereas BS 5268 was based on *permissible stress.* Under BS 5268 the values in the grade value tables had already been reduced to take into account long-term load duration, and they already included a safety factor. Eurocode 5, on the other hand, uses characteristic values of materials as the starting point of the design. To these the designer applies factors to take into account, for example, safety, load duration and environmental conditions. Thus, the characteristic values in Eurocode 5 are higher than the grade values given in BS 5268 (Engineered Wood Association 2009).

Eurocode 5 has been published in every EU country, which has, in turn, attached its own National Application Document to it. Individual countries are responsible for their own health and safety and other matters covered by the CPD's Essential Requirements.

North America

The *Voluntary American national standard for hardwood and decorative plywood* (ANSI/HPVA HP-1-2004, referred to below as HP-1) and the *Voluntary standard for sliced decorative wood face veneer* (Industry Standard DFV-1 1995, referred to below as DFV-1) outline the nationally recognized specifications for hardwood plywood and veneer in the United States (the Canadian Hardwood Plywood and Veneer Association has adopted the former). A total of 44 industries, associations, technical bodies and other stakeholders were consulted during the drafting of HP-1. There is also the *Voluntary product standard for structural plywood* (PS 1-07), which was developed by the National Institute of Standards and Technology and issued by the United States Department of Commerce. Marine-grade tropical hardwoods do not have a specific United States standard. As a rule, boards are required to meet BS 1088.

These standards are the prime tools for the conduct of plywood-related business in the United States. HP-1 articulates appearance factors, with species-specific tables describing allowable appearance characteristics. But it also governs the construction, core and back grades, glue bond performance, formaldehyde emissions, moisture content, dimensions and finish of panels. A panel manufactured to the HP-1 standard must meet or exceed requirements for all of those critical performance indicators.

HP-1 establishes nationally recognized marketing classifications, quality criteria, inspection and test methods, definitions, product marking and designation practices. It is designed to serve as a reference in trade literature, catalogues, contracts, building codes and procurement regulations. It includes a glossary of common trade terminology to facilitate communication and understanding.

HP-1 mentions tropical species specifically in requirements for, among others, veneer face and back grades and inner ply grades. Fifteen tropical species are listed: bubinga, keruing, rosewood, kapur, sapele, tanoak, avodire, mahogany, teak, anegre, cativo, lauan, makore, meranti and primavera. In addition, dakua, kaudamu, okoume and sande are mentioned in a footnote under 'import'. Full technical and appearance details are given in reference tables for face veneers, doorskins and back veneers, by species group. These tables group together mahogany, anegre, makore, sapele and other species with similar characteristics. For species that are not listed, the buyer and seller should select the best-matching species grouping.

DFV-1 introduced a thinner veneer group (Group A) to encourage efficiency in the use of scarce timbers. A common Group A thickness for

hardwoods is 0.55 mm. The purpose of DFV-1 is to provide a common understanding among veneer producers, splicers, architects and the manufacturers of doors, furniture and decorative panels of the unique material at their disposal and its characteristics in use.

Veneer appearance is almost impossible to categorize. In that sense, each flitch can yield a different design, depending on cut and technology. The appearance grade of veneers may depend on the final product (e.g. overlaid panel or plywood), so this standard does not define explicit grade requirements. Reference is made to other standards (e.g. HP-1) that attend to aspects of appearance.

Table 3 shows the latest revision of the IHPA's *Procurement standard for imported hardwood plywood*, *IHPA grade*; it includes thickness tolerances and describes plywood made from tropical hardwoods graded and marked in thicknesses of 2.7 mm through 25 mm.

ISO standards

Draft international standard ISO 12465: Plywood – specifications

This standard establishes plywood specifications for general or structural use in dry, humid, high-humidity and exterior conditions. Normative references are ISO/CD 16572, ISO/DIS 2074 and ISO standards 9426, 1954, 16978, 12466-1, 12466-2, 9427, 2426-2 and 2426-3. Details are as follows:

- **Materials**.
  - *veneer species*: any wood species is permitted; thickness: maximum 6.0 mm; quality: grade of veneer shall be controlled in accordance with defined limits for the characteristics defined in Annex A of the standard.
  - *jointing*: edge joints (parallel to grain) are permitted; glued or unglued end joints shall be structurally made (i.e. scarfed or equivalent) and glued.
  - *adhesives*: in combination with the veneer used, these shall be capable of providing a bond of the performance necessary to meet the requirements for the bond type, as specified in Clause 8 of the standard.
- **Manufacturing of panels.** The lay-up shall be controlled, including the thickness, orientation, wood species and quality of the piles.
- **Dimensions and tolerances.** Unless otherwise stated, the dimensions of plywood are determined in the conditions given in ISO 9426 and the tolerances to be applied are determined in the conditions given in ISO 1954.

Table 3 Summary of IHPA's procurement standard for imported hardwood plywood

Criteria	**Results**		
Thickness tolerance	≤ 5.5 mm = - 0.2 mm + 0.2 mm		
	≥ 6 mm = - 0.5 mm + 0.2 mm		
Sizes tolerance	- 0 + 1.6 mm		
Diagonal tolerance	Maximum: 1.6 mm		
Moisture content	Maximum: 12%		
Bonding quality	Minimum: 90%		
Requirements of shear strength and wood failure	Average shear strength (kg/cm^2)	Average wood failure (%)	Minimum average wood failure in one test piece (%)
	< 17.6	50	25
	≥ 17.6 – < 24.6	30	10
	> 24.6	15	10
Soak de-lamination test	T I = minimum 25.4 mm		
	T II = minimum 50 mm		

Source: http://www.tjipta.com/data/plywood-specs2.html.

- **General requirements.** Classification by surface appearance.
- **Mechanical characteristics.** If required, bending strength and/or stiffness shall be determined on small test pieces in accordance with ISO 16978.
- **Structural application.** Characteristics values used for the determination of design properties and capacities shall be determined in accordance with ISO/CD 16572.
- **Physical properties.** If required → ISO 1679 and ISO 9427.
- **Bonding quality.** In accordance with ISO 12466 Part 1 and classified in accordance with ISO 12466 Part 2.
- **Supplementary properties.** For certain applications, information on some supplementary properties is be required. Some of these supplementary properties and corresponding test methods are listed in a reference table. If no ISO standard is available, the method used shall be fully described in the test report.
- **Conformance.** Plywood conforming to this standard shall be manufactured under a quality system which
  - is included in plant production and quality control procedures
  - includes external and internal auditing of the in-plant procedures
  - is consistent with the requirements of ISO Guide 65.
- **Marking, identification and documents.** The marking and accompanying information shall be placed on the product itself, on a label attached to it, on its packaging, or in the accompanying commercial documents. It shall provide reference to this standard, the name, logo or code of the manufacturer, and the bonding class.

ISO 2426-2: Plywood – Classification by surface appearance (hardwood)

This part of ISO 2426 specifies the nature and limits of characteristics inherent in wood and manufacturing defects, enabling the visual assessment of plywood for allocation to an appearance class. This part of ISO 2426 is applied to plywood, the surface veneers of which are made from hardwood species. It does not apply to overlaid panels. Details are as follows:

- **Normative reference.** ISO 2426-1 Part 1: General.
- **Classification by surface appearance.** Appearance classes – should be carried out in accordance with ISO 2426-1. Appearance classes E, I, II, III or IV, as defined by the permissible characteristics and permissible defects according to a reference table given.

Wooden flooring standards

The European Commission postponed its intended launch of a mandatory CE mark for wooden flooring to the standard EN 14342 *Wooden flooring – characteristics, evaluation of conformity and marking* from 1 March 2009 by one year. A manufacturer must have documented conformity to an internal production control system and must perform an initial type testing.

In the United States, the American National Standards Institute (ANSI), in collaboration with the HPVA, has issued the *American national standard for engineered wood flooring* (ANSI/ HPVA 2009a) developed under the *Procedures for development of American national standards*. It is relevant to tropical wood because it contains provisions for commercially available engineered wood flooring, classified by species, pattern and finish of the face veneer. By its definition, engineered wood flooring includes flooring such as multiple pieces of varying lengths and widths that creates a strip or plank appearance or multiple specific shaped pieces to fit together to form a pattern.

Common temperate hardwood classes are defined, and when other species (including tropical species) are referred to, the minimum requirement is set by compression perpendicular to the grain (fibre stress at proportional limit), which is to be equal to or in excess of black cherry (a reference American hardwood species).

The standard covers:

- Requirements for moisture content, machining, bond line, construction, formaldehyde emissions and the finish of engineered wood flooring for interior use.

- Methods for identifying products that conform to the standard, as well as definitions of trade terms used.
- Information on ordering, installation, re-inspection practices and inherent characteristics.
- Characteristics of allowed imperfections and tolerances.

Face veneer grades are to be determined by the manufacturer's product samples. These grades include cutting methods such as sawn, rotary and sliced, as well as natural characteristics, texturing methods and factory finishes.

Formaldehyde requirements

Overview of international regulations

The emission of formaldehyde from wood products using resins is a cross-cutting concern in standard-setting. Formaldehyde is most often used in the manufacture of plywood, particleboard and other wood-based panels, but formaldehyde gas can also be emitted from various composite wood products used in home construction elements, decorations and furniture. Any wooden structures made by using urea-formaldehyde resins are potential sources of formaldehyde.

The emission of minute quantities of formaldehyde has been found to be an irritant to humans in confined areas and can cause headaches and nausea; it is also a suspected human carcinogen. It can be an issue for wood panels if formaldehyde is used in excess during manufacture. High ambient temperature and humidity seem to exacerbate the effects of formaldehyde on humans. In response, ISO and CEN (for example) have issued strict limits on the residual amounts of formaldehyde that can remain in boards and sheets (International Trade Centre 2004).

Some manufacturers in tropical producer countries may find it difficult to comply with the maximum limit set by CEN for formaldehyde in boards. It is therefore important to seek satisfactory maximum limit confirmation. There are two reference test methods for this:

- ENV 717-1: 1999 *Wood-based panels - determination of formaldehyde release – Part 2 – Formaldehyde emission by the perforator method*
- ENV 717-2: 1999 *Wood-based panels – Determination of formaldehyde release – Part 2 – Formaldehyde emission by the gas analysis method.*

The ISO's current work on formaldehyde is explained below.

ISO/DIS 12460-1 *Wood-based panels – Determination of formaldehyde release – Part 1 Formaldehyde emission by the 1-cubic metre chamber method*

This standard specifies a 1 m^3 chamber method for determining formaldehyde emissions from wood-based panels under defined conditions that correspond to average conditions in real life. Details are as follows:

- **Normative references.** ISO 16000-3; ISO 16999.
- **Terms and definitions.** Volume of the chamber; loading factor; air exchange rate; air velocity; steady-state; emission value.
- **Principles.** Preconditioned test pieces of known surface area are placed in a 1 m^3 chamber in which the temperature, relative humidity, air velocity and air exchange rate are controlled at defined values. Formaldehyde emitted by the test pieces mixes with the air in the chamber. The air in the chamber is sampled periodically over a defined period. The formaldehyde concentration is determined by drawing air from the chamber through a gas washing bottle containing water, which absorbs the formaldehyde. The concentration of formaldehyde in the chamber atmosphere is calculated from the concentration in the water in the gas washing bottle and the volume of sampled air, and expressed as milligrams per cubic metre (mg/m^3). Sampling is continued until the formaldehyde concentration in the chamber has reached a steady state.

In addition to international and government-led standard-setting on formaldehyde emissions, the wood industry itself may initiate improvements to standards. Usually, however, the industry is in adjustment mode to such initiatives, which almost without exception impose stricter limits than were previously in place. Formaldehyde regulations in the major markets are discussed below.

Europe

Most EU countries have passed laws that regulate formaldehyde. Standards such as EN 312, EN 622-5 and EN 300 all require that a level of 0.1 mg/m^3/h is met. The testing procedure is the Perforator Test Method (found in EN 120) and gas analysis (found in EN 717-1). In 2004, EN 13986 established the E1 and E2 emission classes for use in construction. These standards require testing to be done on formaldehyde-containing wood products used in construction. In 2006, these same methods and the associated limits became effective for panel production. The limits are:

- Uncoated particleboard/oriented strandboard (OSB)/medium density fibreboard (MDF) = less than 8 mg/100 g dry board (~0.10 ppm).
- Uncoated hardwood plywood/solid wood panels/laminated veneer lumber (LVL) = less than 0.13 mg/m^3/h (~0.14 ppm).
- Coated particleboard, OSB, MDF, etc = less than 0.13 mg/m^3/h (~0.14 ppm).

The latest development in the industry is the demand for 'zero' formaldehyde emissions (E0), which are defined as emissions of 0.5 mg/litre or less.

United States

Hardwood and decorative plywood and wall panels in the United States must meet established formaldehyde chamber concentration requirements when tested in accordance with the *Standard test method for determining formaldehyde levels from wood products under defined test conditions using a large chamber, ASTM E 1333-96 or latest edition*.

To comply with the formaldehyde emission requirements of this standard, plywood must be certified by an independent, accredited certification organization that has been approved and issued a current accreditation by a signatory to the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement for ISO 65 product certification. Approval by a governmental organization with wood-product formaldehyde emission standards, which otherwise meet all the requirements, would qualify as the independent, accredited certification organization mentioned in this standard (ANSI/HPVA 2009b).

All hardwood and decorative plywood represented as conforming to the formaldehyde emission requirements of this standard shall be identified by product manufacturer, mill identification, date of production and/or lot number, and product category. Labels may be stamped on the product or attached or affixed as a unit label, and a written statement containing the necessary information is to be included with the shipment and/or the accompanying invoice.

The California Air Resources Board (CARB) has established a new emissions standard on formaldehyde at the state level (Table 4). The CARB standard will affect hardwood plywood and other wood-based panels, as well as products such as window frames, doors, furniture and flooring made of those panels. It will first pertain to the sale and manufacture of such products in the state of California, but, given that the stricter norm-setting in California is often taken as a new industry benchmark in other states, it is also expected that the CARB standard will ultimately set a new, higher norm that affects exporters to the wider United States' market.

The CARB phase 1 standards (in place as of January 2009) can be met without major changes to the resins in use today but, in phase 2 (2010–2012), manufacturers will most likely have to adapt by using modified urea-formaldehyde resin, no-added-formaldehyde resins, or ultra-low-emitting formaldehyde resins.

Table 4 Formaldehyde emission requirements for composite wood products in California

Phase 1	**Emission standard**
By January 2009	Hardwood plywood (veneer core): 0.08 ppm Particleboard: 0.18 ppm MDF: 0.21 ppm
By July 2009	Hardwood plywood (composite core): 0.08 ppm
Phase 2	
By January 2010	Hardwood plywood (veneer core): 0.05 ppm
By January 2011	Particleboard: 0.09 ppm MDF: 0.11 ppm
By January 2012	Hardwood plywood (composite core): 0.05 ppm

Moreover, downstream industries such as furniture manufacturing may be keen to expand the new standard nationally to avoid conflicting standards and the resultant commercial confusion. The American Home Furnishing Alliance, for example, has

suggested to the national Environmental Protection Agency a national extension of a CARB-level standard. Downstream industries tend to prefer regulating the emissions of intermediate products (raw panels) instead of extending controls to final products (Wood-based Panels International 2009).

According to ANSI/HPVA (2009a), engineered wood flooring made from hardwood plywood, veneer or composite core panels must meet the formaldehyde chamber concentration requirements set out in Table 5 when tested in accordance with the *Standard test method for determining formaldehyde levels from wood products under defined test conditions using a large chamber, ASTM E 1333-96 or latest edition*.

Japan

With progress in regulatory reform, including the incorporation of performance-based requirements in regulations, an increasing number of voluntary Japan Industrial Standard (JIS) standards are being adopted as technical regulatory standards.

Japan has its own rating system under JIS/JAS for formaldehyde emissions by adhesives used in wood products. These are set forth by the JIS and JAS departments and apply to formaldehyde-emitting building materials, including composite wood products such as plywood, LVL, engineered hardwood flooring, bamboo floors and laminate flooring.

The JIS/JAS emissions standards have four levels, sometimes expressed as F* [i.e. 'F 1-star'], F** [i.e. 'F 2-star'], F*** [i.e. 'F 3-star'], and F**** [i.e. 'F 4-star']. Because the emissions standards are measured in mg/m^{2}h for adhesives it is difficult to compare ratings with those given by the CARB phase 1 and phase 2 standards and the European E1 and E2 formaldehyde emission standards, which are measured in ppm. The following provides information on the level of safety associated with each of the JIS/JAS formaldehyde emissions ratings:

- F* – adhesives with this emission level have a formaldehyde emissions rate greater than 0.12 mg/m^{2}h. This is considered high and products with this rating are not permitted to be used in Japan. Engineered hardwood, bamboo and laminate floors with an F* rating are known as Type 1 formaldehyde-emitting building materials.
- F** – this rating is for products with adhesives with a formaldehyde emissions rate in the range 0.02–0.12 mg/m^{2}h. Products with this rating are known as Type 2 formaldehyde-emitting building materials and their use is restricted to specified areas.
- F*** – under this rating, formaldehyde emissions are in the range 0.005–0.02 mg/m^{2}h. Materials with this rating are called Type 3 formaldehyde-emitting building materials and have limited approved uses.
- F**** – any adhesive with this mark can claim a formaldehyde emission rate of less than 0.005 mg/m^{2}h. These adhesives are approved for use in Japan without restriction.

Japan's regulations are considered the most stringent in the world, while the CARB phase 2 standard is stricter than Europe's E1 and E0 standards.

Table 5 Formaldehyde emission requirements for engineered wood flooring in the United States

Formaldehyde emission classification	**Loading ratio**		**Maximum chamber concentration[a]**	
	m^2/m^3	ft^2/ft^3	mg/m^3	ppm
Level 1[b]	0.043	0.13	0.10	0.08
Level 2	0.043	0.13	0.06	0.05
Level 2 ULEF exempt	0.043	0.13	0.05/0.06	0.04/0.05
Level 2 NAUF exempt	0.043	0.13	0.05/0.06	0.04/0.05
Level 2 NAF exempt	0.043	0.13	0.05/0.06	0.04/0.05

a Emissions are based on standardizing observed formaldehyde concentrations in the ASTM E1333 large chamber to a temperature of 25 oC (77 oF) and a relative humidity of 50%.

b This formaldehyde emission classification shall expire after 31 December 2009.

Note: ULEF= ultra-low-emitting formaldehyde resin; NAUF = no-added-urea formaldehyde; NAF= no added formaldehyde.

Source: ANSI/HPVA (2009a).

Regulation on solid wood packaging material in the EU

International standards for phytosanitary measures (ISPMs) are prepared by the secretariat of the International Plant Protection Convention (IPPC) as part of the Food and Agriculture Organization of the United Nations (FAO) global program of policy and technical assistance in plant quarantine. The IPPC is an international treaty on plant health, to which approximately 124 governments currently adhere. Its purpose is to secure common and effective action to prevent the introduction and spread of pests of plants and plant products, and to promote appropriate measures for their control (International Trade Centre 2004, IPPC 2009).

The ISPM 15 standard for regulating wood packaging in international trade[3] describes phytosanitary measures to reduce the risk of introducing and/or spreading quarantine pests associated with wood-packaging material made of coniferous and non-coniferous raw wood used in international trade. The standard was adopted in March 2002 by the Interim Commission on Phytosanitary Measures, which directs the objectives of the IPPC, but its implementation was suspended until mid-2003 as a result of issues concerning the legal protection of the associated wood-packaging mark. It is expected that IPSM 15 will be adopted in most parts of the world's timber economy and is already in place in many countries.

The two approved treatments are heat treatment and methyl bromide gas fumigation. Normally the wood packaging should also be debarked. In heat treatment (which differs from kiln drying), a minimum wood core temperature of 56 °C must be maintained for at least 30 minutes. The standard also prescribes requirements for methyl bromide fumigation (International Trade Centre 2004).

IPSM 15 applies to sawnwood packaging material such as pallets, crates, drums, cases, load boards, pallet collars and skids. It does not apply to packaging made entirely of plywood, particleboard or OSB, the manufacturing processes for which involve glue, heat and pressure and are deemed to have eliminated pests.

A key provision of the standard is the use of an approved mark for the certification of the treatment measures. The wood product is marked with the IPSM logo, together with a country code, treatment code and a unique identifying code (by which the product can be traced back to the supplier). This third-party scheme applies only to the sterility of the wood; it does not apply to the product's other technical qualities or its fitness for purpose. The EU began enforcing ISPM 15 on 1 March 2005. The EU deferred, for a year, its debarking and bark-free specifications and began enforcing those in March 2006.

3 The full ISPM 15 standard can be downloaded at www.ippc.int.

China's new timber standards relevant to tropical logs

China is a major buyer of unprocessed logs in many ITTO producer countries. English translations of the following Chinese timber standards were produced for this report, where 'GB' denotes national standards and 'LY' denotes forestry industry standards:

- GB/T 155-2006 *Defects in logs*
- LY/T 1680-2006 *Code for wood integrated utilization*
- GB/T 15779-2006 *Logs of peeled veneer*
- GB/T 15106-2006 *Logs of sliced veneer*
- GB/T 4812-2006 *Logs of super grade*
- GB/T 15787-2006 *Terms in log inspection.*

The English translations of these standards are presented in Annex 2.

Tropical logs (mahogany, bubinga) are mentioned in the sliced veneer log standard. The standards also reflect an apparent need to introduce smaller-diameter classes and lesser-known species to adapt to the declining availability of large-sized logs.

Since China joined the WTO, its national standards have been developed to better accord with international standards, especially those of ISO. All of China's mandatory standards concerning trade have been notified and have largely been recognized by the international standards community.

If an international standard is considered to be suitable for China, efforts will be made at the national level to adopt it, thereby ensuring that, ultimately, the international standard is entrenched in China's technical regulations. About 40% of China's standards have been developed on the basis of international standards.

Development of environmental standards: forest certification

Forest Stewardship Council

The following review of the Forest Stewardship Council (FSC) is limited to developments directly related to forest management. It does not consider, for example, changes in chain-of-custody standards (project certification standard), the policy of association or the FSC/Fairtrade pilot on dual certification, all of which might have an influence on the demand for certified forest products and therefore on the certification of forest management. In recent years the following developments have taken place:

- FSC compliance with the ISEAL Code of Practice for developing social and environmental standards (2006).
- Approval of a new version of the FSC controlled-wood standard for forest management enterprises (2006).
- The completion of the technical phase of the FSC plantation policy review (2007). The recommendations of this process are reflected in the draft of a revised set of principles and criteria (P&C), which are currently the subject of public consultation. The policy phase of the FSC plantation policy review is ongoing and depends on progress being made in the P&C review.
- A group certification standard was approved in 2010, which allows a group of forest owners to join together under a single FSC certificate and to share the costs of certification. One of the main objectives of this approach is to take into account the potential cumulative impacts of the certification of small areas of forest on the ecosystem and surrounding landscape.
- In 2009 the FSC approved a set of accreditation standards to raise the quality of the FSC certification process. The aim of these standards is to ensure greater consistency in performance between the certification bodies that provide FSC certification services. Addressing concerns expressed by the FSC membership and also ISO requirements, the accreditation standards offers a more logical system for certification bodies, with more stringent requirements for each auditor, stricter auditing for larger operations, and a reduced timeframe in which certification bodies may resolve stakeholder complaints.
- A dispute resolution system was developed to facilitate the consistent and timely evaluation of appeals against decisions and complaints about performance or any other issue within the FSC scheme. Designed in a modular way, the system enables stakeholders to express concerns about the operation of the FSC system and to seek the best way to resolve disputes. The FSC has also developed supporting documents that outline basic principles for managing disputes in a transparent and consistent manner.[4] A 'dispute resolution centre' has been created to enable stakeholders to submit and track complaints and appeals online.
- In 2009 the FSC published a literature review of independent research and a compilation of findings on the outcomes and impacts of FSC certification in and beyond the forest.[5]

Ongoing and planned activities include the following (Marion Karmann, FSC International Center GmbH, personal communication, 2010):

- **Review of the P&C.** Given that the forest sector has changed considerably in almost all countries in the 15 years since the first approval of the P&C, a major review is necessary. Version 5-0 Draft 2-0 of the P&C, which is substantially different in content from the current version, Version 4-0, is under public consultation. The first phase of the consultation process is close to being concluded. Pending ultimate approval by the FSC General Assembly, the following significant changes seem likely:
  - One of the major changes in the current draft is the legality verification approach in Principle 1, which can be used as a stand-alone principle, for example in the modular approach or adopted by other schemes.
  - One of the recommendations of the plantation policy review group has been taken up. The existing 'Plantation Principle 10' is in the draft P&C, incorporated into the other nine principles and/or as a new 'Principle 10 on Management Activities'.

4 Available at www.fsc.org/dispute-resolution.
5 Available at http://www.fsc.org/fscpublications.htm.

  - Other likely changes are related to areas for the conversion of land use, the use of pesticides, and the need to evaluate social impacts and the existence of provisions in management plans to prevent, mitigate and compensate negative impacts on social and/or environmental values (externalities).

- **The potential development of a standard for the certification of forest management service providers/loggers.** The FSC is considering permitting the transfer of the obligation of implementing forest certification requirements from the owner of small forest properties to certified forest service enterprises. By using a certified forest service enterprise, a forest owner will be assured that the service enterprises comply with all relevant certification requirements.
- **A draft standard for a modular/stepwise approach issued for consultation in February 2010.** The concept of modular verification is essentially that 'full' certification is broken into a number of modules or steps to be achieved in a sequence over time. Operations receive credit for achieving earlier steps but full credit only when they are compliant with the complete set of P&C. The modular approach (as well as group certification) is designed to make certification more accessible to smallholders.
- **The work of the FSC's Forest Carbon Working Group.** This working group was formed in 2009 to explore the roles that FSC governance, policy and forest certification can play in frameworks and projects to mitigate climate change.[6]
- **A project to develop a concept for the certification of forest contractors and small forest operations in four European countries.** This project aims to develop simplified forest management standards for smallholders and forest contractors, including specific indicators that clarify responsibilities between forest owners and forest contractors to facilitate forest management certification.

6 The Forest Carbon Working Group submitted its final report with recommendations for a strategic framework for an FSC climate-change engagement to the *FSC Board of Directors* in March 2011 (FSC 2011).

Programme for the Endorsement of Forest Certification Schemes

The Programme for the Endorsement of Forest Certification Schemes (PEFC) Council launched a comprehensive review of its entire technical documentation in 2008 with the aim of revising all its standards and guidelines to incorporate current and emerging issues on sustainable forest management and forest certification and to streamline procedures. Table 6 shows the PEFC's schedule for the review. In 2008, the PEFC revised its logo usage rules and updated its international chain-of-custody requirements.

Table 6 PEFC's schedule for the completion of documentation review

Document	Title	Timetable
Annex 1	Terms and definitions	2010
Annex 2	Rules for standard-setting	2009–2010
Annex 3	Basis for certification schemes and their implementation	2009–2010
Annex 4	Chain of custody of forest-based products – requirements	2008–2009
Annex 5	PEFC logo usage rules	2007–2008
Annex 6	Certification and accreditation procedures	2010
Annex 7	Endorsement and mutual recognition of national schemes and their revision	2010

The progress made can be summarized as follows (Sarah Price, PEFC Council, personal communication, 2010):

- **Revision of standard-setting rules and certification schemes and their implementation.** A multi-stakeholder working group has been established to lead the revision process. The group will work to draft revised standards and hold public consultations to August 2010, with approval expected during the 2010 General Assembly. Annex 2 (as listed on Table 7) defines the rules for national forest certification schemes for standard-setting and scheme development, including the development of criteria for sustainable forest management and chain-of-custody certification. The review process will specify minimum requirements for standard-setting and scheme development, further outline procedures, and provide guidance for stakeholder participation and consensus-building. Annex 3 defines the sustainability benchmarks that schemes must

meet to be considered for PEFC endorsement, the rules for implementation at the national level for regional, group and individual certification, and dispute settlement procedures. For Annex 3, the process will review the PEFC's framework and coverage for sustainability benchmarks and also consider issues such as those related to genetically modified organisms, conversion, protected areas and other areas of significance, and social criteria such as free, prior and informed consent.

- **New PEFC logo usage rules.** The credibility of the PEFC logo and label and their proper use is essential for the PEFC's success, and the revision of the PEFC logo usage rules (PEFC ST 2001: 2008) further clarified licensing requirements and optimised administrative processes. Other modifications, based on the results of global stakeholder consultations, concern the better adaptability of rules to market circumstances, and improved marketing and communication.
- **Chain of custody.** The PEFC's chain of custody acts as an audit trail from certified forests to the end-user and assures that no illegal timber enters the supply chain. The PEFC completed the first phase of the *Chain of custody of forest based products – requirements (Annex 5)* revision in 2008. Stakeholder consultations focused on improving the application of the 'volume credit method', a system to account for certified timber within the chain of custody, with the proposed changes adopted in November 2008. The PEFC is now in the final stages of a second phase of the revision, which has looked at all requirements in detail and involved wide consultation with businesses, certification bodies, non-governmental organizations and other interested parties. The final revised chain-of-custody standard was expected to be approved at the 2010 General Assembly.
- **Formalization of role of panel of experts.** The PEFC has strengthened the transparency and robustness of its system with the document *Involvement of the panel of experts in the endorsement of national forest certification schemes.* This provides procedures governing the appointment and work of a panel of experts to verify the quality of the independent evaluations of national certification schemes via a peer-review system. This additional safeguard, unique to the world of forest certification, has been mandatory since October 2006.
- **Certificate database and transparency.** The PEFC's certificate database offers up-to-date information on all PEFC certificate-holders in sustainable-forest-management and chain-of-custody certification. This important service to the supply chain, customers and the marketplace is part of the PEFC's commitment to transparency: in addition to valid certificates, it also informs users about suspended, withdrawn, expired or other non-PEFC-recognised certificates.
- **International stakeholder membership.** To benefit more from the knowledge and experience of its stakeholders, during the 2009 General Assembly the PEFC revised its statutes to enable international stakeholders to become members of the PEFC Council. International stakeholder membership enables closer collaboration with and the engagement of international organizations, businesses and associations and provides an opportunity for participants to engage actively in shaping the future of forest certification. The PEFC also regularly convenes stakeholder dialogues, which are open to any interested party. The next such dialogue, in Geneva on 26 May 2010, will offer an opportunity to review and discuss the PEFC's current revised draft standard. Some of the critical issues to be discussed include:
  - ensuring balanced stakeholder participation in developing national standards
  - ensuring the recognition of Indigenous peoples' rights related to forest resources
  - ensuring basic labour, health and safety standards in forest operations
  - how to stop forest conversion and the best approach to limiting the use of herbicides.

4 REVIEW OF STANDARDS IN THE FURNITURE SECTOR

Manufacturer's choice to adopt standards and quality controls

Furniture-making comprises a number of processing stages, each of which influences the assembly, composition and quality of the finished product. Quality assurance is needed at each processing stage to ensure that the quality and value of the final product are maximized. Quality deviations can be caused by:

- defective raw material (e.g. natural/handling/drying defects)
- inadequate machines and tools (e.g. poor surface quality or dimensional accuracy)
- poor technical design (e.g. joints, stability)
- a lack of or delay in machine maintenance/re-setting
- an inappropriate operating environment (e.g. unstable working conditions, poor finishing)
- human error/management flaws.

Quality control objectives should be set to ensure that:

- design standards are maintained
- customer specifications are met
- discrepancies along the processing chain are observed and corrected
- wearing processing machines/tools are checked and replaced where necessary
- The effectiveness of process department/personnel is measured
- defective products are spotted, withdrawn and corrected
- a customer-friendly replacement policy is in place.

Product safety standards

Product safety controls affect the production of wood furniture in both the intake of raw materials and the testing of the properties of finished products. Adherence to EU product legislation on environmental and consumer health and safety issues is compulsory for all producers, as demanded by Directive 2001/95 for general product safety. Products put on the market by manufacturers and distributors must always comply with these general safety requirements. In addition, manufacturers must provide consumers with information with which they can assess a product's inherent threat, particularly when this is not obvious. This information can be provided either by labelling or by providing clear user instructions. For all items of furniture, safety is an important requirement and legislation is in force at both the EU and national levels to ensure that no unsafe products are offered for sale to consumers.

In EU countries, legislation exists on controlling formaldehyde-containing wood-based panels such as fibreboard, which are common in domestic furniture. There is legislation on the use of arsenic in solid-wood preservatives. In addition, in July 2003 the European Commission adopted stricter legislation (Directive 2001/90/EC) prohibiting the sale of wood treated with creosote oil (bensapyrene) and the use of this preservative. The reason for implementing the stricter legislation is creosote's potential to cause cancer.

Some EU countries have stricter legislation governing the use of pentachlorophenol (PCP) than exists at the EU level. PCP is used in many different industries, including the furniture-manufacturing sector, as an antibacterial agent. Other potentially problematic substances include volatile organic compounds, certain azo-based or heavy-metal-based colouring agents and wood preservatives, some flame-retardants (pentaBDE and octaBDE) and polyvinyl chloride (PVC). Legislation on ozone-depleting substances such as foaming agents is also relevant to furniture (Centre for the Promotion of Imports from Developing Countries 2005).

There may be genuine reasons for a consumer country to be concerned about the safety of furniture exported from a producer country; for example, the structural design could be defective or the product may not use approved fire-retardant material. The stringent rules imposed by the State of California on the flammability of upholstered furniture and mattresses recently caused debate at the international level. There has also been controversy over shipments to Europe of Chinese

upholstered furniture considered hazardous to human health because they contained harmful chemicals in their fabrics and caused allergic reactions on exposure to human skin.

In the EU, the exporter (or his representative in the EU) may be held liable for damage caused to persons or property by a product that turns out to be less safe than expected (EU Product Liability Directive 85/374/EEC). When a relationship between a lack of product safety and the cause of an injury can be proved, the supplier may be required to pay compensation for the suffering incurred. As the EU importer will be regarded as the supplier, he may choose to cover his exposure to any of the above-mentioned risks by requiring a clause on liabilities in contracts with exporters (Centre for the Promotion of Imports from Developing Countries 2005).

It is also possible that protectionist interests in importing countries may insist on the establishment of unrealistically stringent standards, which might have the effect of obstructing trade. This could be done quite easily, for example, for components of furniture and ready-to-assemble parts. It may be argued, for example, that polishes on furniture emit certain hazardous substances or that the wood used has been treated with a chemical (e.g. for protection against termites) that is harmful to human, animal or plant life. In such cases, emerging-country exporters may be well advised to plead that arbitrary standards have been imposed that create unnecessary hurdles to trade and therefore constitute a violation of the TBT.

Accessing higher-quality markets requires effort. A key challenge for wood furniture manufacturers is to conform to a prescribed standard consistently and at a competitive cost. Nevertheless, there are benefits to rising to such a challenge. Ultimately, quality control and the adoption of standards will help to reduce costs by reducing production downtime and the wastage of raw materials. Customer satisfaction will improve, too, as product quality improves.

Furniture product standards

CEN/TC 207 is in charge of standardization in furniture manufacture in the EU. The following working groups (WGs) deal with various types of furniture and aspects of standardization (Centre for the Promotion of Imports from Developing Countries 2005):

- CEN/TC 207/SC 3 *Office furniture*
- CEN/TC 207/SC 3/WG 1 *Seats*
- CEN/TC 207/SC 3/WG 2 *Tables and storage*
- CEN/TC 207/SC 3/WG 3 *Screens*
- CEN/TC 207/WG 1 *Domestic furniture*
- CEN/TC 207/WG 2 *Kitchen and bathroom furniture*
- CEN/TC 207/WG 4 *Outdoor furniture*
- CEN/TC 207/WG 5 *Contract and educational furniture*
- CEN/TC 207/WG 7 *Surfaces and surface finishes of furniture*
- CEN/TC 207/WG 8 *Hardware for furniture.*

The principal furniture standards relate to, for example:

- assessment of the ignitability of upholstered furniture
- stability of seating
- coordinating sizes for kitchen furniture
- safety requirements and testing of foldaway beds, and bunk beds
- safety requirements of domestic cribs and cradles, cots and high chairs
- strength, durability and safety of tables
- safety and test requirements of beds, mattresses and storage furniture
- mechanical and structural safety requirements of seating and tables
- durability of mechanisms for convertible sofa beds.

Nineteen new standards are pending approval or are under development and are due to be published in the period 2009–2012 (Annex 3).

The CEN standards on furniture are not meant to serve protectionist aims. On the contrary, they are proposed as a basis for wider international work on furniture standards under ISO TC 136 (on furniture). All the CEN standards are voluntary and, since there will be no harmonized product standard for furniture, furniture will not carry the

CE mark (ITTO & International Trade Centre 2004).

The ISO standards do not describe particular measures of quality or environmental impact (e.g. emissions standards). Rather, they are oriented towards management systems and aim to secure sufficient documentation to permit ex-post verification of the appropriateness of management actions.

Comparison of furniture standards in EU countries

Product quality standards that would rank products based on their appearance, stability, materials or other properties are not applied in the furniture sector. International and national furniture standards concentrate on measurable safety and health-related aspects, test methods, dimensional coordination, and terminology. Table 7 shows the existence of furniture-related standards in ISO, CEN and the German Institute for Standardization (DIN), and Table 8 provides a list of ISO furniture-related standards.

The ISO and EN international standards are used in many countries. The German DIN standard is given as an example of a national European standard that coexists with ISO and EN. DIN standards are often used as benchmark standards if no comparative international standard exists. Eventually, all EN standards will be implemented as national standards by DIN and other CEN member organizations. At the international level, harmonization is implemented by the ISO.

Table 7 Existing furniture standards, by organization

Standard indicators	ISO	CEN	DIN
Safety requirements and test methods			
Beds and mattresses		●	●
Built-in and free-standing kitchen cabinets and worktops		●	●
Bunk beds and high beds for non-domestic use		●	●
Bunk beds for domestic use	●	●	●
Chairs and tables for educational institutions		●	●
Children's cots and folding cots for domestic use	●	●	●
Children's high chairs for domestic use	●	●	●
Cribs and cradles for domestic use		●	●
Domestic storage furniture		●	●
Foldaway beds	●	●	●
Office furniture, screens		●	●
Office storage furniture		●	●
Office work chair		●	●
Seating		●	●
Seating and tables for camping, domestic and contract use		●	●
Tables		●	●
Work tables and desks		●	●
Assessment of the ignitability of upholstered furniture			
Ignition source: smouldering cigarette	●	●	●
Ignition source: match-flame equivalent	●	●	●
Determination of strength, durability and/or stability			
Seating (upright, with tilting or reclining mechanisms, and/or rocking chairs)	●	●	●
Tables	●	●	●
Work tables and desks		●	●
Storage furniture	●	●	●
Bunk beds and high beds for non-domestic use		●	●
Ranked seating		●	●
Test for surface finishes			
Assessment of resistance to dry heat	●	●	●
Assessment of resistance to fat on surfaces with scratches			
Assessment of resistance to impact	●		
Assessment of resistance to wet heat	●	●	●
Assessment of surface resistance to cold liquids	●	●	●
Assessment of the light resistance of the surface		●	
Assessment of the surface gloss		●	●
Assessment of the surface resistance to abrasion		●	
Assessment of the surface resistance to scratching		●	

Standard indicators	ISO	CEN	DIN
Behaviour at abrasion			●
Behaviour at chemical influence			●
Behaviour at glowing cigarette			●
Behaviour at scratches			●
Behaviour on subjection to wet heat			●
Behaviour on subjection to dry heat			●
Measurement of the surface reflectance		●	●
Dimensions			
Chairs and tables for educational institutions	●	●	●
Fixed desks and chairs for lecture rooms			
Kitchen furniture and kitchen appliances		●	●
Kitchen sinks, connecting dimensions		●	
Office furniture, screens		●	●
Office storage furniture		●	
Office work chair		●	●
Work tables and desks		●	●
Terminology			
Storage units, terminology			

Source: ITTO & International Trade Centre (2004).

Table 8 ISO furniture standards

Reference number	Document title
ISO 4211:1979	Furniture – Assessment of surface resistance to cold liquids
ISO 4211-2:1993	Furniture – Tests for surfaces – Part 2: Assessment of resistance to wet heat
ISO 4211-3:1993	Furniture – Tests for surface finishes – Part 3: Assessment of resistance to dry heat
ISO 4211-4:1988	Furniture – Tests for surfaces – Part 4: Assessment of resistance to impact
ISO 5970:1979	Furniture – Chairs and tables for educational institutions – Functional sizes
ISO 7170:1993	Furniture – Storage units – Determination of strength and durability
ISO 7171:1988	Furniture – Storage units – Determination of stability
ISO 7172:1988	Furniture – Tables – Determination of stability
ISO 7173:1989	Furniture – Chairs and stools – Determination of strength and durability
ISO 7174-1:1988	Furniture – Chairs – Determination of stability – Part 1: Upright chairs and stools
ISO 7174-2:1992	Furniture – Chairs – Determination of stability – Part 2: Chairs with tilting or reclining mechanisms when fully reclined, and rocking chairs
ISO 7175-1:1997	Children's cots and folding cots for domestic use – Part 1: Safety requirements
ISO 7175-2:1997	Children's cots and folding cots for domestic use – Part 2: Test methods
ISO 7617-1:2001	Plastics-coated fabrics for upholstery – Part 1: Specification for PVC-coated knitted fabrics
ISO 7617-2:1994	Plastics-coated fabrics for upholstery – Part 2: Specification for PVC-coated woven fabrics
ISO 7617-3:1988	Plastics-coated fabrics for upholstery – Part 3: Specification for polyurethane-coated woven fabrics
ISO 8191-1:1987	Furniture – Assessment of the ignitability of upholstered furniture – Part 1: Ignition source: smouldering cigarette
ISO 8191-2:1988	Furniture – Assessment of ignitability of upholstered furniture – Part 2: Ignition source: match-flame equivalent
ISO 9098-1:1994	Bunk beds for domestic use – Safety requirements and tests – Part 1: Safety requirements
ISO 9098-2:1994	Bunk beds for domestic use – Safety requirements and tests – Part 2: Test methods
ISO 9221-1:1992	Furniture – Children's high chairs – Part 1: Safety requirements
ISO 9221-2:1992	Furniture – Children's high chairs – Part 2: Test methods
ISO 10131-1:1997	Foldaway beds – Safety requirements and tests – Part 1: Safety requirements
ISO 10131-2:1997	Foldaway beds – Safety requirements and tests – Part 2: Test methods

Source: ITTO & International Trade Centre (2004).

5 FACILITATION OF INFORMATION EXCHANGE ON TECHNICAL AND ENVIRONMENTAL STANDARDS

It is widely acknowledged that, with a few exceptions, the participation of tropical developing countries is inadequate in the development and implementation of standards. ITTO is not alone in its desire to facilitate information exchange on technical and environmental standards relating to tropical timber products. ISO, for example, is striving to facilitate information exchange and capacity building in developing countries through its Committee on Developing Country Matters (DEVCO).

ISO (2005) identified the following multiple benefits to developing countries of standardization:

- increasing their participation in standardization and conformity assessment
- enabling technology transfer
- adaptation of products to global markets
- greater competitiveness, growing market share and better prices
- improving resistance against low-quality imports
- facilitating the development of infrastructure, networks and investment.

In practical terms, achieving such benefits will require action that can be assisted by ITTO. Potential actions include:

- Supporting ITTO member countries to update membership status (e.g. from a corresponding to a full member).
- Providing access to generic ISO information resources and electronic service portals made available by ISO.
- Encouraging participation in technical work, for example by assisting representatives of ITTO producer member countries to attend technical committee and expert meetings.
- Providing direct training opportunities (e.g. workshops, seminars, e-learning and sponsorship) and associated educational materials.
- Fostering regional partnerships with donors and international organizations and twining between developing-country and developed-country member bodies.
- Enhancing national infrastructure and human-resource capacity for conformity assessment and mutual recognition of their results.
- Embedding quality management thinking into the business communities of relevant ITTO member countries.

As recent experiences show, technical standards and trade regulations, where they exist, can be fundamentally incompatible between even neighbouring countries. Often, they pose real non-tariff barriers or impediments on trade. The Accra Work Plan, an output of the International Conference on Promotion of Intra-African Trade in Timber and Timber Products (convened in Accra, Ghana, on 30 June–2 July 2009) states that the harmonization of trade names, grading rules, standards and measurement formulae for African timbers is necessary for the expansion of intra-regional trade on the continent.

The nature of standards is that they are exact and must be fully captured to allow an understanding of the requirements of and preparation for conformity. It is therefore recommended that electronic formats and platforms for exchanging standards related to tropical timbers become the norm.

Suitable expert groups can be identified to facilitate such endeavours. For example, the Trade Standards Practitioners Network (TSPN) is a wide-ranging 'network of networks' comprising organizations such as FAO, the EU, the InterAmerican Development Bank, the World Bank Group, national-level institutions and the private sector. It helps developing countries to address the trade and development challenges and opportunities presented by emerging social, environmental and safety standards. Forest product standards are part of its agenda, but for the time being the TSPN's work is focused on the dissemination of forest certification standards. Members are:

- Involved in pertinent standard-setting and/or standards-related capacity strengthening.

- Involved in multi-country settings and/or activities.
- Able and willing to contribute to attaining TSPN objectives through institutional knowledge and implementation experiences.
- Have their own networks and contacts that can be useful in the gathering and dissemination of information.

The TSPN holds annual meetings for associate, affiliate and individual members and other invited guests. It would be possible to arrange ITTO's participation if this is deemed productive. As for ISO and other international standardization bodies, ITTO may apply for a liaison membership of the technical committee.

6 CONCLUSIONS

Today's complex global trade in wood products and furniture would hardly have been possible without the internationally agreed trade regulatory system provided by the WTO agreements and standards for *willing* users. While standards are usually voluntary, they have greatly lowered the risk of disputes over product quality, dimensions, performance and safety.

Adherence to agreed specifications for products, services and test methods underpins international commerce. In wood products trade, standards have ensured the worldwide interchangeability of components and parts. They have also established a common terminology and provide a basis for the achievement, assessment and demonstration of quality. This has enabled even the most complex wood-based value chains to develop across borders and continents.

Wood product categories show varying levels of adherence to national and international standards; normally the relevance of standards grows along with the degree of processing. In lower-value-added primary products, the main purpose of standards is to help buyer and seller agree on the physical dimensions, volumes, grades and ultimately prices of wood products. Wood measurement and calculation formulae are commonly applied according to a standardized system. The use of standards is voluntary in most cases, and a lack of standards is not usually an obstacle to trade between willing buyers and sellers. Exceptions are the strict rules on legality and certification that apply in some market segments; in those cases, standards facilitate mostly business-to-business transactions. Another rationale for standards in primary products or semi-manufactured goods is to minimize the spread of pests and diseases.

In the higher categories of processed wood products for sale to consumers the role of standards becomes more oriented towards fitness-for-purpose and consumer safety. This is where good practices in manufacturing, the testing of strength, resistance and durability, and issues related to flammability and toxic emissions of substances like formaldehyde come into play. Standardized manufacturing and testing methods are designed to ensure that products can be tested according to a set of criteria that is internationally agreed and fair to all producers who adhere to them.

The challenge for manufacturers is to translate their customers' needs into precise product specifications and to manufacture those products consistently and cost-effectively according to the prescribed standards accepted in trade. Deviations from accurate processing can occur at any stage of processing. An efficient quality-control system can minimize the accumulation of errors that could result to a finished product violating a standard's requirements.

Standards can also enhance industrial efficiency and competitiveness. Quality control in the manufacturing process and the adoption of product standards will help to reduce costs by reducing wastage and production downtime. The objective of standardizing product quality and safety is to ensure that all wood products and furniture available on the market are safe to use and of solid and strong construction. Therefore, standardization as such can hardly be considered harmful to manufacturers, including those in developing countries. On the contrary, voluntary product standards can enable the efficient exchange of information between importer and supplier. The supplier benefits from working with a stable set of requirements rather than having to deal with non-specific and constantly changing requirements.

Manufacturers normally use standards voluntarily in their product development, process control and marketing. Having a common language for product test methods, product dimensions, safety and strength characteristics is usually considered more important than specifying explicit criteria for how a wood product should look or feel. Thus, while product quality and safety can be verified through standards and communicated to buyers through labels, the product's visual appeal and comfort in use are ultimately for the manufacturers to decide.

Many developing countries do not have national sets of standards because the enabling conditions for their development have not been present. Standards have often been accorded low priority in national development agendas. Governments may instead resort to a loose reference to international standards.

This is why ISO and other international or regional standards are important to developing countries. Additionally, new voluntary standards developed in the major markets may stem some product flows from developing countries.

In markets where developing countries export their wood manufactures, nationally or regionally applied standards may appear as obstacles to trade. When product standards, building codes and similar regulations are decided nationally, they influence the use of tropical timber for various end-uses in the consuming markets. They often fail to consider the specific characteristics and applications of tropical timber and may indirectly have a negative impact on market access. In practical terms, it is difficult to serve more than one market from the same exporting mill – preferences and regulations may differ, for example, between the Japanese, United States' and EU markets.

To alleviate intentional and unintentional friction in the application of standards, the ISO, CEN, ATIBT and others are increasingly striving to harmonize the product specifications and standards of major markets.

7 RECOMMENDATIONS FOR FUTURE ACTION

Recommendations for the ITTO Secretariat

1. Support practical measures to better comply with standards and regulations affecting tropical timber trade, and facilitate access to training events on standardization.

2a. Analyse the conformity and market access problems posed to tropical timber products by nationally-set building codes, procurement rules and the lack of harmonization in major importing markets.

2b. Assess the immediate potential for removing barriers to regional trade of tropical timber products caused by incompatible procedures and a lack of standardization between countries, especially in Africa.

2c. Support producer member countries to participate in direct training opportunities (e.g. workshops, seminars and e-learning) and to acquire associated educational materials in capacity-building events organized by standardization organizations.

2d. Encourage twinning approaches in which producer and consumer countries share a common interest in improving the application of standards in their bilateral trade.

3. Provide a platform for knowledge exchange on standards issues.

4a. Establish links between the ITTO website and the most relevant standardization bodies.

4b. Engage in networking with existing standards practitioners' groups.

4c. Collect a virtual library on the most pertinent standards affecting tropical timber products, on the basis of the information sources provided in this report.

4d. Invite members of international and national standards bodies to ITTO meetings to raise awareness of their work plans and future directions.

Recommendations for governments in ITTO producer member countries

5. Encourage the development of public–private partnerships in ITTO producer member countries to effectively respond to trade-related standards.

6. Hold expert meetings for wood-industry managers and policymakers to signify the importance of entrenching 'a standards culture' in the private sector, and develop enabling policies to support it.

7. Undertake joint efforts in the regional harmonization of product and trade-related standards to alleviate unnecessary impediments to trade.

8a. Collaborate in the regional harmonization of trade names, grading rules, standards and measurement formulae for African timbers (in line with the Accra Action Plan), in collaboration with industry and trade associations (e.g. ATIBT and the InterAfrican Forest Industries Association).

8b. Launch similar initiatives where needed in Latin America and Asia in support of regional free-trade agreements (e.g. on harmonizing grading rules and the classification of teak between important producer countries).

9. Follow up on the further evolution of major forest certification schemes, the modification of their standards, and in particular the inclusion of aspects related to forest carbon.

10. Engage in stakeholder consultations and working groups considering the role of forest certification in policy frameworks and projects to mitigate climate change (with the FSC and the PEFC).

11. Improve the institutional and technical infrastructure for progressing standardization and conformity assessment.

12. Support training and capacity-building to better integrate standardization into economic and industrial development plans.

Recommendations for industry and trade associations in ITTO producer member countries

13. Adopt the following measures to lower the barriers to standardization at the industry level:

13a. Apply twinning approaches along the value chain to pass on knowledge and experiences on standards, and to cumulatively increase the level of standardization from logs to value-added wood products.

13b. Disseminate ITTO's networking contacts with standards bodies, technical working groups and standards practitioners' groups widely among members.

13c. Provide training courses on standards issues and help build absorptive capacities among managers.

13d. Encourage managers to capture the benefits of standards through quality control, production planning, sales and marketing (i.e. to take a 'standards culture' to the factory floor).

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ANNEX 1: EUROPEAN STANDARDS FOR ROUNDWOOD, SAWN TIMBER AND TIMBER STRUCTURES

Standard reference	Title
ENV 1250-2:1994	Wood preservatives – Methods for measuring losses of active ingredients and other preservative ingredients from treated timber – Part 2: Laboratory method for obtaining samples for analysis to measure losses by leaching into water or synthetic sea water
ENV 1250-1:1994	Wood preservatives – Methods for measuring losses of active ingredients and other preservative ingredients from treated timber – Part 1: Laboratory method for obtaining samples for analysis to measure losses by evaporation to air
EN 1014-1:1995	Wood preservatives – Creosote and creosoted timber – Methods of sampling and analysis – Part 1: Procedure for sampling creosote
EN 1014-2:1995	Wood preservatives – Creosote and creosoted timber – Methods of sampling and analysis – Part 2: Procedure for obtaining a sample of creosote from creosoted timber for subsequent analysis
EN 1014-3:1997	Wood preservatives – Creosote and creosoted timber – Methods of sampling and analysis – Part 3: Determination of the benzo(a)pyrene content of creosote
EN 1014-4:1995	Wood preservatives – Creosote and creosoted timber – Methods of sampling and analysis – Part 4: Determination of the water-extractable phenols content of creosote
EN 212:2003	Wood preservatives – General guidance on sampling and preparation for analysis of wood preservatives and treated timber
CEN/TS 15082:2005	Wood preservatives – Determination of the preventive effectiveness against sapstain fungi and mould fungi on freshly sawn timber – Field test
CEN/TR 14734:2004	Durability of wood and wood-based products – Determination of treatability of timber species to be impregnated with wood preservatives – Laboratory method
EN 13377:2002	Prefabricated timber formwork beams – Requirements, classification and assessment

Standard reference	Title
EN 1194:1999	Timber structures – Glued laminated timber – Strength classes and determination of characteristic values
EN 392:1995	Glued laminated timber – Shear test of glue lines
EN 390:1994	Glued laminated timber – Sizes – Permissible deviations
EN 594:1995	Timber structures – Test methods – Racking strength and stiffness of timber frame wall panels
EN 595:1995	Timber structures – Test methods – Test of trusses for the determination of strength and deformation behaviour
EN 380:1993	Timber structures – Test methods – General principles for static load testing
EN 1195:1997	Timber structures – Test methods – Performance of structural floor decking
EN 1075:1999	Timber structures – Test methods – Joints made with punched metal plate fasteners
EN 912:1999	Timber fasteners – Specifications for connectors for timber
EN 13271:2001	Timber fasteners – Characteristic load-carrying capacities and slip-moduli for connector joints
CEN/TC 124 – Timber structures	
EN 1381:1999	Timber structures – Test methods – Load-bearing stapled joints
EN 1382:1999	Timber structures – Test methods – Withdrawal capacity of timber fasteners
EN 1383:1999	Timber structures – Test methods – Pull-through resistance of timber fasteners
EN 596:1995	Timber structures – Test methods – Soft body impact test of timber framed walls
EN 12509:2001	Timber poles for overhead lines – Test methods – Determination of modulus of elasticity, bending strength, density and moisture content
EN 12512:2001	Timber structures – Test methods – Cyclic testing of joints made with mechanical fasteners
EN 338:2003	Structural timber – Strength classes
EN 384:2004	Structural timber – Determination of characteristic values of mechanical properties and density

Standard reference	Title
EN 385:2001	Finger-jointed structural timber – Performance requirements and minimum production requirements
EN 386:2001	Glued laminated timber – Performance requirements and minimum production requirements
EN 387:2001	Glued laminated timber – Large finger joints – Performance requirements and minimum production requirements
EN 14251:2003	Structural round timber – Test methods
EN 14250:2004	Timber structures – Product requirements for prefabricated structural members assembled with punched metal plate fasteners
EN 14080:2005	Timber structures – Glued laminated timber – Requirements
EN 408:2003	Timber structures – Structural timber and glued laminated timber – Determination of some physical and mechanical properties
EN 336:2003	Structural timber – Sizes, permitted deviations
EN 391:2001	Glued laminated timber – Delamination test of glue lines
EN 14081-1:2005	Timber structures – Strength-graded structural timber with rectangular cross section – Part 1: General requirements
EN 14081-2:2005	Timber structures – Strength-graded structural timber with rectangular cross section – Part 2: Machine grading; additional requirements for initial type testing
EN 14081-3:2005	Timber structures – Strength-graded structural timber with rectangular cross section – Part 3: Machine grading; additional requirements for factory production control
CEN/TC 124 – Timber structures	
EN 14374:2004	Timber structures – Structural laminated veneer lumber – Requirements
EN 14358:2006	Timber structures – Calculation of characteristic 5-percentile values and acceptance criteria for a sample
EN 789:2004	Timber structures – Test methods – Determination of mechanical properties of wood based panels
EN 15228:2009	Structural timber – Structural timber preservative treated against biological attack
EN 12512:2001/ A1:2005	Timber structures – Test methods – Cyclic testing of joints made with mechanical fasteners
EN 14545:2008	Timber structures – Connectors – Requirements
EN 14592:2008	Timber structures – Dowel-type fasteners – Requirements

Standard reference	Title
EN 383:2007	Timber structures – Test methods – Determination of embedment strength and foundation values for dowel type fasteners
EN 409:2009	Timber structures – Test methods – Determination of the yield moment of dowel type fasteners
EN 1380:2009	Timber structures – Test methods – Load bearing nails, screws, dowels and bolts
EN 14081-4:2009	Timber structures – Strength graded structural timber with rectangular cross section – Part 4: Machine grading – Grading machine settings for machine controlled systems
EN 1912:2004+A3:2009	Structural timber – Strength classes – Assignment of visual grades and species
EN 28970:1991	Timber structures – Testing of joints made with mechanical fasteners – Requirements for wood density (ISO 8970:1989)
EN 26891:1991	Timber structures – Joints made with mechanical fasteners – General principles for the determination of strength and deformation characteristics (ISO 6891:1983)
EN 912:1999/ AC:2000	Timber fasteners – Specifications for connectors for timber
EN 13271:2001/ AC:2003	Timber fasteners – Characteristic load-carrying capacities and slip-moduli for connector joints
ENV 13381-7:2002	Test methods for determining the contribution to the fire resistance of structural members – Part 7: Applied protection to timber members
CEN/TC 175 – Round and sawn timber	
EN 844-1:1995	Round and sawn timber – Terminology – Part 1: General terms common to round timber and sawn timber
EN 844-2:1997	Round and sawn timber – Terminology – Part 2: General terms relating to round timber
EN 844-3:1995	Round and sawn timber – Terminology – Part 3: General terms relating to sawn timber
CEN/TC 175 – Round and sawn timber	
EN 844-4:1997	Round and sawn timber – Terminology – Part 4: Terms relating to moisture content
EN 844-5:1997	Round and sawn timber – Terminology – Part 5: Terms relating to dimensions of round timber
EN 844-6:1997	Round and sawn timber – Terminology – Part 6: Terms relating to dimensions of sawn timber
EN 844-7:1997	Round and sawn timber – Terminology – Part 7: Terms relating to anatomical structure of timber

Standard reference	Title
EN 844-8:1997	Round and sawn timber – Terminology – Part 8: Terms relating to features of round timber
EN 844-9:1997	Round and sawn timber – Terminology – Part 9: Terms relating to features of sawn timber
EN 844-10:1998	Round and sawn timber – Terminology – Part 10: Terms relating to stain and fungal attack
EN 844-11:1998	Round and sawn timber – Terminology – Part 11: Terms relating to degrade by insects
EN 1309-1:1997	Round and sawn timber – Method of measurement of dimensions – Part 1: Sawn timber
EN 1310:1997	Round and sawn timber – Method of measurement of features
EN 1311:1997	Round and sawn timber – Method of measurement of biological degrade
EN 1438:1998	Symbols for timber and wood-based products
EN 1611-1:1999	Sawn timber – Appearance grading of softwoods – Part 1: European spruces, firs, pines and Douglas firs
EN 1312:1997	Round and sawn timber – Determination of the batch volume of sawn timber
EN 1313-1:1997	Round and sawn timber – Permitted deviations and preferred sizes – Part 1: Softwood sawn timber
EN 14220:2006	Timber and wood-based materials in external windows, external door leaves and external doorframes – Requirements and specifications
EN 14221:2006	Timber and wood-based materials in internal windows, internal door leaves and internal doorframes – Requirements and specifications
EN 1315-1:1997	Dimensional classification – Part 1: Hardwood round timber
EN 1316-1:1997	Hardwood round timber – Qualitative classification – Part 1: Oak and beech
EN 975-2:2004	Sawn timber – Appearance grading of hardwoods – Part 2: Poplars
CEN/TC 175 – Round and sawn timber	
EN 1313-2:1998	Round and sawn timber – Permitted deviations and preferred sizes – Part 2: Hardwood sawn timber
EN 13307-1:2006	Timber blanks and semi-finished profiles for non-structural uses – Part 1: Requirements
EN 12248:1999	Sawn timber used in industrial packaging – Permitted deviations and preferential sizes
EN 12249:1999	Sawn timber used in pallets – Permitted deviations and guidelines for dimensions
EN 1315-2:1997	Dimensional classification – Part 2: Softwood round timber

Standard reference	Title
EN 1316-2:1997	Hardwood round timber – Qualitative classification – Part 2: Poplar
EN 1316-3:1997	Hardwood round timber – Qualitative classification – Part 3: Ash and maples and sycamore
EN 844-12:2000	Round and sawn timber – Terminology – Part 12: Additional terms and general index
EN 13556:2003	Round and sawn timber – Nomenclature of timbers used in Europe
EN 13183-1:2002	Moisture content of a piece of sawn timber – Part 1: Determination by oven-dry method
EN 13183-2:2002	Moisture content of a piece of sawn timber – Part 2: Estimation by electrical resistance method
EN 12246:1999	Quality classification of timber used in pallets and packaging
ENV 14464:2002	Sawn timber – Method for assessment of case-hardening
EN 14298:2004	Sawn timber – Assessment of drying quality
EN 1313-1:1997/ A1:1999	Round and sawn timber – Permitted deviations and preferred sizes – Part 1: Softwood sawn timber
EN 14076:2004	Timber stairs – Terminology
EN 1611-1:1999/ A1:2002	Sawn timber – Appearance grading of softwoods – Part 1: European spruces, firs, pines, Douglas fir and larches
EN 13183-3:2005	Moisture content of a piece of sawn timber – Part 3: Estimation by capacitance method
EN 1309-2:2006	Round and sawn timber – Method of measurement of dimensions – Part 2: Round timber – Requirements for measurement and volume calculation rules
EN 975-1:2009	Sawn timber – Appearance grading of hardwoods – Part 1: Oak and beech
CEN/TC 175 – Round and sawn timber	
CEN/TS 12169:2008	Criteria for the assessment of conformity of a lot of sawn timber
EN 942:2007	Timber in joinery – General requirements
EN 1927-1:2008	Qualitative classification of softwood round timber – Part 1: Spruces and firs
EN 1927-2:2008	Qualitative classification of softwood round timber – Part 2: Pines
EN 1927-3:2008	Qualitative classification of softwood round timber – Part 3: Larches and Douglas fir
CEN/TS 15679:2007	Thermal modified timber – Definitions and characteristics
CEN/TS 15680:2007	Prefabricated timber stairs – Mechanical test methods
EN 1313-2:1998/ AC:1999	Round and sawn timber – Permitted deviations and preferred sizes – Part 2: Hardwood sawn timber

Standard reference	Title
EN 13183-2:2002/ AC:2003	Moisture content of a piece of sawn timber – Part 2: Estimation by electrical resistance method
EN 13183-1:2002/ AC:2003	Moisture content of a piece of sawn timber – Part 1: Determination by oven-dry method
EN 1927-2:2008/ AC:2009	Qualitative classification of softwood round timber – Part 2: Pines
Eurocode 5 – Timber structures	
EN 1995-1-1:2004	Eurocode 5: Design of timber structures – Part 1-1: General – Common rules and rules for buildings
EN 1995-1-2:2004	Eurocode 5: Design of timber structures – Part 1-2: General – Structural fire design
EN 1995-2:2004	Eurocode 5: Design of timber structures – Part 2: Bridges
EN 1995-1-1:2004/ A1:2008	Eurocode 5: Design of timber structures – Part 1-1: General – Common rules and rules for buildings
EN 1995-1-1:2004/ AC:2006	Eurocode 5: Design of timber structures – Part 1-1: General – Common rules and rules for buildings
EN 1995-1-2:2004/ AC:2009	Eurocode 5: Design of timber structures – Part 1-2: General – Structural fire design

ANNEX 2: SELECTED CHINESE TIMBER STANDARDS

English translations of Chinese timber standards were produced for this report, as follows:

- GB/T 155-2006 *Defects in logs*
- LY/T 1680-2006 *Code for wood integrated utilization*
- GB/T 15779-2006 *Logs of peeled veneer*
- GB/T 15106-2006 *Logs of sliced veneer*
- GB/T 4812-2006 *Logs of super grade*
- GB/T 15787-2006 *Terms in log inspection.*

These are reproduced (unedited) below.

ICS 79.040

B 68

National Standard of the People's Republic of China

GB/T 155—2006

Substitution for GB/T 155—1995

Defects in logs

(ISO4473:1988, Coniferous and broadleaved tree sawlogs ---Visible defects---classification; ISO 4474:1989, Coniferous and broadleaved tree sawlogs ---Visible defects----Terms and definitions; ISO 4475:1989, Coniferous and broadleaved tree sawlogs----Visible defects----Measurement, MOD)

Issued on July.12th., 2006 Implemented on Dec.1st., 2006

Issued by Issued by the

General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China and China National Standardization Administrative Commission

CONTENT

PREFACE

ISO 4473:1988 <Coniferous and broadleaved tree sawlogs-----Visible defects ---Classification> is adopted for the revision of defect classification in this standard, ISO 4474:1989 <Coniferous and broadleaved tree sawlogs---Visible defects----Terms and definitions> is adopted for the revision of terms and definitions of defects in this standard and ISO 4475:1989 <Coniferous and broadleaved tree sawlogs---Visible defects----Inspection> is adopted for the revision of methods for inspection and calculation in this standard.

This standard was drafted again based on ISO 4473:1988, ISO 4474:1989 and ISO 4475:1989, and the table of comparisons between the article numbers of this standard and those in ISO 4473:1988, ISO 4474:1989 and ISO 4475:1989 is given in Annex A.

Some modifications have been made in this standard when adopting ISO 4473:1988, ISO 4474:1989 and ISO 4475:1989 considering the situation in China. Related technical differences have been put in the text and the single vertical lines are drawn at the page blanks of the related articles.

Table of technical differences and causes is given in Annex B for reference.

For convenience of use, the following editorial modifications have also been made for ISO 4473:1988, ISO 4474:1989 and ISO 4475:1989 in this standard:

a) Put the three standards in one standard, substituting for ISO 4473:1988, ISO 4474:1989 and ISO 4475:1989;

b) The prefaces of ISO 4473:1988, ISO 4474:1989 and ISO 4475:1989 have been deleted;

c) The diagrams and calculation formulae of this standard are compiled according to forms of the national standards in China, i.e. the diagram and the formula follow the related article tightly;

d) Chinese phonetic alphabetical index has been added.

This standard substitutes for GB/T 155—1995 <Defects in logs>.

Compared to GB/T 155—1995, the main changes are as follows:

-------The scope has been specified again;

-------The defects have been divided into 6 classes (8 classes in GB/T155-- 1995) in this standard according to ISO 4473:1988, and the sequence has been adjusted;

--------Some terms have been adjusted in this standard. For knot: diffused knot whorl knot group of knots round knot, oval knot have been deleted; For shake: end shake and side shake have been deleted; And pith heartwood, brittle heartwood, resin pocket and cross grain have been deleted for the defects of wood structure, while scar and inbark are listed instead; The chemical stain has been deleted for the defect caused by fungi (stain in GB/T 155—1995) but rot in GB/T 155—1995 is added instead; Resinous wood has been deleted in damage (injure in GB/T 155—1995).

--------For the inspection and calculation formulas: calculation formulas for sap rot heart rot false heartwood heart sapwood mechanical damage have been deleted and those for knob round root swelling veined root swelling and closed inbark have been added;

--------Annex C Effect of defect on material quality in GB/T155:1995 (reference) has been deleted. This standard was put forward by the State Bureau of Forestry. This standard was under the jurisdiction of the National Technical Commission of Wood Standardization. Units for drafting: Heilongjiang Institute of Wood Harvesting, National Technical Commission of Wood Standardization and Forestry Bureau of Lang County in Heilongjiang. Versions substituted by this standard:

-------GB/T155.1~155.3:1984;

-------GB/T4823.1~4823.3:1984;

------- GB/T155:1995.

INTRODUCTION

National standard <Defects in logs> has been implemented for 10 years in China, which plays an important part in log production. It is necessary to modify the original standard so as to fit in with the needs of joining WTO, promote the international trade and exchange, and the national standard of the defects in logs will be in accord with the international standard gradually. Some defects in the original standard have been deleted, thus making the defect category more clearly and benefit to the application of the standard.

Adopting the international standard is one of the important bases for removing technical trade barriers. The international standards shall be used as much as possible in developing the international trade and the national standards conflicting with the international standards shall be abolished as early as possibly. But it is difficult to adopt the international standards completely because of the situation or technical problems in China, which is why this standard adopts the international standard after modification; it will be helpful for the trade and exchange between China and the countries and regions in the world.

The differences between this standard and the corresponding international standard have been marked clearly, which can inform us in time whether there is the necessity for the existence of these differences and will be the references for the modification later.

Defects in logs

1 Scope

This standard specifies the classification, definitions, inspection and calculation methods for the visible defects of coniferous and broadleaved tree sawlogs. This standard applies to coniferous and broadleaved tree logs, the original articles shall be implemented by referring to.

2 Normative references

The following standards contain provisions which, through reference in this part, constitute provisions of this standard. For the dated references, all the revision lists followed (excluding the corrigenda) or the revised editions do not apply to this part. However, the parties to agreements based on this part are encouraged to investigate the possibility of applying the most recent editions of this part. And for the undated references, the most recent editions apply to this part.

GB/T 11917 Terms for sawmilling technology;

GB/T 15787 Terms for log inspection.

3 Terms and definitions

For the purpose of this standard, the following terms and definitions apply.

3.1 Visible defects

All kinds of defects visible to the naked eye on logs which will affect wood quality and the application value or reduce strength and durability.

4 Classification

The visible defects in logs can be divided into 6 classes according to the causes.

The types, categories and details can be seen in Table 1.

Table 1 Classification of defects in logs

Type	Category	Detail	
5.1 Knot	5.1.1 Flush knot 5.1.2 Overgrown protruding knot 5.1.3 Lie knot 5.1.4 Dead knot 5.1.5 Seriously decayed knot	5.1.1.1 Sound knot 5.1.1.2 Rotten knot	
5.2 Shake	5.2.1 End shake 5.2.2 Side shake	5.2.1.1 Heart shake 5.2.1.2 Ring shake 5.2.2.1 Frozen crack and shake caused by lightning 5.2.2.2 Drying shake 5.2.2.3 Shallow shake 5.2.2.4 Deep shake 5.2.2.5 Through shake 5.2.2.6 Popping	5.2.1.1.1 Simple heart shake 5.2.1.1.2 Compound (star) heart shake
5.3 Defect of trunk shape	5.3.1 Curvature 5.3.2 Knob 5.3.3 Root swelling 5.3.4 Ovality 5.3.5 Tapering	5.3.1.1 Simple curvature 5.3.1.2 Compound curvature 5.3.3.1 Round root swelling 5.3.3.2 Veined root swelling	
5.4 Defects of wood structure	5.4.1 Slope of grain 5.4.2 Reaction wood 5.4.3 Double or multiple pith 5.4.4 Removed pith 5.4.5 Scar 5.4.6 Inbark	5.4.2.1Compression wood 5.4.2.2 Tension wood	
5.5 Defects caused by fungi	5.5.1 Fungal heartwood stains and streaks 5.5.2 Fungal sap coloration 5.5.3 Suffocated wood 5.5.4 Rot 5.5.5 Hollow	5.5.2.1 Blue stain 5.5.2.2 Coloured sap stain 5.5.4.1 Sap rot 5.5.4.2 Heartwood rot	
5.6 Damage	5.6.1 Damage caused by insects (insect-holes) 5.6.2 Damage caused by parasitic plants 5.6.3 Bird-holes 5.6.4 Alien inclusion 5.6.5 Char 5.6.6 Mechanical damage	5.6.1.1 Surface insect-hole 5.6.1.2 Shallow insect-hole 5.6.1.3 Deep insect-hole 5.6.6.1 Bark shelling 5.6.6.2 Blaze 5.6.6.3 Incision 5.6.6.4 Saw-cut 5.6.6.5 Off-chip 5.6.6.6 Shear 5.6.6.7 Extraction 5.6.6.8 Deviation of saw kerf 5.6.6.9 Wind-breakage	5.6.1.3.1 Large insects 5.6.1.3.2 Small insects

Annex A

(Informative)

Correspondence table between article numbers in this standard and those in ISO 4473:1988, ISO 4474:1989 and ISO 4475:1989

Article number of this standard	Article number of the corresponding international standard	
4	ISO 4473:1988	2
5.1		Table 1
5.2		Table 2
5.3		Table 3
5.4		Table 4
5.5		Table 5
5.6		Table 6
5.1	ISO 4474:1989	1
5.1.1		1.1
5.1.1.1		1.1.1
5.1.1.2		1.1.3
5.1.2		1.2
5.2		2
5.2.1		2.1
5.2.1.1		2.1.1
5.2.1.1.1		2.1.1.1
5.2.1.1.2		2.1.1.2
5.2.1.2		2.1.2
5.2.2		2.2
5.2.2.1		2.2.1
5.2.2.2		2.2.2
5.2.2.3		2.2.3
5.2.2.4		2.2.4
5.2.2.5		2.2.5
5.3	ISO 4474:1989	3
5.3.1		3.1
5.3.1.1		3.1.1
5.3.1.2		3.1.2
5.3.2		3.2
5.3.3		3.3
5.3.3.1		3.3.1
5.3.3.2		3.3.2
5.3.4		3.4
5.3.5		3.5
5.4		4
5.4.1		4.1
5.4.2		4.2
5.4.3		4.3
5.4.4		4.4
5.4.5		4.5
5.4.6		4.6
5.4.6.1		4.6.2
5.4.6.2		4.6.1
5.4.7		4.7
5.4.8		4.8
5.4.9		4.9
5.5		5
5.5.1		5.1
5.5.2		5.2
5.5.2.1		5.2.1
5.5.2.2		5.2.2
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Annex B

(Informative)

Technical differences and the causes between this standard and ISO 4473:1988, ISO 4474:1989 and ISO 4475:1989

Article number of this standard	Technical difference	Cause
5.1.3	'Live knot' is added	A need in production
5.1.4	'Dead knot' is added	A need in production
5.1.5	'Seriously decayed knot' is added	Because of the greater affect on the material quality, fitting in with the needs of practical production in China
5.2.2.6	'Popping' is added	Appearing frequently in production, with significant effect on the material quality
5.4.2.1	'Compression wood' is added	'Reaction wood' for coniferous tree
5.4.2.2	'Tension wood' is added	'Tension wood' for broadleaved tree
5.4.5	Figure 11 is the scar diagram of the National Standard here as the figure in the international standard is not clear	Easy to identify
5.6.6.8	'Deviation of saw kerf' is added	As it will affect the log quality due to deviation during manufacture
5.6.6.9	'Wind-breakage' is added.	Benefit for inspection
6.1.3 6.1.4 6.1.5	Inspections of 'live knot, dead knot and seriously decayed knot' are added	Fitting in with the need of production
6.2.2	Calculation formulas are added	Fitting in with the need of production
6.3.5	The inspection formula for tapering is added	Fitting in with the need of production
6.4.1	Slope of grain inspection without stripping is deleted.	Not fitting in with the need of production in China
6.4.1	Calculation formula for inspection of stripping slope of grain is added	Easy for inspection
6.4.2	Inspection for reaction wood is added	Easy for inspection
6.4.5	Inspection formula for scar is added	Easy for use
6.4.6.1	Inspection for closed inbark is added	Easy for inspection
6.4.7	Inspection for cancer is added	Easy for use
6.6.5.5	Inspection for deviation of saw kerf is added	Added in classification and terms separately
6.6.5.6	Inspection for wind-breakage is added	Added in classification and terms separately

ICS 65. 020.99

B 04

Forestry Industry Standard of the People's Republic of China

LY/T 1680 2006

Code for wood integrated utilization

Issued on 2006-08-31 **Effected on** 2006-12-01

Issued by State Forestry Administration

Contents

Foreword

This standard is proposed by the State Forestry Administration. This standard is under the jurisdiction of National Technical Committee 41 on Timber of the Standardization Administration of China.

The organization in charge of drafting this standard is the National Forestry Industry Management Office, Research Institute of Wood Industry, Chinese Academy of Forestry. The organizations assisting in the drafting of this standard are the Northeast Forestry University, the Beijing Forestry University, Northwest A&F University, South China Agricultural University, Hainan Normal University and Shengda Forestry Industry (Group) Co., Ltd etc. **This standard is issued for the first time.**

Code for wood integrated utilization

1 Scope

This standard provides the principle and technical measures for deforestation, log storage, lumbering, wood drying, wood protection, man-made board, wood flooring, wood pulping, wood residues utilizing, and provides the principle for waste wood recycling.

This standard applies to the design department, production department and department for project approval related to timber production, processing and utilizing.

2 Normative references

The following referenced documents contain provisions which, through reference in this standard, constitute provisions of this standard. For dated references, subsequent amendments to (not including corrigendum), or revision of any of

these publications do not apply to this standard. However, parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest editions of the referenced documents are applied to this part.

GB/T 143 *Ripping logs*

GB 3095 *Ambient air quality standard*

GB 3096 *Environmental quality standards for noise*

GB 3544 *Discharge standard of water pollutants for pulp and paper industry*

GB 3838 *Environmental quality standards for surface water*

GB /T 4897 *Particleboard*

GB /T 5849 *Blockboard*

GB /T 6491 *Drying quality of sawn timber*

GB /T 9846.2 *Plywood-Part2: Tolerances on dimensions*

GB /T 9846.3 *Plywood-Part 3: General specification for plywood for general use*

GB /T 9846.4 *Plywood-Part4: Specification for classification by appearance of plywood for general use*

GB /T 9846.5 *Plywood-Part 5: Inspection codes of plywood for general use*

GB /T 9846.6 *Plywood-Part 6: Marking, tag, packaging of plywood for general use*

GB 10956 *Woodworking band saw and carriage accuracy*

GB /T 11716 *Logs of small diameter*

GB /T 11717 *Pulp logs*

GB /T 11718 *Medium density fibreboard*

GB /T 12626 (all part) *Hard fibreboard*

GB 12801 *General principles for the requirements of safety and health in production process*

GB /T 13010 *Sliced veneer*

GB /T 13123 *Bamboo-mat plywood*

GB /T 15036.1 *Solid wood flooring-Technical condition*

GB /T 15102 *Surface decorated wood-based panels with paper impregnated thermosetting resins*

GB /T 15104 *Decorative veneered wood-based panel*

GB /T 15106 *Log of sliced veneer*

GB /T 15779 *Log of peeled veneer*

GB /T 17656 *Plywood for concrete form*

GB /T 18102 *Laminate flooring*

GB /T 18103 *Parquet*

GB 18580 *Indoor decorating and refurbishing materials-Limit of formaldehyde emission of wood-based panels and finishing products*

GB 18584 *Indoor decorating and refurbishing materials--Limit of harmful substances of wood based furniture*

GB /T 18959 *Specification of wood protection in storage*

GB 50222 *Code for fire prevention in design of interior decoration of buildings*

LY /T 1055 *Plybamboo for bottom boards of trucks and buses*

LY /T 1068 *Technology rules for kiln-drying sawn timber*

LY /T 1069 *Technology rules for air-drying sawn timber*

LY /T 1203 *Corrugated wood fibre hardboard*

LY /T 1205 *Thin type hardboard*

LY /T 1580 *Oriented strandboard*

LY /T 1599 *Rotary cut veneer*

LY /T 1611 *Fibreboard for flooring*

LY /T 1635 *Wood preservatives*

LY /T 1636 *Use category and specification for preservative-treated wood*

LY /T 1646-2005 *Code of forest harvesting*

YB /T 5168 *Coal-tar-creosote for the preservation of timber*

ICS 79. 040

B 68

National Standard of the People's Republic of China

GB/T 15779:2006ºSupersede GB/T 15779:1995

Log of peeled veneer

Issued on 2006-07-12 Effected on 2006-12-01

Issued by

General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China
Standardization Administration of the Peoples Republic of China

GB/T 15779:2006

Foreword

This standard is the recension on GB/T 15779:1995 *Logs of sliced veneer*.

Comparing with GB/T 15779:1995, this standard is amended mainly in following points:

— The diameter class is revised from which equal to and over 26 cm in original standard to become which equal to and over 20 cm;

— The wood quality index limits of heartwood rot and splinter pulling are revised;

— The requirements for limits of ring shake and burst check are added in;

— The requirement of that the knot section does not allow to have rot is added in.

This standard will supersede the standard GB/T 15779 1995 from the effected date. This standard is proposed by the State Forestry Administration, P.R.China. This standard is under the jurisdiction of National Technical Committee 41 on Timber of the Standardization Administration of China. The organization in charge of drafting for this standard is the Forestry Industry Institute of Heilongjiang Province. The National Technical Committee 41 on Timber of the Standardization Administration of China is in charge of the interpretation for this standard. The issuance conditions of the various revisions of the standard superseded by this standard in the past are as follows: GB/T 15779 1995.

Logs of peeled veneer

1 Scope

This standard provided the species, size requirements, wood quality indexes and wood volume calculation for logs of peeled veneer.

This standard applies to logs of peeled veneer used to make the plywood.

2 Normative references

The following referenced documents contain provisions which through reference in this text, constitute provisions of this standard. For dated references, subsequent amendments to (not including corrigendum), or revision of any of these publications do not apply to this standard. However, parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest editions of the referenced documents are applied to this standard.

GB/T 144:2003 *Log inspection* (ISO 4475:1989, MOD)

GB 4814:1984 *Table of log wood volume*

GB/T 17659.1 *Sampling and judging methods for lot inspection of logs and sawn timbers*: Part 1:Sampling and judging methods for lot inspection of logs

LY/T 1511:2002 *Mark imprint for log products*

3 Requirements

3.1 Species

3.1.1 Coniferous wood

Including Masson pine, Spruce, *Pinus yunnanensis*, Mongolian scots pine, Dahurian larch etc.

3.1.2 Broadleaved wood

Including basswood, Manchurian ash, mountain jujube, birch wood, *Liquidambar formosana*, aspen wood, maple, samak, *Alniphyllum fortunei*, etc.

3.2 Size requirements

3.2.1 Length class: 2 m, 2.6 m, 4 m, 5.2 m, 6 m.

Wood length tolerance: permissible deviations are +6 cm, -2 cm.

3.2.2 Diameter class: which with the diameter ≥ 20 cm, take 2 cm as an increasing unit.

3.3 Wood quality indexes

See Table 1.

4 Sampling method, inspection method, wood volume calculation and product marking

4.1 Sampling and determination method

Sampling and determination should be implemented in accordance with the provisions of GB/T 17659.1.

4.2 Inspection method

The size measurement method and quality appraising should be implemented in accordance with the provisions of GB/T 144-2003.

4.3 Wood volume calculation

Wood volume calculation should be implemented in accordance with the provisions of GB/T 4814:1984.

4.4 Product marking

Product marking should be implemented in accordance with the provisions of LY/T 1511:2002.

Table 1 Wood quality indexes

Defect designation	Permissible limit	
	Coniferous wood	Broadleaved wood
Unsound knot, dead knot	Knot diameter must not exceed 30% of diameter class	
	Not allowed to have rot on the knot section	
	Within a range of random 1 m of wood length, the knot number must not exceed	
	8	4
Seriously decayed knot	Not allowed all length inside	
Sap rot	Not allowed all length inside	
Heartwood rot, splinter pulling	The rot diameter and splinter pulling diameter must not exceed 20% of the diameter class	
Burrow (worm grub)	Within a range of random 1 m of wood length, the worm grub number must not exceed	
	10	5
Split crack, exposed bark pocket	The lengths of split crack and exposed bark pocket should not exceed 30% of the length class	
Curving	Maximum arch height of the curving should not exceed 2% of the incurvation plane length	
Partial dry rot, surface harm	The depth should be less than 20% of the diameter class	
Double branch log, rupture	Not allowed all length inside	
Ring shake, burst check	Within a square of 25 cm^2 on same and one section, the number of ring shake and burst check should not exceed 3	
	The radius of ring shake and the arch height of burst check must not exceed 10% of diameter class	

Note 1: If necessary, the other species, wood quality and size may be determined by agreement between both supplier and buyer.
Note 2: Defects not listed in this table would not be counted.

ICS 79. 040

B 68

National Standard of the People's Republic of China

GB/T 15106:2006

Supersede GB/T 15106:1994

Logs of sliced veneer

Issued on 2006-07-12 **Effected on 2006-12-01**

Issued by

General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China
Standardization Administration of the Peoples Republic of China

Foreword

This standard is the recension on GB/T 15106:1994 *Log of sliced veneer*.

Comparing with GB/T 15106:1994, this standard is amended mainly on following points:

— The wood quality indexes on dead knot, unsound knot, split crack, exposed bark pocket and surface harm (partial dry rot) etc are revised.

— The wood measurement and calculation method for the wood quality defects of heartwood rot and curving are revised.

— The new content of items of rotten knot, cross crack, butt swelling, burl (tree-lump) and foreign material etc are added in.

— The diameter class is revised from which equal to and over 26 cm in original standard to become which equal to and over 20 cm.

— The designations of partial applicable species are specified.

This standard will supersede the standard GB/T 15106:1994 from the effected date. This standard is proposed by the State Forestry Administration of P.R. China. This standard is under the jurisdiction of National Technical Committee 41 on Timber of the Standardization Administration of China. The organization in charge of drafting this standard is the Forestry Industry Institute of Heilongjiang Province. The National Technical Committee 41 on Timber of the Standardization Administration of China is in charge of the interpretation for this standard. The issuance conditions of the various revisions of the standard superseded by this standard in the past are as follows: GB/T 15106:1994.

Log of sliced veneer

1 Scope

This standard provided the applicable species, size requirements, wood-quality indexes, wood measurement method and wood volume calculation for logs of sliced veneer.

This standard applies to logs of sliced veneer used as the surface of decorative material.

2 Normative references

The following referenced documents contain provisions which through reference in this text, constitute provisions of this standard. For dated references, subsequent amendments to (not including corrigendum), or revision of any of these publications do not apply to this standard. However, parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest editions of the referenced documents are applied to this standard.

GB/T 144:2003 *Log inspection* (ISO 4475:1989, MOD)

GB 4814:1984 *Table of log wood volume*

GB/T 17659.1 *Sampling and judging methods for lot inspection of logs and sawn timbers: Part 1:Sampling and judging methods for lot inspection of logs*

LY/T 1511:2002 *Mark imprint for log products*

3 Requirements

3.1 Applicable species

3.1.1 Broadleaved wood

Including Manchurian ash, oak wood, walnut wood, birch wood, basswood, elm wood, Phellodendron, berangan, beech, common sassafras, *Castanopsis sclerophylla*, fortunes paulownia, samak, cinnamon wood, *Phoebe nanmu*, machilus, Schneider's zelkova, teak wood, Proteaceae, *Liquidambar formosana*, mahogany wood, *Juglans nigra*, bubinga, etc.

3.1.2 Coniferous wood

Including cork wood (Korean pine), Dahurian larch, *Dacrydium pierrei* Hickel, spruce, fir, yew and *Fokienia hodginsii* (Dunn) Henry et Thomas, etc.

3.2 Size requirements

3.2.1 Length class: 2 m, 2.6 m, 4 m, 5.2 m, 6 m.

Wood length tolerance: permissible deviations are +6 cm, -2 cm.

3.2.2 Diameter class: which with the diameter ≥ 20 cm, take 2 cm as an increasing unit, when actual size increasing is less than 2 cm, then increasing the part more than 1 cm, but the part less than 1 cm is rounded.

3.3 Wood-quality indexes

3.3.1 Wood-quality indexes should conform to the provision of Table 1.

3.3.2 The defects which are not involved by the provisions on the wood-quality indexes in this standard will not be reckoned in.

Note 1: If necessary, other species may be determined by agreement between both supplier and buyer.

Note 2: If other length classes are needed, they may be determined by agreement between both supplier and buyer.

Table 1 Wood-quality indexes and measurement

Defect designation	Permissible limit	
	Broadleaved wood	Coniferous wood
Unsound knot	For knot diameters not exceeding 15% of diameter class, no more than 5 are permitted in the range of 1 m of wood length at discretion	For knot diameters not exceeding 10% of diameter class, the permissible number is unlimited
Dead knot, rotten knot	For knot diameters not exceeding 10% of diameter class, the number permitted in a range of random 1 m of wood length is	
	1	2
Seriously decayed knot	Not allowed all length inside	
Heartwood rot	Where the rot diameter does not exceed the following percentages of diameter class in large end (It is not allowed in small end)	
	5%	2%
Sap rot	Maximum rotten thickness does not exceed 5% of diameter class in large end (it is not allowed in small end)	
Burrow (worm grub)	Not allowed all length inside	
Cross crack, ring shake, burst check	Not allowed	
Split crack	The length should not exceed 10% of the length class	
Curving	Maximum arch height of the curving should not exceed 15% of the diameter class	
Swelling butt	The round butt is allowed, but hollow butt is not allowed	
Burl, tree-lump	Not allowed	
Torsion fibre	The height of the texture declination within the range of 1 m of wood length at small end should not exceed 10% of the diameter class	
Double heart	Not allowed	
Exposed bark pocket	The length should not exceed 10% of the length class	
Partial dry rot, surface harm	The depth should be less than 5% of the diameter class	
Foreign material	Not allowed	
Sunk wood	Not allowed	
Splinter pulling	Should not exceed 4% of the diameter class	

4 Wood measurement method and wood volume calculation

4.1 Wood measurement method: the size measurement method and the measurement method for quality appraising should be implemented in accordance with the provisions of GB/T 144-2003, and the sampling mode should be implemented in accordance with the relevant provisions of GB/T 17659.1.

4.2 Wood volume calculation: should be implemented in accordance with the provisions of GB/T 4814:1984.

4.3 Mark and imprint for log products: mark and imprint for log should be implemented in accordance with the provisions of LY/T 1511:2002.

ICS 79. 040

B 68

National Standard of the People's Republic of China

GB/T 4812:2006

Supersede GB/T 4812:1995

Logs of super grade

Issued on 2006-07-12 **Effected on 2006-12-01**

Issued by

General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China
Standardization Administration of the Peoples Republic of China

Foreword

This standard is the recension on GB/T 4812:1995 *Logs of super grade*.

The recension of this standard refered to ISO 4475:1989 Coniferous and broadleaved tree sawlogs – Visible defects – Measurement, foreign advanced standard, 22298:1985 Exported coniferous tree sawlogs and 2140:1990 Wood defect classification, nomenclature and definition and measuring method. The recension is performed mainly on the species, size and wood-quality indexes, and the main revised contents are as follows:

— Species – revised from the original 12 species to 27 species.

— Length class – revised from original 4 m~6 m to become 2 m~6 m for broadleaved wood, and revised from original 4 m~8 m to become 4 m~6 m for coniferous wood.

— Diameter class – revised from original 26 cm and above for coniferous wood (20 cm and above for cypress and fir) and 26 cm and above for broadleaved wood to become 24 cm and above for both coniferous wood and broadleaved wood, while there is no change for cypress and fir.

— Unsound knot and dead knot – revised from original content, which allowed four knots for coniferous wood and two knots for broadleaved wood all length inside when the diameter of the knot is not larger than 15% of the diameter class, to the new standard where two knots for coniferous wood and one knot for broadleaved wood are allowed within a range of random 1 m of wood length when the diameter of the knot is not larger than 15% of the diameter class.

— Heartwood rot – revised into the proportion of the rot diameter to the diameter class.

— Crack – the limits of ring shake and burst check on cross-section are added in, so that two cracks (without limit for starting point of the check) are allowed within a square of 25 cm^2.

— Splits – revised so that the splits shedding thickness at large end and small end should not exceed 5% of the diameter in same direction.

— Double heart – revised from original content, where it was not allowed on the cross-section of small end, to the new standard where it is not allowed on the entire length inside.

— The items of tree-lump, sap rot, exposed bark pocket, ring shake, burst check, splinter pulling, etc, are added in, and they become properly stricter.

— For defects at the large end, considering they may be cut off in course of process and will not effect use, therefore they are properly relaxed.

This standard will supersede the standard GB/T 4812:1995 from the effected date. This standard is proposed by the State Forestry Administration, P.R. China. This standard is under the jurisdiction of National Technical Committee 41 on Timber of the Standardization Administration of China. The organization in charge of drafting this standard is the Forestry General Administration of Heilongjiang Province. The organizations joining in the drafting of this standard are the Forestry Bureau of Xinglong, the Forestry Bureau of Dailing and the Timberyard of Weihe Forestry Bureau. The National Technical Committee 41 on Timber of the Standardization Administration of China is in charge of the interpretation of this standard. The issuance conditions of the various revisions of the standard superseded by this standard in the past are as follows: GB/T 4812:1984, GB/T 4812:1995.

Logs of super grade

1 Scope

This standard provides the applicable species, size requirements, wood-quality indexes, inspection and wood volume calculation for logs of super grade.

This standard applies to high-quality logs used for advanced building, finishing, cultural relic decoration, furniture, musical instruments and various specific purposes.

2 Normative references

The following referenced documents contain provisions which through reference in this text, constitute provisions of this standard. For dated references, subsequent amendments to (not including corrigendum), or revision of any of these publications do not apply to this standard. However, parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest editions of the referenced documents are applied to this standard.

GB/T 144:2003 *Log inspection* (ISO 4475:1989, MOD)

GB 4814:1984 *Table of log wood volume*

GB/T 17659.1 *Sampling and judging methods for lot inspection of logs and sawn timbers: Part 1:Sampling and judging methods for lot inspection of logs*

LY/T 1511:2002 *Mark imprint for log products*

3 Technical requirements

3.1 Species

Korean pine, spruce, sand-pine, *Pinus* var. mongolica, Armand pine, cypress, fir, Dahurian larch, masson pine, Manchurian ash, Manchurian walnut, common sassafras, sassafras, *Toona sinensis*, *Phoebe nanmu*, Schneider's zelkova, maple, Holm oak, oak wood, beech, samak, *Castanopsis hystrix*, elm wood, basswood, *Betula costata*, Chinese cherry, white birch, etc.

3.2 Dimensions

3.2.1 See Table 1

Table 1 Dimensions

Species	Length class (m)	Diameter class (cm)
Coniferous wood	4–6	≥ 24 (≥ 20 for cypress and fir)
Broad leaved wood	2–6	≥ 24

3.2.2 For the length class, take 0.2 m as an increasing unit, and the wood length tolerance should be 6 cm.

3.2.2 For the diameter class, take 2 cm as an increasing unit.

3.3 Wood quality indexes

Wood quality indexes see Table 2.

Table 2 Wood quality indexes and measurement

Defect designation	Permissible limit	
	Coniferous wood	Broad leaved wood
Unsound knot, dead knot	For which the knot diameter does not exceed 15% of diameter class, within a range of random 1 m of wood length, its number is allowed to be	
	2	1
Tree-lump (enclosed knot)	For which the height projected out of the log surface does not exceed 30 mm all length inside, it is allowed to be with 1 knot	
Heartwood rot	Rot diameter should not exceed 10% of diameter class in large end (It is not allowed in small end)	
Sap rot	Within a range of 1 m from the large end face, the sop rot thickness should not exceed 5% of diameter class, the arc length of sop rot should not exceed 1/4 of the section circumference, and the sop rot is not allowed in other location	
Crack	The length of split crack should not exceed 15% (for fir wood) and 10% (for other woods) of the length class It is not allowed for the cracks through the cross-section The arch height of the section burst check or the radius of the ring shake should not exceed 20% of the diameter class It is allowed there are 2 fissures of ring shake and burst check on cross section within a square of 25 cm2 (without limit for starting point of the fissure).	
Split crack	The splits shedding thickness at large end and small end should not exceed 5% of the diameter in same direction.	
Curving	The ratio of arch height to the horizontal length of the curving within that segment should not exceed:	
	1	1.5
Torsion fibre	The height of the texture declination within the range of 1 m of wood length at small end should not exceed 10% of the diameter class	
Wandering heart	The distance between section center and wandering heart at small end should not exceed 10% of the diameter class	
Surface harm	The radial depth should not exceed 10% of the diameter class	
Exposed bark pocket	Within a range of 1 m from the large end face, the pocket length should not exceed 10% of the length class and the bark pocket is not allowed in other location	
Splinter pulling	It is not allowed in the section at small end The splinter pulling diameter at large end should not exceed 10% of the diameter class	
Burrow (worm grub)	The burrow from 3 mm and above is not allowed all length inside	

Note: Beside the defects listed in this table, the defects such as seriously decayed knot, burl, partial dry rot, wind fall wood and double circula etc are not allowed all length inside, other defects, which are not involved, will not be reckoned in.

4 Inspection, wood volume calculation, sampling determining method

4.1 Size measurement should be implemented in accordance with the provisions of GB/T 144-2003.

4.2 For the quality appraising, except which has been provided by this standard, the other should be implemented in accordance with the provisions of GB/T 144-2003.

4.3 Wood volume calculation should be implemented in accordance with the provisions of GB/T 4814-1984.

4.4 The sampling determining method should be implemented as per the provisions of GB/T 17659.1.

4.5 Mark and imprint for log products should be implemented in accordance with LY/T 1511-2002.

ICS 79. 040

B 68

National Standard of the People's Republic of China

GB/T 15787 2006

Supersede GB/T 15787 1995

Terms in log inspection

Issued on 2006-07-12 **Effected on 2006-12-01**

Issued by

General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China
Standardization Administration of the Peoples Republic of China

Foreword

This standard is the recension on GB/T 15787:1995 *Terms in log inspection*.

Compared with GB/T 15787:1995, this standard is amended mainly on following points:

— The following terms are added in, which have close relations with GB/T 144:2003 *Log inspection*, and tend to arouse controversy in operation of inspection:

  Merchantable timber species, tree root part, gibbous section, axe cut co-boundary, felling cut/undercut, log all length, primary diameter, all length inside, homeo-direction primary diameter, radial measurement, anomalistic fracture plane, vertical check breadth, slit inside, slit outboard, rank lumber, cull lumber, log marking.

— The following terms are added in, which are not provided by the original standard and need to be extended: round wood, stem wood, specification log.

— The following terms, which have no direct relations with GB/T 144:2003 *Log inspection*, their identical significations are already quite clear and belong to basic terms, are deleted: standard size, size class, tolerance, deviation, positive deviation, minus deviation, deduction size, log marking.

— The following terms in the original standard, which are improperly interpreted, or with indeterminate signification, or with inaccurate parlance or varying with the production changing, are amended:

  Log, log inspection, double branch log, double heart log, butt with branch log, split log, merchantable timber species, size measurement, cross-section centre, average diameter, normal position of log, volume, log-quality appraising, log assortment, length class inside, length class outside.

— The term 'length' in original standard is amended to 'log length', and the term 'diameter' in original standard is amended to 'log diameter'.

This standard is proposed by the State Forestry Administration, P.R. of China. This standard is under the jurisdiction of National Technical Committee 41 on Timber of the Standardization Administration of China.

The organization in charge of drafting this standard is the Heilongjiang Vocational Institute of Ecological Engineering. The National Technical Committee 41 on Timber of the Standardization Administration of China is in charge of the interpretation for this standard.

The issuance conditions of the various revisions of the standard superseded by this standard in the past are as follows: GB/T 15787:1995.

Terms in log inspection

1 Scope

This standard provides the terms and definitions used in log inspection. This standard applies to log products and log inspection.

2 Terms and definition

2.1 Round wood

Round timbers, including stem wood and logs.

2.1.1 Stem wood

The felled tree after trimming and without cross-cutting.

2.1.2 Log

Round billet formed via cross-cutting.

2.1.2.1 Specification log

Log with size conforming to the provisions of the log product standard.

2.2 Log inspection

The generic term for works proceeding for species' identification, log-size measurement, quality appraising, wood-assortment dividing, volume computing and log marking.

2.2.1 Double branch log

Log presenting with two furcations (i.e. a fork) and with two stand-alone sections.

2.2.2 Double heart log

Log with two piths, two groups of annual ring system on small-end section, and a collective annual ring encircled by full periphery or a side-loop.

2.2.3 Butt with branch log

Log formed via cross-cutting from the lower part of two furcations of the bole, with two piths, two groups of annual rings on large-end section.

2.2.4 Split log

Log with its section torn into more than two pieces of rupture surface under action of external force, or its partial cleavage blocks are broken off.

2.2.5 Dissected log

The log sawed into two equal parts or two approximate equal parts along the log length and diameter.

2.2.6 Tree root part

Irregular scraggly-butt or gibbous section formed at the large end of log.

2.3 Commercial timber name

The commercial name of the timbers designated based on the principle that the recognition features of the timbers are similar and their wood properties and quality are similar.

2.3.1 Commercial timber species

The species sorted out based on commercial timber name.

2.3.2 Coniferous timber

The timber produced from a coniferous tree – i.e. a gymnosperm, without vessels.

2.3.3 Broadleaved timber

The timber produced from broadleaved tree – i.e. an angiosperm, with vessels, generally.

2.4 Log size measurement

The measurement and determination of length class and diameter class of log.

2.4.1 Log length

The size measured on the shortest location between both end sections of the log.

2.4.2 Log all length

The maximum size measured between both ends of the log.

2.4.3 Length class

The length measured as per the provision of standard and after rounding.

2.4.4 Length tolerance

The allowable dimension variation for log length against the length class.

2.4.5 Cross centre

The log section centre, namely log section centroid, geometric centre.

2.4.6 Log diameter

The size measured through the log section centre.

2.4.7 Short diameter

The shortest diameter through the log section centre.

2.4.8 Long diameter

The diameter through the short diameter centre and perpendicular to it.

2.4.9 Longest diameter

The maximum diameter perpendicular to the short diameter.

2.4.10 Average diameter

The average value of the long diameter and the short diameter or the longest diameter and the short diameter.

2.4.11 Diameter class

The diameter measured as per the provision of the standard and after rounding.

2.4.12 Primary diameter

The diameter before the log section is damaged.

2.4.12.1 Homeo-direction primary diameter

Refer in particular to the primary diameter measured at the small end. which the split log has been broken off, and on the homeo-direction of the measuring orientation for split thickness.

2.4.13 Normal diameter position

The location with minimum diameter of a log where both ends are large and the middle is small.

2.4.14 Felling cut/undercut

The upper and low kerfs remained on the trunk root location when felling.

2.4.15 Axe cut co-boundary

The starting point of axe-cutting at the most inner side on log trunk direction.

2.4.16 Gibbous section

The end part at the log butt similar to conical formed in felling operation.

2.5 Log defect

Various defects presented on log which lower the quality and affect the use of the log.

2.6 Log-quality appraising

The process of performing defect measuring, class appraising and inspection evaluation of a log.

2.6.1 Length class inside

The range of the log body with a limit of the terminated line of length class.

2.6.2 Length class outside

The range of the length from the terminated line of length class to the end face, which falls short of one class.

2.6.3 All length inside

The whole of the log, including the length class inside and length class outside.

2.6.4 Radial measurement

The measurement through the log section centre, and perpendicular to including the axial line of log (the connecting line of the section centres).

2.6.5 Vertical check breadth

The slit size measured on the direction perpendicular to split or tearing direction.

2.6.6 Anomalistic fracture plane

The section with irregular geometric figures such as non-circular or non-elliptic figure.

2.6.7 Slit inside

When a ruler-bar crossly snuggling up to the log surface at the area of the slit, the part located at the inner side within the two snuggling points.

2.6.8 Slit outboard

When a ruler-bar crossly snuggling up to the log surface at the area of the slit, the log surface located at the outer side of the two snuggling points.

2.6.9 Rank lumber

The log with wood quality reached grade 3 and over grade 3 of the grade scale of ripping log.

2.6.10 Cull lumber

The log with wood quality lower than grade 3 of the grade scale of ripping log.

2.7 Log volume

Log volume calculated based on the diameter class and the length class specified by the standard.

2.8 Log marking

The operation to mark the log species, wood assortment, length class, diameter class, girth and inspector on the log.

2.9 Wood assortment

The log product sorts divided based on different purposes and different quality requirements for use.

References

1) GB/T 15787:1995 *Terms in log inspection*

2) GB/T 11917:1989 *Terms in lumber technology*

3) GB/T 144:2003 *Log inspection*

4) GB/T 155:1995 *Defects in logs*

5) GB/T 143.1:1995 *Coniferous processing logs: Species: Main applications*

6) GB/T 143.2:1995 *Coniferous ripping logs: Dimensions, tolerances and grade classification*

7) GB/T 4813:1995 *Broadleaved ripping logs: Dimensions, tolerances and grade classification*

8) GB/T 4812:1995 *Logs of super grade*

ANNEX 3: CEN TIMBER AND FURNITURE STANDARDS UNDER DEVELOPMENT

Roundwood and sawnwood	Project reference	Title	Current status	Availability
00175124	prEN 1533	Wood and parquet flooring – Determination of bending strength under static load – Test methods	Under approval	2011-05
00175127	FprEN 1313-1	Round and sawn timber – Permitted deviations and preferred sizes – Part 1: Softwood sawn timber	Under approval	2010-02
00175130	prEN 15912	Durability of reaction to fire performances – Classes of fire retardant treated wood-based product in interior and exterior end-use applications	Under approval	2011-06
00175131	FprEN 1315	Dimensional classification of round timber	Under approval	2010-02
00175137	prEN 13647 rev	Wood flooring and wood panelling and cladding – Determination of geometrical characteristics	Under development	2012-06
00175138	FprCEN/TS 13307-2	Laminated and finger-jointed timber blanks and semi-finished profiles for non-structural uses – Part 2: Production control	Under approval	2009-11
00175140	prCEN/TS 14464 rev	Round and sawn timber – Method for assessment of case hardening	Under development	2010-11
00175141	prEN 1534 rev	Wood flooring – Determination of resistance to indentation (Brinell) – Test method	Under development	2011-05
00175143	prEN 13228 rev	Wood flooring – Solid wood overlay flooring elements including blocks with an interlocking system	Under development	2012-06
00207174	prEN 527-1	Office furniture – Work tables and desks – Part 1: Dimensions	Under approval	2011-09
00207181	FprEN 12520	Furniture – Strength, durability and safety – Requirements for domestic seating	Under approval	2010-04
00207183	prEN 13759	Furniture – Operating mechanisms for seating and sofa-beds – Test methods	Under approval	2012-06
00207191	prEN 12227	Playpens for domestic use – Safety requirements and test methods	Under approval	2010-09
00207195	prEN 15828	Hardware for furniture – Strength and durability of hinges and their components – Stays and hinges pivoting on a horizontal axis	Under approval	2011-03
00207198	prEN 15185	Furniture – Assessment of the surface resistance to abrasion	Under approval	2012-06
00207199	prEN 15186	Furniture – Assessment of the surface resistance to scratching	Under approval	2012-06
00207203	FprEN 14434	Writing boards for educational institutions – Ergonomic, technical and safety requirements and their test methods	Under approval	2010-02
00207205		Non-domestic storage furniture – Test methods for the determination of strength, durability and stability	Under development	2011-11
00207206	prEN 15939	Hardware for furniture – Determination of strength and load capacity of wall attachment devices	Under approval	2012-01
00207207	FprCEN/TR 1335-4	Office furniture – Office work chair – Part 4: Clarifications to EN 1335-1:2000 (Dimensions)	Under approval	2009-11
00207209	prEN 1729-2	Furniture – Chairs and tables for educational institutions – Part 2: Safety requirements and test methods	Under approval	2012-02

Roundwood and sawnwood	Project reference	Title	Current status	Availability
00207210	EN 716-1:2008/ prA1	Furniture – Children's cots and folding cots for domestic use – Part 1: Safety requirements	Under development	2012-06
00207211	EN 716-2:2008/ prA1	Furniture – Children's cots and folding cots for domestic use – Part 2: Test methods	Under development	2012-06
00207212	prEN 1957 rev	Domestic furniture – Beds and mattresses – Test methods for the determination of functional characteristics	Under development	2012-06
00207213	prEN 16014	Hardware for furniture – Strength and durability of locking mechanism	Under approval	2012-06
00207214	FprCEN/TR 16015	Hardware for furniture – Terms for locks and locking systems	Under approval	2010-05
00207215	EN 15338:2007/ FprA1	Hardware for furniture – Strength and durability of extension elements and their components	Under approval	2010-03
00207C06	EN 1335-3:2009/ prAC	Office furniture – Office work chair – Part 3: Test methods	Under development	2009-08

Source: European Committee for Standardization (www.cen.eu/CENORM).

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00207174	prEN 527-1	Office furniture – Work tables and desks – Part 1: Dimensions	Under approval	2011-09
00207181	FprEN 12520	Furniture – Strength, durability and safety – Requirements for domestic seating	Under approval	2010-04
00207183	prEN 13759	Furniture – Operating mechanisms for seating and sofa-beds – Test methods	Under approval	2012-06
00207191	prEN 12227	Playpens for domestic use – Safety requirements and test methods	Under approval	2010-09
00207195	prEN 15828	Hardware for furniture – Strength and durability of hinges and their components – Stays and hinges pivoting on a horizontal axis	Under approval	2011-03
00207198	prEN 15185	Furniture – Assessment of the surface resistance to abrasion	Under approval	2012-06
00207199	prEN 15186	Furniture – Assessment of the surface resistance to scratching	Under approval	2012-06
00207203	FprEN 14434	Writing boards for educational institutions – Ergonomic, technical and safety requirements and their test methods	Under approval	2010-02
00207205		Non-domestic storage furniture – Test methods for the determination of strength, durability and stability	Under development	2011-11
00207206	prEN 15939	Hardware for furniture – Determination of strength and load capacity of wall attachment devices	Under approval	2012-01
00207207	FprCEN/TR 1335-4	Office furniture – Office work chair – Part 4: Clarifications to EN 1335-1:2000 (Dimensions)	Under approval	2009-11
00207209	prEN 1729-2	Furniture – Chairs and tables for educational institutions – Part 2: Safety requirements and test methods	Under approval	2012-02
00207210	EN 716-1:2008/prA1	Furniture – Children's cots and folding cots for domestic use – Part 1: Safety requirements	Under development	2012-06
00207211	EN 716-2:2008/prA1	Furniture – Children's cots and folding cots for domestic use – Part 2: Test methods	Under development	2012-06
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