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THE REFERENCE FOR TROPICAL TIMBER

PERFORMANCE & FUNCTIONAL REQUIREMENTS GUIDE FOR STRUCTURES USING AFRICAN TROPICAL TIMBER

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PREAMBLE:

CLARIFICATION REGARDING STANDARDS

Although translated into English, this guide refers to French standards (NF) as well as European standards (EN). However, some French standards do not have European equivalents. It is therefore essential to check the specific characteristics of each country.

Here is the list of French standards without equivalents:

NF DTU 51 4	NF DTU 41 2
NF DTU 31 1	NF DTU 31 2
NF B 54 040	NF P 99 610
FD P20 651	NF P 99 650
XP P 98 405	NF D 61 062 /A1
NF P 01 012	FD S 54 203
NF P 01 013	NF B 53 669
NF DTU 36 3	NF B 53 676
NF P 21 210	NF B 54 008
NF DTU 36 5	NF DTU 51 1
NF P 20 302	NF DTU 51 2
NF DTU 34 4	NF DTU 51 11

However, some French standards are similar to European standards; these are described below.

NF DTU 36 3 : The purpose of this document is to define the general design rules and specific rules related to Eurocode 5 (NF EN 1995-161) for the design and justification of wooden stairs and guardrails.

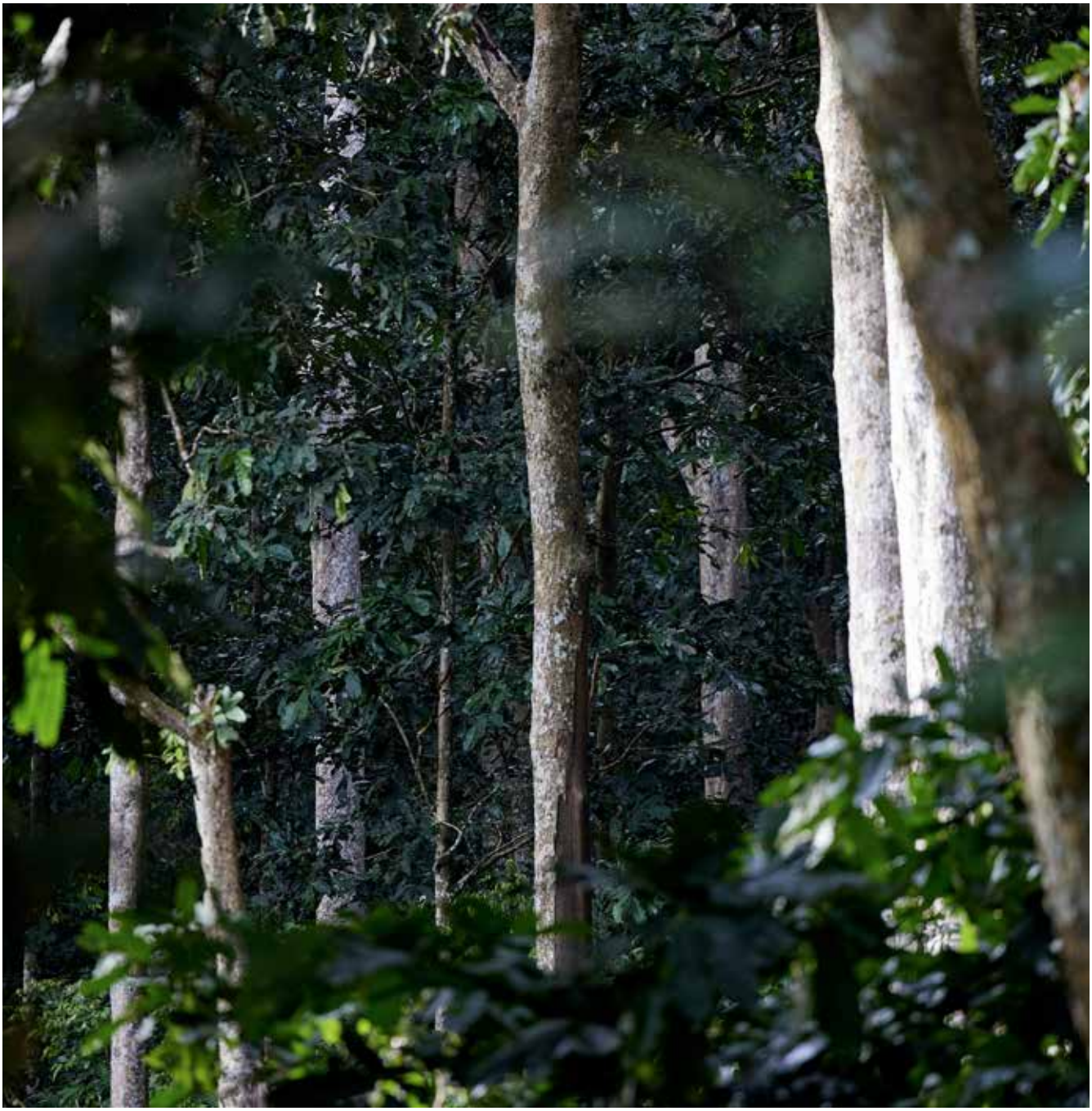
NF P 21 210 : This document supplements standard NF EN 14076 of February 2014, "Wooden stairs - Terminology," and provides definitions specific to the design and construction of stairs in certain regions of France.

NF P 23 305 : This document specifies the minimum design and manufacturing characteristics for windows, French windows, exterior doors, and wooden joinery assemblies. These joinery products are manufactured either in a factory or workshop and may or may not be glazed. These specifications enable the durability performance requirements defined in standard NF EN 14351-1 to be met.

NF P 20 302 : This document refers to existing European classification standards for windows and incorporates characteristics not covered by the European standardization system.

NF P 99 610 : This document applies to seating furniture intended for installation in any public area: seats with or without backrests, with or without armrests. The seating furniture concerned is that of category "P" (free-standing) or "S" (sealed/anchored/fixed), including multifunctional furniture intended by the manufacturer to be used for seating, regardless of the material(s) used, installed in public places, whether covered or not (pedestrian areas, sidewalks, rest areas, etc.). For products in category "I" (integrated), it covers the part of the product that has a seating and resting function. This document does not cover: - folding benches covered by NF EN 581-2; - stadium seating benches covered by NF EN 12727; - outdoor furniture covered by NF EN 581-1 and NF EN 581-2; - unforeseeable uses such as vandalism.

NF B 50 005 : This standard corresponds to ISO 5323-1984. However, it has a wider scope of application.



1. WHY DO WE NEED THIS GUIDE?

1.1 PREAMBLE, GENERAL OBJECTIVE

The creation of this Guide originates from a request by project owners, mainly architects, who wish to use tropical timber in public procurement, due to its specific performance characteristics, but may face difficulties in drafting the Special Technical Clauses (CTP – clauses techniques particulières).

These clauses can be challenging to formalise for various reasons, including technical difficulties (timber performance to intended use match), complex regulations, traceability requirements, and new European regulations such as the EUDR.

To address this complexity, the Guide relies on Article R2111-8 of French public procurement law for the formulation of technical specifications. This article allows project owners to draft their tenders based on the performance or functional requirements of the materials used in their timber-related projects.

Because public opinion is important, public procurement is always tied to eco-responsible image requirements. The levels of requirements and performance must align with the expected guarantees.

The aim of this Guide is therefore to define technical specifications based on performance or functional requirements, which can, if necessary, be incorporated into special technical clauses for public works contracts or the specifications of Project Management Assistance (AMO - Assistance à Maîtrise d'Ouvrage). These specifications comply with the current regulatory and normative framework, both technically and environmentally, and are primarily driven by the sustainability requirements regarding the resource.

This Guide is not intended to replace existing Technical Specifications Document drafting guides, which are sometimes used by project owners and specifiers[1].

Another objective of this Guide is to support and promote the process of eco-certification, sustainable forest management, and, consequently, the long-term viability of the timber sector in the Congo Basin.

To achieve this, the Guide highlights to public decision-makers the value and benefits of certified tropical timber, providing arguments to communicate with the general public and enhance understanding of the eco-certification process and the importance of its widespread adoption.

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1. Help with drafting Technical Specifications Documents (FCBA) https://catalogue-bois-construction.fr/
Technical Specifications Documents: Recommendations and model clauses (CSTB) https://boutique.cstb.fr/detail/guides-et-livres/droit-et-construction/cctp-recommandations-et-modeles-de-clauses
The complete guide to drafting your Technical Specifications Document in architecture (D&V Translation Agency https://www.dvtranslation.com/blog/le-guide-complet-pour-rediger-votre-cctp-en-architecture/
Drafting your Technical Specifications Documents - Framework contracts (ekopolis / DEMOCLES collaborative platform) https://www.ekopolis.fr/ressources/guide-redaction-de-vos-cctp-contrats-cadres
CLIC Technical Specifications Document, online software for drafting and costing Technical Specifications Documents and Pricing schedules https://www.clic-cctp.com/

1.2 PERFORMANCE AND FUNCTIONAL REQUIREMENTS VS STANDARDS OR OTHER EQUIVALENT DOCUMENTS

The technical specifications set out in the public procurement code define the public buyer's requirements. As a mandatory element, they precisely establish the characteristics and requirements that bidders' offers must meet.

Well-drafted specifications should clearly express the requirement and ensure equal access to public procurement, ultimately securing the best value for money.

It is important to highlight that Article R2111-8 of the Public Procurement Code[2] defines three ways in which buyers can formulate the technical specifications of their contracts.

Indeed, the services covered by a contract must be defined in the technical specifications document, also known as the CCTP (*Cahier des Clauses Techniques Particulières*), which is incorporated into the procurement documents. The technical specifications document must outline the technical specifications:

- either by referring to standards or other equivalent documents accessible to bidders, such as technical approvals or other technical references established by standardisation bodies;
- **or in terms of performance or functional requirements;**
- or through a combination of both.

This flexibility in defining technical specifications allows buyers to tailor their approach according to the nature of their needs while ensuring a clear and objective expression of their expectations.

This framework therefore aims to reconcile the necessary technical precision required for the proper execution of the contract with openness to innovation and alternative solutions.

The contracting authority may also define technical specifications that take environmental characteristics into account, notably by referring to eco-labels.

This Guide, therefore, focuses on the second approach - technical specifications based on performance and functional requirements - covering 13 categories of timber products (article R2111-8 of the public procurement code, which allows the technical specifications of a technical specifications document to reference these characteristics).

1.3. POTENTIAL USERS OF THIS GUIDE

The *Performance & functional requirements Guide for works using African tropical timber* is intended as a tool for disseminating information and assisting in the drafting of technical specifications documents (CCTPs - *Cahiers des Clauses Techniques Particulières*) for all of its users, regardless of their role. These include «specifiers», contracting authorities, local communities of all types - municipalities, departments, regions - as well as special-status authorities and overseas territories.

2. https://www.marche-public.fr

All of them share the common responsibility of making decisions regarding the use of tropical timber in the structures or structural elements under their management.

These contracting authorities, who may also act as project managers, fall into three main categories:

- **Non-regulated private contracting authorities:** these entities are not subject to any specific regulations regarding their procurement processes. They have a high degree of freedom in this respect, with their only constraints being those of general law.

- **Regulated private contracting authorities:** these entities are subject to regulations because part of their funding for construction projects comes from public sources. They must comply with the provisions of the MOP law[3] (*Maîtrise d'Ouvrage Publique* - public project management), which is integrated into the public procurement code (CCP - *code de la commande publique*)[4] and governs the relationship between the contracting authority and private project management.

- **Public contracting authorities:** these entities receive most or all of their funding for construction projects from public funds, in particular from government agencies or local authorities. As such, they are subject to the public procurement code, whose key principles are transparency and the equal treatment of bidders.

2. TRENDS IN CENTRAL AFRICAN TROPICAL TIMBER PRODUCTION AND MARKETS, ECO-CERTIFICATION, AND LEGALITY

2.1 CONGO BASIN FORESTS: ECONOMIC AND SOCIAL ISSUES

The Congo Basin's forests form the world's second-largest tropical forest mass after the Amazon.
They cover approximately 300 million hectares, representing 7% of the world's forests and 22% of tropical forests. Dense, humid forests span 170 million hectares, including 51 million hectares designated for production, 18 million hectares allocated for conservation, and 100 million hectares that remain unassigned. (Sources: Bayol 2018[5]; CIFOR 2021[6]; COMIFAC 2021[7].)

3. Law No. 85-704 of 12 July 1985 on public project management and its relationship with private project management: https://www.legifrance.gouv.fr/loda/id/JORFTEXT000000693683
4. https://www.legifrance.gouv.fr/codes/texte_lc/LEGITEXT000037701019/
5. Bayol, N., 2018. Industrialisation of the Timber Sector in the Six Congo Basin Countries – Strategic Vision Through 2030. 40 page presentation.
6. CIFOR, 2021. The Forests of the Congo Basin – State of the Forests in 2021. Edited by Richard Eba'a Atyi, François Hiol Hiol, Guillaume Lescuyer, Philippe Mayaux, Pierre Defourny, Nicolas Bayol, Filippo Saracco, Dany Pokem, Richard Sufo Kankeu, and Robert Nasi; 474 pages. https://www.observatoire-comifac.net/publications/edf/2021
7. COMIFAC, 2021. The Forests of the Congo Basin: State of the Forests in 2021. 8 page summary report. https://www.cifor-icraf.org/wp-content/uploads/sites/35/2024/06/Factsheet-Etat_des_forets_du_Bassin_du_Congo-2021-FR.pdf

Primarily distributed across six of the nine Central African countries[8] - Democratic Republic of Congo, Gabon, Republic of Congo, Cameroon, Central African Republic, and Equatorial Guinea - these forests play a vital role in both global biodiversity and climate regulation.

They represent a key economic resource for the region, as the forestry sector is a major employer and generates significant revenue for the national economies:

- The international market for timber from these forests is estimated at around $2.2 billion, with the forestry sector's contribution to GDP varying by country: 5.2% in Cameroon, 3.5% in Gabon, 4.9% in the Republic of the Congo, and 0.15% in the Democratic Republic of the Congo[9] (AfDB, 2018[10]).
- The forestry sector is the second-largest employer in the region after the public sector. It employs approximately 15,000 people in Cameroon, 13,000 in Gabon, 7,500 in the Republic of the Congo, and 4,500 in the Democratic Republic of the Congo. While this industry is crucial for local economies, it must be managed sustainably in order to preserve these unique ecosystems and their role in combating climate change (AfDB 2018; Martin & Groutel 2023[11]).

It is widely accepted that sustainable forest management, and consequently the responsible use of timber and non-timber products, helps curb deforestation by ensuring that these forests retain long-term economic value.

2.2 TRENDS IN AFRICAN TROPICAL TIMBER MARKETS

The tropical timber market is currently undergoing a profound transformation, driven by various economic, environmental, and political factors. Several major trends are emerging from this evolution.

2.2.1 DECLINING DEMAND IN EUROPE

The European market for tropical timber has been in decline for logs since the 1973 oil crisis, with an accelerated downturn since 2000 due to the 2008 economic crisis and the introduction of new forest codes in Central Africa, which are linked to efforts to gradually process logs locally.

For sawn timber, the decline has been less pronounced compared to logs since 1973, but with fluctuations, particularly during the economic crises of 1993 and 2008.
Increased competition from temperate timber species and alternative materials has also significantly weakened the European market for tropical timber (Bayol et al., 2014[12]). However, there has been growing demand in the European market for higher value-added products, such as multi-layer laminated scantlings used in industrial joinery.

8. The other three countries are Angola, São Tomé and Príncipe, and Chad.
9. Data unavailable for Equatorial Guinea.
10. African Development Bank (AfDB), 2018. Integrated and Sustainable Development of the Timber Sector in the Congo Basin: Opportunities, Challenges, and Operational Recommendations. Strategic report, 308 pages. https://www.afdb.org/sites/default/files/documents/publications/developpement_integre_et_durable_de_la_filiere_bois_dans_le_bassin_du_congo_-_regional_0.pdf
11. Martin P., Groutel E., 2023. Guide for the local use of timber from Central Africa. ATIBT – RIFFEAC, 116 pages. https://www.atibt.org/files/upload/technical-publications/ATIBT-GUIDE-TOME-2-FSC.pdf
12. Bayol N., Anquetil F., Bile C., Bollen A., Bousquet M., Castadot B., Cerutti P., Kongape J.A., Leblanc M., Lescuyer G., Meunier Q., Melet E., Penelon A., Robiglio V., Tsanga R., Vautrin C., 2014. Lumber industry and natural forest management: tropical timber and Central African forests facing market changes. In de Wasseige C., Flynn J., Louppe D., Hiol Hiol F., Mayaux Ph. (eds). The forests of the Congo Basin – State of the Forests 2014: pages 47-66. https://www.cifor-icraf.org/knowledge/publication/5318/

Despite the promotion of certification schemes and the availability of certified tropical timber, consumer behaviour has remained marked by reluctance to use these such timber, particularly in public procurement (Karsenty, 2019[13]; White et al., 2020[14]), where contracts may be scrutinised by stakeholders who are highly sensitive to global deforestation issues.

In France, imports of tropical sawn timber fell by 12% in 2023, reflecting economic difficulties and stricter environmental regulations.

This decline is driven by several factors:

- a negative perception of tropical timber among certain European consumers, who associate it with deforestation and unsustainable practices (Bayol et al., 2018; Karsenty, 2019). This perception is particularly evident in public procurement, where political pressure from environmentally focused elected officials can influence decision-making[13];
- the complexity of supply chains and a lack of traceability;.
- the high cost of tropical timber compared to alternative materials.

2.2.2 GROWTH OF BOTH DOMESTIC AND REGIONAL MARKETS

Meanwhile, the Congo Basin's domestic market is experiencing sustained growth, driven by population increase, urbanisation, and economic development in the sub-region.

As such, in several Central African countries, domestic demand for sawn timber now exceeds export volumes. However, a significant portion of this market remains informal or illegal due to low consumer purchasing power, the existence of an informal local value chain, and the lack of sustainable management requirements (Groutel & Alix, 2015[15]).

The development of this domestic market is therefore crucial for enhancing local resources and supporting the regional economy, but it needs to be regulated to prevent unsustainable practices - something that is still far from being achieved.

2.2.3 LOG EXPORT BANS

In response to market challenges, several Central African countries implemented measures to ban log exports. Gabon was the first to introduce such a policy in 2010.

This strategy aims to boost the local timber processing industry, maximise value added within the country, and create more jobs[12].

13. Karsenty, 2019. Certification of tropical forests: A private instrument of public interest? A focus on the Congo Basin. Forest Policy and Economics, vol. 106. https://doi.org/10.1016/j.forpol.2019.101974
14. White G., van Benthem M., Oldenburger J., Teeuwen S., 2020. Understanding the market for secondary processed tropical timber products through data – Analysis of the European market for secondary processed certified tropical timber products in 2019. Edited by Jonathan Kaufman, 66 pages. https://www.probos.nl/images/pdf/rapporten/Rapp2020_Comprendre_le_marche_des_produits_de_seconde_transformation_en_bois_tropical.pdf
15. Groutel E., Alix Y., 2015. The timber era – Strategic & forward-looking note. Wale, Sefacil, AFD, FFEM, ATIBT, 85 pages. https://doi.org/10.13140/RG.2.1.2303.3042

These measures, however, are not as straightforward or immediate to implement. They are seen as contributing to the economic and social development of the relevant countries. However, they must be accompanied by professional training programmes and investment incentives. Otherwise, these measures could create difficulties for companies that still rely on log exports to maintain their economic viability (Kombila-Mouloungui 2019[16], Karsenty 2021a[17], Ecofin Agency 2024[18]).

2.2.4 DIVERSIFICATION OF SPECIES

The sustainability of forestry operations in Central Africa is currently undermined by reliance on a limited number of timber species, whose harvesting is considered economically profitable under present conditions.

Some of these species have recently been listed under Appendix II of CITES. Their market entry requires the issuance of a Legal Acquisition Finding (LAF) by the Management Authority of the exporting country, while the Scientific Authority of the importing country must issue a Non-Detriment Finding (NDF) document. These timber species are predominantly sought after by secondary processing operators (Karsenty 2021b[19]).

To address this situation, diversifying the range of commercialised species is a major challenge, as it would reduce pressure on the most sought-after species and encourage better regeneration of timber volumes[20]. Consequently, it would support the viability and long-term sustainability of the well-established model of «sustainably managed forest concessions» (FSC-FM or PAFC-BC certified).

To ensure a successful transition, it is important to promote - through applied testing - lesser-known timber species that are often underutilised due to a lack of awareness. These are referred to as secondary species or, more commonly, as LKTS[21].

However, the concept of lesser-known tropical timber species remains somewhat relative, as the technological properties determined in laboratories and their potential applications in structural and industrial timber works are well documented for a vast number of tropical species (Gérard et al. 2016[22], 2017[23]; Tropix 2024[24]).

Developing market opportunities for a wider variety of timber species would contribute to a more balanced and sustainable management of the region's tropical forests (Martin and Groutel 2023).

These developments demonstrate that the tropical timber market is at a crossroads - between the need to meet environmental imperatives and the opportunity to revitalise local economies through more sustainable and diversified management of forest resources.

16. Kombila-Mouloungui A.G., 2019. The ban on log exports in Gabon: issues and perspectives. Doctoral thesis in geography and planning, University of Pau and the Adour Region, 448 pages. https://theses.hal.science/tel-04647714v1/file/fix_nH3i6y4s.pdf
17. Karsenty A., 2021a. Issues in the industrial timber economy in Central Africa and the announced ban on log exports. Les Cahiers d'Analyse et de Prospective de CyclOpe (CyclOpe Analysis and Forecasting Papers) - Understanding the structural changes in raw material sectors, No. 01, September 2021, 8 pages. https://cercle-cyclope.com/cap-cyclope/
18. https://www.agenceecofin.com/bois-et-derives/0204-117557-il-faudrait-repenser-l-interdiction-d-exportation-de-grumes-de-bois-en-afrique-centrale-alain-karsenty-cirad
19. Karsenty A., 2021b. Fiscal and non-fiscal incentives for sustainable forest management: synthesis of the lessons derived from case studies in Brazil, Cambodia, the Congo, Côte d'Ivoire, Myanmar, Peru, Thailand and Viet Nam. ITTO Technical Series No. 48. International Tropical Timber Organization (ITTO), Yokohama, Japan, 35 pages. https://www.itto.int/direct/topics/topics_pdf_download/topics_id=6682&no=1&disp=inline
20. Sist P., 2024. Sustainable exploitation of tropical forests. Editions QUAE, 100 pages. https://www.quae-open.com/produit/268/9782759239313/exploiter-durablement-les-forets-tropicales
21. Lesser Known Timber Species
22. Gérard J. (ed), Guibal D., Paradis S., Cerre J.C. et al., 2016. Atlas of Tropical Timber. Editions Quae, Practical Guide collection, print/pdf/epub version, 1,000 pages. http://www.quae.com/fr/r4976-atlas-des-bois-tropicaux.html
23. Gérard J. (ed), Guibal D., Paradis S., Cerre J.C. et al., 2017. Tropical Timber Atlas. Editions Quae, Practical Guide collection, pdf/epub version, 999 pages. http://www.quae.com/fr/r5241-tropical-timber-atlas.html
24. https://tropix.cirad.fr/fiches-disponibles

2.3 SUSTAINABLE FOREST MANAGEMENT TO COMBAT DEFORESTATION

When conducted under sustainable management (FSC-FM, PAFC-BC), timber harvesting is not a cause of deforestation, contrary to a widely held belief. This misconception is particularly prevalent in the Congo Basin, where all forms of logging are often conflated with legal harvesting.
Other factors are responsible for localised deforestation in the Congo Basin, which are outlined in the following sections.

2.3.1 MAIN CAUSES OF DEFORESTATION

The conversion of forests into agricultural lands is the primary cause of deforestation in the Congo Basin.

Accelerating population growth, urbanisation, and economic development have led to an increased demand for agricultural lands at the expense of forested areas.

The expansion of subsistence and cash crops such as oil palm, soya, cocoa, coffee, and sugarcane directly threatens the long-term sustainability of forest areas.

In tropical Africa, the production of fuel timber also significantly contributes to deforestation, particularly in regions already weakened by the effects of climate change, as timber remains the primary energy source for most households (CIFOR 2021, Sist 2024, WRI 2024[25]).

Mining activities and the construction of various types of infrastructures - such as roads, dams, and industrial zones - also contribute to deforestation (Ciza et al. 2015[26]).

Forest roads provide access to previously remote areas, facilitating illegal logging and the conversion of lands for other uses.

2.3.2 LEGAL TIMBER HARVESTING AND SUSTAINABLE MANAGEMENT

Conversely, legal timber harvesting, regulated by strict national forestry codes, enables responsible management of forest resources. As such, certified forestry companies (FSC-FM or PAFC-BC) commit to compliance with a stringent set of requirements, not only from an industrial perspective (mandatory resource preservation) but also in terms of social and environmental obligations (respecting local communities' rights and protecting biodiversity).

25. https://research.wri.org/fr/gfr/latest-analysis-deforestation-trends
26. Ciza S.K., Mikwa J-F., Malekezi A.C., Gond V., Bosela F.B., 2015. Identification of the drivers of deforestation in the Isangi region, Democratic Republic of Congo. Bois & Forêts des Tropiques, 324, pages 29-38.

These forest eco-certifications (see the next section) therefore play a crucial role in the continuous improvement of forest management and the reduction of deforestation, which are enforced by standards that are constantly being raised in terms of regulations.

However, illegal logging in Central Africa remains a major problem. It contributes not only to deforestation but also to forest degradation (European Parliament 2020[27]).

To combat this problem, initiatives such as timber traceability systems and the Voluntary Partnership Agreements (VPAs) under FLEGT[28],[29] have been implemented in producer countries to promote more sustainable forest resource management. Meanwhile, consumer regions such as the European Union are strengthening their regulations against imported deforestation through the new EU Deforestation Regulation (EUDR), which is currently being rolled out.

2.3.3 BENEFITS OF SUSTAINABLE FOREST MANAGEMENT FOR BOTH THE ENVIRONMENT AND LOCAL COMMUNITIES

Sustainable forest management is essential to ensure environmentally responsible timber harvesting while meeting economic needs.

It guarantees the long-term viability of forest resources by allowing for their regeneration and controlled harvesting, thereby securing timber supply chains and ensuring the availability of tropical timber for end users.

This approach is based on selective logging, which minimises impacts on the forest ecosystem and protects biodiversity.

Forest management plans, which are key tools for sustainable management, set harvesting limits, define cutting cycles to allow for species regeneration, and include measures to protect soil, water, and wildlife.

Their ultimate goal is to maintain forest productivity while preserving ecological integrity.

Beyond its protective role for the environment and its function in ensuring resource sustainability, sustainable forest management also helps improve the well-being of local populations through social agreements made with local communities.

Thus, while contributing to biodiversity conservation, soil and water protection, carbon storage, and the preservation of forest ecosystems, sustainable forest management also creates long-term jobs and generates income for local communities, thereby supporting the economic and social development of producing regions.

Furthermore, involving local populations in sustainable forest management promotes a greater awareness of environmental issues, leading to a more responsible and sustainable use of resources. This approach strengthens the long-term sustainability of forest management and ensures the long-term protection of tropical forests.

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27. European Parliament. 2020. European Parliament resolution of 22 October 2020 with recommendations to the Commission on an EU legal framework to halt and reverse EU-driven global deforestation, 2020/2006 (INL). Committee on the Environment, Public Health and Food Safety. https://www.europarl.europa.eu/doceo/document/TA-9-2020-0285_EN.html
28. https://eur-lex.europa.eu/FR/legal-content/summary/voluntary-partnership-agreements-on-forest-law-enforcement-governance-and-trade.html
29. https://efi.int/sites/default/files/files/publication-bank/2018/efi_policy_brief_3_fra_net.pdf

2.3.4 GLOBAL ORGANISATIONS THAT PROMOTE THE USE OF SUSTAINABLY MANAGED TROPICAL TIMBER

Several major global organisations promote the responsible consumption of tropical timber due to its crucial role in forest conservation, combating deforestation, and promoting sustainable development.

As such, the ITTO (International Tropical Timber Organization) plays a central role in supporting sustainable forest management and promoting the benefits of legal and sustainable timber in global markets (ITTO 2023[30]).

The FAO (Food and Agriculture Organization of the United Nations) supports international initiatives aimed at strengthening sustainable forest management and combating deforestation by incorporating tropical timber into its circular bio-economy approaches (FAO 2022[31]).

ATIBT (*Association Technique Internationale des Bois Tropicaux* - International Technical Association of Tropical Timber) also highlights the importance of ethical and sustainable trade to support local communities and preserve tropical ecosystems (ATIBT 2023[32]).

Additionally, organisations such as the WWF, through awareness campaigns and partnerships, and initiatives like the EU's FLEGT programme, work to strengthen the traceability and legality of supply chains (WWF 2022[33]; European Commission 2023[34]).

These organisations support responsible consumption to promote timber products sourced from sustainably managed forests, to ensure the longevity of forest resources, and to encourage economic development that respects both ecosystems and local communities.

2.4 LEGALITY CERTIFICATION VS. FOREST MANAGEMENT CERTIFICATION

Third-party verified forest certifications are effective tools to support and recognise legal and sustainable forest management, and to promote responsible logging practices.

Furthermore, this voluntary approach is market-driven for a sensitive resource and helps consumers identify timber sourced from well-managed forests. Certification is thus a voluntary process in which an independent third party (the "certifier") evaluates the quality of a forestry company's management (in Central Africa, they are concession holders) based on the requirements outlined in certification «standards».

When associated with certifications, labelling allows consumers to quickly identify the quality of forest management (whether legal or sustainable) in the areas where the timber and other forest products were harvested.

In the field, certification is implemented through two distinct but interconnected processes:

30. OIBT, 2023. International Tropical Timber Organization: Managing Tropical Forests Sustainably. Excerpt from www.itto.int
31. FAO, 2022. The State of the World's Forests 2022: Forest Pathways for Green Recovery and Building Inclusive Economies. Rome: FAO.
32. ATIBT, 2023. Promoting Tropical Timber as a Sustainable Resource. Excerpt from www.atibt.org
33. WWF, 2022. Tackling Deforestation Through Responsible Timber Supply Chains. Excerpt from www.wwf.org
34. European Commission, 2023. FLEGT – Action Plan for Forest Law Enforcement, Governance and Trade. Excerpt from https://ec.europa.eu

- **Forest management** certification, which assesses whether forests are managed according to a set of specific standards (sustainable and/or legal);

- **Chain of custody** (CoC) certification, which ensures that the certified raw material is identified or kept separate from uncertified or uncontrolled materials during the processing stages, from the forest to the final consumer. In order for a finished product to be fully certified, both forest management certification and chain of custody certification are required.

Furthermore, these certifications require the implementation of a traceability system to track the timber from the forest to the finished product, thereby enhancing transparency within the sector[35].

As such, and for several decades, the Congo Basin's forestry sector has faced numerous challenges in terms of both sustainability and legality.

To address these issues, several certification systems have been established in the sub-region, providing both consumers and stakeholders with guarantees regarding the origin and quality of forest management.

These certifications fall into two main categories: ***legality* certifications** and **sustainable forest management certifications**[36].

2.4.1 LEGALITY CERTIFICATES

Legality certificates serve to ensure that the timber they cover originates from sources that comply with the laws and regulations in effect in the producer country. However, they go beyond mere regulatory legality by aligning more closely with the environmental and social standards established by the World Bank.

The main timber legality certification systems are as follows:

- **OLB (Bureau Veritas).** The OLB (*Origine et Légalité des Bois* – Timber Origin and Legality) system was developed in 2004 by the Bureau Veritas certification body. Up until today, it has been used in several central and western African countries, as well as in Asia.

The system aims to verify that the timber has been legally produced, acquired, and then sold by a forestry company or an individual forest manager.

Further information on OLB certification, along with a list of certified companies (available at the bottom of the website), can be found on the Bureau Veritas website[37].

- **LegalSource (*Preferred by Nature*).** The LegalSource system (also known as LS), proposed by Preferred by Nature (formerly NEPCon), involves third-party evaluation of due diligence procedures so as to manage the risks of purchasing illegal forest products. LegalSource certification helps companies mitigate risks associated with legal violations related to the purchase of timber products that may apply to their operations.

37. https://www.bureauveritas.fr/besoin/certification-olb

Information on Preferred by Nature's Legal-Source system, as well as the corresponding certificate database, is available on the Preferred by Nature[38] website.

- **TLV (Control Union):** Timber Legality Verification[39] (TLV) was developed by Control Union. This certification applies to all organisations aiming to reduce or mitigate the risks of illegal logging and the trade of forest products. Control Union provides access to a database of its certificates[40].

2.4.2 SUSTAINABLE FOREST MANAGEMENT CERTIFICATES

Sustainable Forest Management certification (SFM) is a mechanism used to assess whether the management and harvesting of a forest are conducted in a responsible and sustainable manner.

It assures consumers that the timber comes from responsibly managed forests, adhering to strict environmental and social criteria that preserve biodiversity, natural resources, and the rights of local communities.

For Central Africa, the two main certification systems in this category are:

*** PEFC / PAFC Congo Basin**

The PAFC-BC (Pan African Forest Certification) is a regional initiative of the PAFC Congo Basin, resulting from collaboration between several national African organisations that are members of the PEFC Alliance.

This initiative, funded by the COMIFAC's Certification Promotion Programme (PPECF), has established a unique regional approach to sustainable forest management certification in the Congo Basin, which is auditable[41] in Cameroon, Gabon, and the Republic of Congo. This regional label was endorsed by PEFC International in December 2021.

The availability[42] of such a sustainable forest management certification scheme in this region - of major importance for tropical timber production - helps meet current needs while preserving the ecosystem and biodiversity for future generations.

All information on the procedures implemented to develop this certification system is available on the PAFC website[43].

*** FSC (Forest Stewardship Council)**

The Forest Stewardship Council (FSC) is a non-governmental, non-profit, and independent organisation dedicated to responsible forest management.

38. https://www.preferredbynature.org/focus/timber
39. https://www.controlunion.com/certification-program/tlv-timber-legality-verification/
40. https://cucpublications.controlunion.com/certified_companies_and_products.aspx
41. This scheme, developed by local stakeholders, is based on the PEFC Council's criteria and international requirements. As such, the PAFC Congo Basin certification scheme is adapted to the local context while benefiting from international recognition. This means that PAFC Congo Basin-certified timber products are recognised within PEFC chain-of-custody systems.
42. Officially, recognition of the PAFC-BC scheme was announced at the end of December 2021. The scheme has therefore been in effect since 1 January 2022. Furthermore, accreditation for the PAFC-BC scheme was granted on 27 September 2022 to Bureau Veritas (BV) by the TUNAC organisation. Companies already certified under PAFC-Gabon (BSO) and those currently working towards this certification can now obtain full certification during their first surveillance audit or initial audits.
43. https://pafc-certification.org/

It was created in 1993 to promote a responsible and sustainable approach to forest management worldwide.

It brings together various stakeholders (forestry and/or processing companies, distributors, trade union or community representatives, as well as NGOs working on social and/or environmental issues) within three chambers: economic, social, and environmental.

All information related to the FSC[44] and its certifications[45] can be found on its website.

Although legality and sustainable management certifications are distinct, they are often seen as successive steps in a path towards responsible forest management. In Gabon, this is further encouraged by an incentive-based fiscal law which offers tax reductions on land area taxes depending on the level of certification achieved.

Thus, in many cases, loggers first opt for a legality certification, which is generally less complex and less costly, as a stepping stone towards sustainable management certification. However, some loggers settle for legality certification depending on the requirements of their market, which are not uniform on a global scale.

Moreover, sustainable management certification systems have updated their normative frameworks in order to fully comply with the EUDR (European Union Deforestation Regulation), thereby facilitating due diligence processes for European stakeholders and strengthening their alignment with international sustainability standards.

These third-party verified certification systems are described in detail in the Tashmetum digital library, which contains a comprehensive certification guide dedicated to Congo Basin forestry companies, as well as an illustrated guide outlining careers related to certification (https://tashmetum.atibt.org/fr/).

2.4.3 FAIR TRADE PRODUCTION CERTIFICATES

Some labels and initiatives reflect the global effort to promote fair trade in the timber industry, ensuring respect for both the environment and the rights of workers and local communities.

Among them, the «Madera Justa - Fair Wood» label is developing in Latin America and is expected to expand into Africa in the coming years[46].

The «Madera Justa - Fair Wood» label is the forestry and timber industry's first fair trade label. It follows a step-by-step certification approach and is available at an affordable cost.

It is a comprehensive certification system, as it guarantees compliance with **environmental criteria** such as timber legality, the reduction of greenhouse gas emissions, and sustainable forest management. It also incorporates **social criteria** aligned with fair trade principles and **economic criteria** that ensure a minimum coverage of production costs.

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44. https://fr.fsc.org/fr-fr
45. https://search.fsc.org/fr/
46. https://maderajusta.org/

SUMMARY TABLE OF CERTIFICATIONS

CERTIFICATION	TYPE	MAIN OBJECTIVE	REQUIREMENTS
FSC	Sustainable management	Forest management that is ecologically appropriate, socially beneficial, and economically viable	FSC requirements are based on 10 fundamental principles of responsible forest management that include: compliance with laws, workers' and community rights, environmental and biodiversity preservation, maintenance of ecosystem functions, and impact monitoring, ensuring sustainable and ethical timber harvesting.
PAFC/PEFC	Sustainable management	Forest management that is environmentally, socially, and economically responsible	PAFC Congo Basin requirements are based on the PEFC standard's 6 pillars, aiming for sustainable forest management by ensuring compliance with laws, balanced resource exploitation, ecosystem and biodiversity preservation, while guaranteeing the rights and well-being of local communities, indigenous peoples, and workers.
OLB	Legality	Legal origin of timber and compliance with the producer country's laws	Compliance with forestry laws and regulations, workers' rights, certain sustainable management rules, and product traceability.
LS	Legality	Legality of timber origin	Compliance with laws, implementation of a management system to collect supply chain information, risk assessment for illegality, monitoring measures, and mitigation actions.
TLV	Legality	Legal compliance of forestry operations	Auditing of forestry operations, compliance with the national regulatory framework, traceability, and social aspects.
Madera Justa - Fair Wood	Fair trade	Compliance with fair trade criteria	Certification audit verifying that the company meets the 81 requirements of its standard and is responsible from an environmental, social, and economic perspective.

2.5 EUROPEAN REGULATIONS AND DUE DILIGENCE

2.5.1 EUTR VS EUDR

Since March 2013, stakeholders introducing timber and its derived products onto the market or importing them were required to comply with the EUTR (European Union Timber Regulation)[47], a law aimed at preventing illegally harvested timber - one of the leading causes of global deforestation - from entering the European market.

According to the FAO, 420 million hectares of forest were lost worldwide between 1990 and 2020, and it is estimated that the EU's consumption accounts for approximately 10% of this deforestation.

In order to combat this deforestation, the EUDR (European Union Deforestation Regulation)[48] was adopted in June 2023. Initially scheduled for enforcement at the end of 2024, its implementation was postponed by one year.

Today, this regulation represents a significant expansion compared to the EUTR.

Indeed, while the EUTR only applied to timber, the EUDR extends to other products that may contribute to imported deforestation, such as beef, palm oil, soy, coffee, cocoa, rubber, and timber, as well as certain derived products.

Under the EUDR, relevant stakeholders (companies introducing timber products onto the EU market or exporting them from the EU) and first placers on the market must exercise **due diligence** (see the following section) to ensure that their products are legal and do not originate from deforested areas or contribute to forest degradation.

The EUDR imposes new obligations on European importers of tropical timber and other regulated products. Importers are now required to:

- **Collect detailed information** on their suppliers, the tree species, the country of production, the geo-location of harvest plots, and the date or period of production;
- **Assess risks** linked to deforestation and forest degradation in their supply chains, while taking into consideration factors such as the European Commission's risk classification of the producer country, the presence of forests in the production area, and deforestation prevalence;
- **Implement risk mitigation measures** to reduce the likelihood that their products contribute to deforestation;
- **Submit a due diligence statement** before introducing their products onto the market or exporting them, certifying compliance with the EUDR.

Failure to comply with the EUDR may result in penalties of up to 4% of the company's annual turnover. These sanctions are significantly more deterrent than those under the EUTR.

47. https://eur-lex.europa.eu/legal-content/FR/ALL/?uri=CELEX%3A32010R0995
48. https://eur-lex.europa.eu/FR/legal-content/summary/fighting-deforestation-and-forest-degradation.html

The EUTR-EUDR brochure[49] and the LCB website[50] provide answers to many questions that sector stakeholders may have on this topic. The presentation of the European Regulation against deforestation and forest degradation, as part of the National Strategy to Combat Imported Deforestation, is available on the website of the Ministry of Ecological Transition, Energy, Climate, and Risk Prevention[51]. It summarises the key points to remember about the EUDR.

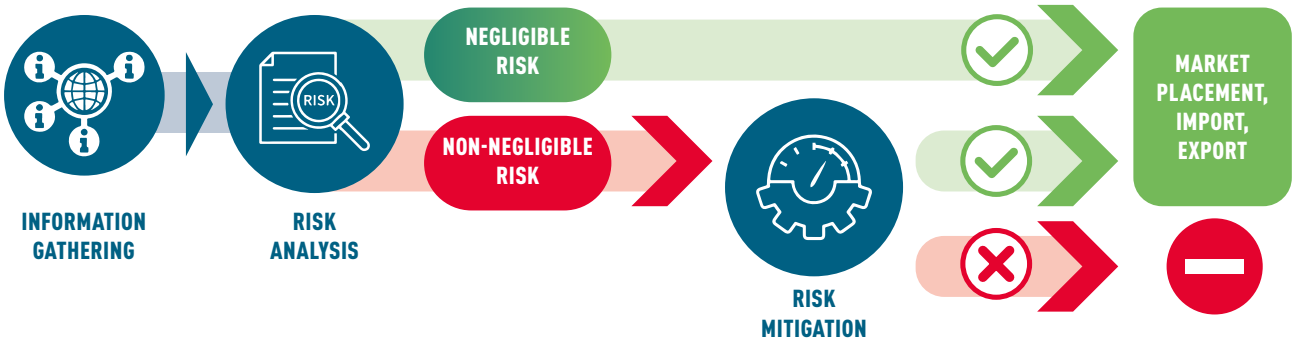
2.5.2 THE IMPORTANCE OF DUE DILIGENCE

In the previous section on the ins and outs of the EUDR, emphasis was placed on a key process required to ensure compliance with legal and environmental standards: due diligence.

This process is a tool for importers, so that they can identify and mitigate risks related to the illegality or unsustainability of their supply chains. Due diligence involves:

- **gathering information:** obtaining detailed information about suppliers, products, and production areas;
- **risk assessment:** evaluating the likelihood that the products come from illegal or unsustainable sources.
- **risk mitigation measures:** implementing measures to reduce identified risks, such as requesting additional documents, conducting audits, or selecting more reliable suppliers.

The Due Diligence process is summarised in the diagram below (source: Groutel & Duhesme, 2023):



The EUDR, like the EUTR, recognises the importance of third-party certification as a tool to support due diligence. However, it does not yet exempt stakeholders from inspections, as certification applies to the «company» entity, whereas due diligence applies to each individual batch of imported timber.

For example, FSC-FM® and PEFC/PAFC-BC certifications provide assurances regarding the legality and sustainability of forest management, thereby facilitating risk analysis and mitigation.

The EUDR represents a significant step towards a more responsible and sustainable timber trade. Strengthened by certification, due diligence remains an essential tool for European importers seeking to ensure the legality and sustainability of their tropical timber purchases.

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49. Groutel E., Duhesme C., 2023. EUTR EUDR, more information for you. ATIBT, 16 pages. https://www.lecommercedubois.org/files/upload/RBUE/BROCHURE-RBUE-RDUE-FR-BD.pdf
50. *Le Commerce du Bois* https://www.lecommercedubois.org/p/43/rbue-rdue
51. https://www.deforestationimportee.ecologie.gouv.fr/reglement-europeen-contre-la-deforestation-et-la-degradation-des-forets/article/reglement-europeen-contre-la-deforestation-et-la-degradation-des-forets

2.5.3 THE DUE DILIGENCE SYSTEM OF THE LCB *(LE COMMERCE DU BOIS)* ASSOCIATION

In 2015, LCB was acknowledged as being a Monitoring Organisation by the European Commission in the framework of the EUTR.

As a result, LCB decided to integrate its Due Diligence (DD) procedure into the audit scope of its environmental charter for companies that choose this collective DD system.

Therefore, to comply with this regulation, a stakeholder placing a timber product on the European market for the first time - such as an importer - must implement a due diligence procedure based on the three previously mentioned items:

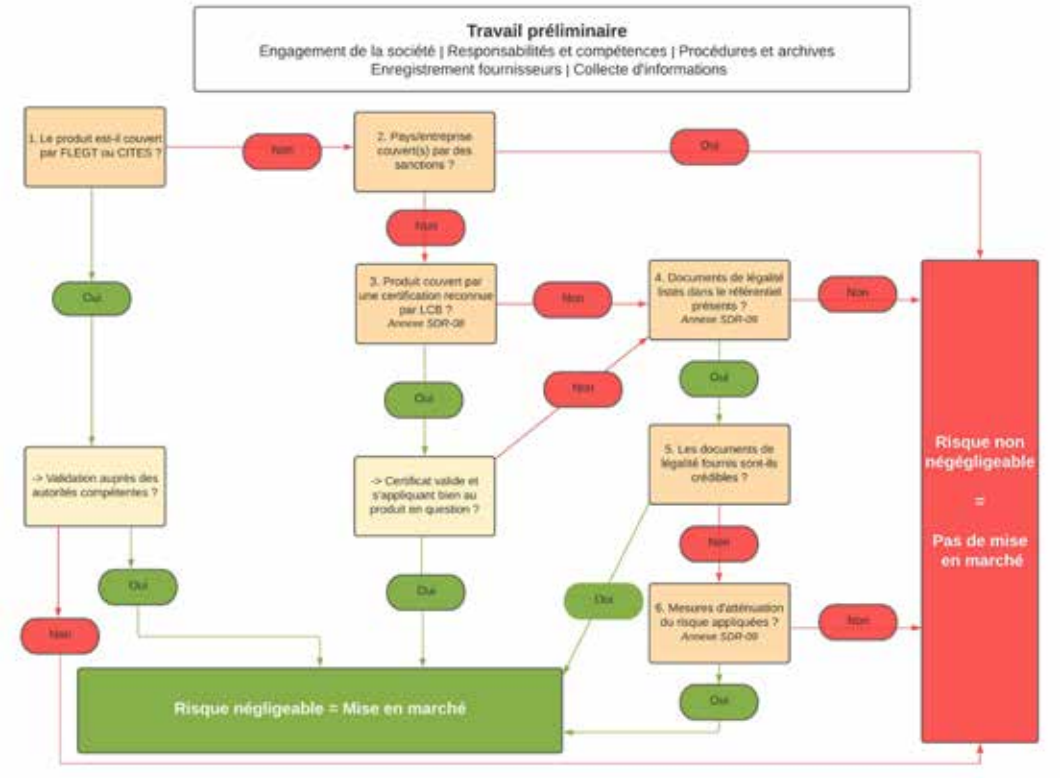
1. **requirements in terms of information gathering;**
2. **a risk assessment procedure;**
3. **a risk mitigation procedure.**

The **Due Diligence System** (DDS) implemented by LCB is structured around 7 key steps: (1) Company commitment; (2) Responsibilities and competencies; (3) Procedures and record-keeping; (4) Supplier registration; (5) Information gathering; (6) Risk assessment; (7) Risk mitigation.

All of these process steps must be validated one by one before proceeding with the risk assessment. At the end of these steps, a conclusion is drawn: risk is either negligible or non-negligible.

Currently, 25 LCB members[52] hold an LCB Due Diligence Compliance Certificate.

In 2024, LCB updated its DDS to align with the EUDR's new requirements. This DDS is available to all market players and major merchants who are signatories of Le Commerce du Bois' CSR Commitments Charter. It is worth noting that LCB mandates a third-party audit to verify the proper use of its DDS by its users. A compliance certificate is issued accordingly, along with a TIMBER-SCORE for the overall CSR component.



Decision Tree of the LCB Due Diligence System updated in 2021

Other decision tree models have been developed by other organisations, such as the one from the German Timber Trade Federation[53], but since they are not publicly available, they cannot be included in this document.

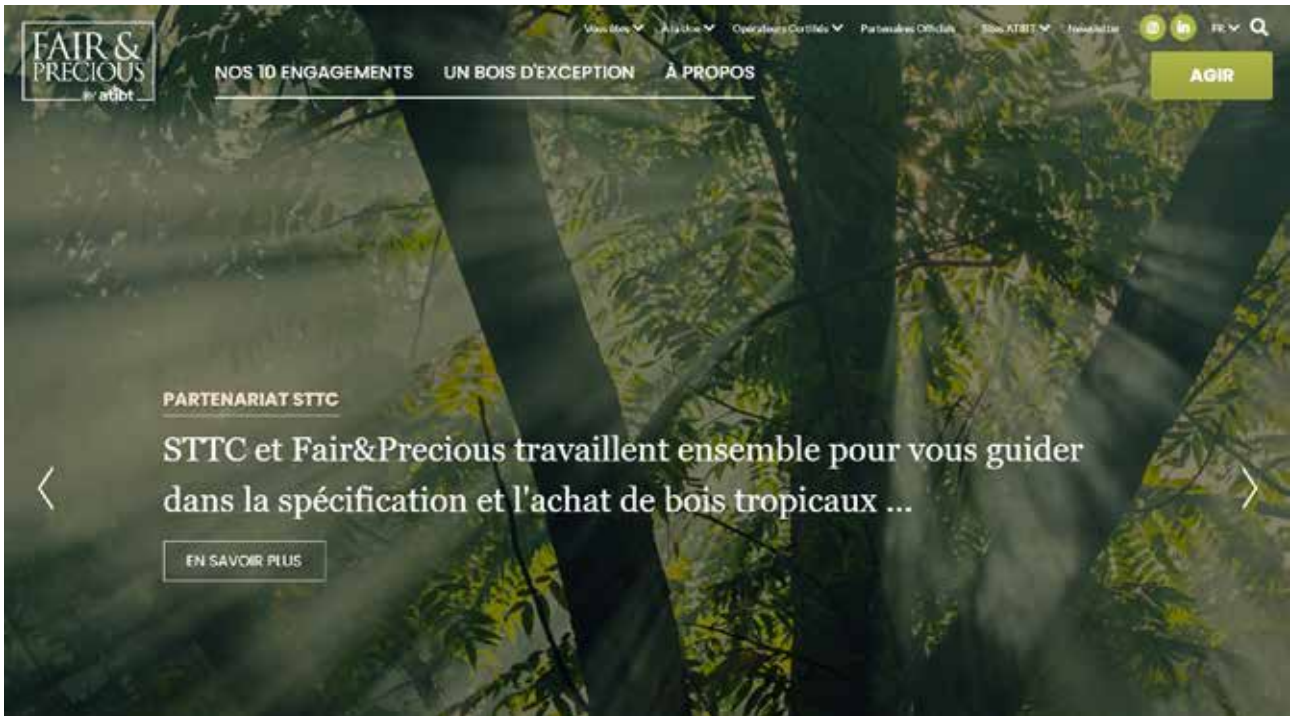
2.6 THE *FAIR&PRECIOUS* BRAND

Fair&Precious[54] is a collective and collaborative brand created by ATIBT and its members, who are committed to certification processes and sustainable management within the tropical timber sector.

For ***Fair&Precious*** companies, dialogue and mutual respect are fundamental values. They work actively in the field every day to ensure that human development occurs in harmony with the forest.

Fair&Precious strives to enhance the value of forest resources in the Congo Basin and Latin America, promote best practices within the tropical timber sector, and, most importantly, encourage the purchase of certified tropical timber among target audiences.

As of 2024, eight loggers in the Congo Basin are members of Fair&Precious[55], collectively overseeing over 6 million hectares of certified tropical forests.



52. https://www.lecommercedubois.org/p/43/rbue
53. For any information on this subject, contact: German Timber Trade Federation | Am Weidendamm 1 A | 10117 Berlin | Germany P: +49-30-726258-21 | F: +49-30-726258-81 | Email: petersen@gdholz.de
54. https://www.fair-and-precious.org/en
55. https://www.fair-and-precious.org/en/p/67/certified-tropical-wood-operators

3. ADMINISTRATIVE AND REGULATORY OBLIGATIONS OF A TECHNICAL SPECIFICATIONS DOCUMENT FOR THE USE OF TROPICAL TIMBER

The recommendation to use tropical timber in a technical specifications document, regardless of the project it refers to, can only be considered in compliance with various regulations, both at the European and national levels.
The key aspects of the main regulations overseeing the use and specificities of tropical timber are presented in this section.

3.1 GENERAL EUROPEAN REGULATIONS

3.1.1 EUROPE'S CONSTRUCTION PRODUCTS REGULATION

The Construction Products Regulation (CPR)[56], which is of primary importance for all materials, whether they are of plant or mineral origin, stipulates that in order to introduce a construction product onto the European Union market, it must be covered by a harmonised standard or conform to a European technical assessment. The manufacturer must issue a declaration of performance and add the CE marking to the relevant product.

By issuing the declaration of performance and adding the CE marking, the manufacturer takes on the responsibility of ensuring the product's compliance with the declared performance characteristics.

This regulation (EU) No. 305/2011 of the European Parliament and Council, dated March 9, 2011, establishes harmonised conditions for the marketing of construction products[57]. It consists of 68 articles organised into 9 chapters: (1) General provisions; (2) Declaration of performances and CE marking; (3) Obligations of economic stakeholders; (4) Harmonised technical specifications; (5) Technical assessment bodies; (6) Simplified procedures; (7) Notifying authorities and notifying bodies; (8) Market surveillance and safeguard procedures; (9) Final provisions.

For applicable products, the CE marking, which is central to this regulation, offers a significant advantage, as all countries must allow the sale of construction products bearing the CE marking (European Commission, 2015[58]).

Public authorities cannot require any additional markings, certificates, or further testing. As a result, distributors can market their products in any country within the EU's internal market using the same documentation.

56. https://www.rpcnet.fr/
57. https://eur-lex.europa.eu/legal-content/FR/TXT/PDF/?uri=CELEX:32011R0305&from=FR
58. European Commission, 2015. CE marking of construction products step by step. 25 pages. https://www.rpcnet.fr/pdf/2015-11-12_marquage_CE_etape_etape.pdf

With the declaration of performances, this marking also helps end users verify the product's performances and compare it with other products using the same technical approach.

18 families of timber products[59] are subject to CE marking, whether they are tropical or temperate: structural finger-jointed timber, rectangular-section structural timber, glued laminated timber, cross-laminated timber, prefabricated structural elements using metal plate connectors, fire-resistant external windows, KERTO – RIPA[60], timber frame house kits, interior cladding and wooden facades, timber-based panels, cement-bonded particleboards, suspended ceilings, fire-retardant wooden flooring and parquet, external doors without fire resistance characteristics, wooden poles for overhead lines, lightweight composite beams and posts made from timber, decorative wall coverings (rolls and panels), and laminate coverings.

3.1.2 EUROCODES, EUROCODE 5

The Eurocodes[61] consist of a set of 58 European standards, applied on a voluntary basis.

They serve to harmonise calculation methods used to verify the stability and sizing of various elements that make up buildings or civil engineering structures, regardless of the type of construction or materials used (concrete, metal, composite steel/concrete structures, masonry, **timber**, aluminium, calculation rules for geotechnical works, and seismic design rules).

The Eurocodes are European design and structural calculation codes that both replace national standards and enable construction companies and engineering firms to access markets in other EU member states.

The Eurocodes are divided into 10 groups of texts[62], covering the technical aspects of structural calculations and fire design for buildings and civil engineering structures. They are organised into two families: cross-cutting Eurocodes, material-specific Eurocodes

Eurocode 5[63] (NF EN 1995) outlines the design and calculation rules for timber structures, including solid timber, glued laminated timber or engineered timber products such as laminated veneer lumber.

In France, Eurocode 5 replaced the CB71 rules[64] in 2010.

However, Eurocode 5 is not fully self-sufficient for timber structure calculations, as certain data - such as the characteristic strength values of solid timber - are provided in NF EN 338[65].

Eurocode 5, which pertains to the NF EN 1995 standard - Design of Timber Structures, consists of three parts:

1995-1-1 – General rules and rules for buildings

1995-1-2 – Fire behaviour calculation

1995-2 – Bridge

59. https://www.fcba.fr/prestations/certifier-evaluer/marquage-ce/
60. https://www.metsagroup.com/fr/metsawood/produits-et-services/produits/kerto-lvl/
61. https://normalisation.afnor.org/thematiques/eurocodes/
62. https://normalisation.afnor.org/wp-content/uploads/2016/05/liste-eurocodes.pdf
63. https://www.calculs-eurocodes.com/eurocode_5
64. https://www.icab.eu/guide/cb71/
65. AFNOR, 2016. Structural timber – Strength classes. Standard NF EN 338 (1 July 2016), 15 pages.

3.1.3 THE REACH REGULATION

REACH[66,67] is a European regulation (Regulation no. 1907/2006) that went into effect in 2007 to ensure the safe manufacture and use of chemical substances in European industry.

Its purpose is to identify, evaluate, and control chemical substances that are manufactured, imported, or introduced onto the European market.

REACH is associated with four main objectives:

- protecting human health and the environment from the potential risks of chemical substances;
- establishing identical and transparent information on the nature and risks of substances, whether in their raw form or in a mixture, from the supplier to the final customer;
- ensuring the safe handling of chemical substances by employees;
- strengthening the competitiveness of industry, particularly the chemical sector, which is a key area of the European economy.

REACH applies to all businesses within the European Economic Area (EEA = European Union + Norway + Iceland + Liechtenstein) that manufacture, import, or use chemical substances in their operations, whether these substances are in their raw state (e.g., a solvent or metal), in a mixture (e.g., a cleaning product containing a solvent, an alloy), or contained in an article (e.g., a kitchen utensil).

The REACH regulation applies to timber products in relation to **bonding operations, preservation treatments,** and **finishing operations** (e.g., painting, varnishing, stains). These processes involve chemical compounds whose use must be authorised by the regulation.

3.2 FRENCH REGULATIONS

3.2.1 PUBLIC PROCUREMENT CODE

The public procurement code[68] came into effect on 1 April 2019.

Organised according to the chronology of a contract's lifecycle, from its preparation to its execution, it serves as a true «toolbox» for public procurement stakeholders.

It also incorporates all mechanisms related to alternative dispute resolution, encouraging stakeholders to adopt a swift and non-contentious approach to resolving their disputes.

It consists of three parts: (1) Definitions and scope; (2) Public contracts; (3) Concessions.

- Article R2111-8 of the Public Procurement Code[69], as presented in section 1.2 of this document, defines the three methods by which buyers can formulate the technical specifications of their contracts:

66. https://www.ecologie.gouv.fr/politiques-publiques/reglementation-reach#quels-sont-les-objectifs-de-reach-1
67. The acronym REACH is formed from the following terms: **R**egistration of all substances manufactured or imported at more than 1 tonne per year; **E**valuation of testing proposals, registration dossiers, and substances; **A**uthorisation for substances of very high concern; Restrictions to manage risks related to other **CH**emical substances.
68. https://www.economie.gouv.fr/daj/code-commande-publique-et-autres-textes
69. https://www.marche-public.fr/ccp/R2111-08-specifications-techniques-normes-documents-performances-exigences-fonctionnelles.htm

- either by reference to standards or other equivalent documents accessible to bidders, including technical approvals or other technical reference documents developed by standardisation bodies;

- **or in terms of performances or functional requirements;**

- or by a combination of both.

This flexibility in formulating technical specifications allows buyers to adapt their approach according to the nature of the need while ensuring a clear and objective expression of their requirements.

As mentioned in section 1.2, this Guide favours a presentation based on performances and functional requirements for the 13 families of timber products that are examined. This approach is therefore based on Article R2111-8 of the public procurement code, which allows the technical specifications of a technical specifications document to refer to these characteristics.

3.2.2 THE RE2020 ENVIRONMENTAL REGULATION

RE 2020 is the new energy and environmental regulation for all new constructions.

With the help of industry stakeholders, the government launched an unprecedented project to incorporate not only energy consumption but also carbon emissions (including those related to the construction phase of the building) into regulations.

The aim is to design and construct the future living spaces of the French population while pursuing three key objectives set by the government:

- an objective of energy efficiency and energy decarbonisation;

- a reduced carbon impact;

- guaranteed comfort during extreme heat conditions.

This new regulation, anticipated by the E+/C- experimental framework and which replaces RT 2012, emerges from the government's initiative and the collective action of stakeholders who have decided to work together to reduce building-related emissions.

RE 2020 is the first French regulation - and one of the first worldwide - to introduce environmental performance into new constructions via a life cycle analysis.

It has been progressively implemented since 1 January 2022, starting with residential buildings.

The *Ministry of Ecological Transition, Energy, Climate, and Risk Prevention* has developed a freely accessible RE 2020 Environmental Regulation Guide[70] to help construction professionals familiarise themselves with this new regulation.

These enhanced requirements, along with a system of evolving thresholds (2025, 2028, and 2031), will favour the use of sustainable materials, such as timber.

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70. Cabassud Nicolas, 2024. RE 2020 Environmental Regulation Guide. Environmental regulation for new buildings (RE 2020), Ministry of Ecological Transition, Energy, Climate, and Risk Prevention, 93 pages. https://www.ecologie.gouv.fr/sites/default/files/documents/guide_re2020_version_janvier_2024.pdf

3.2.3 THE AGEC LAW

The AGEC law[71] (*loi **a**nti-**g**aspillage pour une **é**conomie **c**irculaire* - anti-waste law for a circular economy), is a measure introduced under the 2004 environmental charter.

It consists of 130 articles aimed at combating all forms of waste. It serves as a genuine regulatory tool for the circular economy.

Enacted on 10 February 2020, the AGEC law was published in the Official Journal on 11 February 2020.

It is structured into several implementation phases: 2021 to 2025; 2025 to 2030; 2030 to 2035; 2035 to 2040.

For each of these phases, implementing decrees have already been drafted and will be published in due course according to a set timetable.

The AGEC law thus joins numerous regulatory frameworks encouraging businesses to act in favour of the energy and ecological transition.

It has resulted in several implementing decrees aimed at clarifying its practical application.

These decrees cover various aspects of the law, ranging from waste management to consumer information, including extended producer responsibility, public procurement obligations, and the ban on certain single-use plastic products[72].

ANTI-WASTE LAW
FOR A CIRCULAR ECONOMY

71. LAW no. 2020-105 of 10 February 2020 on combating waste and promoting a circular economy: https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000041553759/
72. https://bigmedia.bpifrance.fr/nos-dossiers/loi-agec-synthese-impacts-obligations-anti-gaspillage-pour-les-entreprises#:~:text=La%20loi%20AGEC%20%C3%A9largit%20d,financer%20leur%20gestion%20des%20d%C3%A9chets
73. https://www.ffbatiment.fr/gestion-entreprise/organiser-mon-chantier/dechets-de-chantier-bonnes-pratiques-environnementales/dossier/dechets-de-chantier-c-est-quoi-la-rep-batiment#:~:text=D%C3%A9chets%20de%20chantier-,D%C3%A9chets%20de%20chantier%20%3A%20c'est%20quoi%20la%20REP%20B%C3%A2timent%20%3F,march%C3%A9%20de%20produits%20et%20mat%C3%A9riaux

3.2.4 THE REP *BÂTIMENT PMCB* REGULATORY FRAMEWORK

©valentynsemenov via Canva.com

As part of the law on combating waste for a circular economy (AGEC – art. 62), the REP Bâtiment PMCB (***R**esponsabilité **É**largie du **P**roducteur pour les **P**roduits et les **M**atériaux de **C**onstruction du secteur du **B**âtiment* - **E**xtended **P**roducer **R**esponsibility for **B**uilding **C**onstruction **P**roducts and **M**aterials) regulatory framework, or more simply REP Bâtiment, went into effect in 2023.

It is based on the «polluter pays» principle: it shifts the cost of waste management from the holder to the entity introducing the products and materials onto the market.

The REP mechanism is simple[73]: an eco-contribution is added to the sale price of products and materials. This eco-contribution is collected by the market players (manufacturers, importers, and distributors having their own brands) and then transferred to eco-organisations accredited by the state. These organisations are responsible for arranging the free collection of sorted waste and its recovery.

For construction companies, this means that construction waste will gradually be collected free of charge.

The REP Bâtiment regulation applies to all products and materials, including walls, floors, and ceiling coverings that are intended to be permanently incorporated, installed, or assembled in a building or used for related site developments, including those for vehicle parking.

These products and materials are classified into two categories:

Category 1: inert materials and products (mineral-based products such as concrete, lime, stone, brick, slate, tiles, etc.)

Category 2: Other building materials and products, including metal, **timber**, chemicals (mortars, coatings, paints, varnishes, resins, etc., except those covered by the REP DDS[74] managed by the EcoDDS eco-organisation), glazed joinery, plaster, plastic, bituminous membranes, glass wool, rock wool, and bio-based materials (excluding timber).

Le *Commerce du Bois*, a partner, administrator, and sector committee chairman within VALOBAT (one of the 4 state-approved eco-organisations), is actively involved in collectively achieving the objectives of reducing illegal dumping, improving collection, developing material recycling, and promoting reuse and repurposing.

For more information, contact *Le Commerce du Bois* or visit the website of the accredited coordinating body: www.oca-batiment.org

74. Extended Producer Responsibility for Specific Diffuse Waste

4. THE PERFORMANCE AND FUNCTIONAL REQUIREMENTS TO BE DEFINED FOR A TECHNICAL SPECIFICATIONS DOCUMENT COVERING 13 FAMILIES OF TROPICAL TIMBER PRODUCTS

4.1 GENERAL APPROACH

The performance levels and functional requirements needed from tropical timber, depending on its use, fall into four main functional categories. The relative importance of each category depends on the intended application and associated technical constraints:

- mechanical strength
- stability
- appearance
- natural durability against biological deterioration agents

4.1.1 MECHANICAL RESISTANCE

Martin and Vernay, 2016[75]

The design of timber structures requires the use of structural calculation codes and an understanding of the reference mechanical properties of timber.

As timber is not isotropic, numerous indicators are needed to characterise the material.

Three key reference properties - density, strength, and the modulus of elasticity in bending - allow a timber species to be assigned to a mechanical class.

Once the mechanical class of a timber species is determined, other mechanical properties (such as tensile, compressive, and shear strength) are defined through conversion rules specified in standard EN 338[76].

The mechanical properties of timber are highly dependent on its natural characteristics. The visual grading of sawn timber allows for the definition of its quality and guarantees the associated mechanical properties, for each species.

Standard EN 1912[77] consolidates various national standards across Europe that describe the various visual grading rules for structural applications.

Mechanical classification is essential in order to obtain CE marking for structural timber.

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75. Martin P., Vernay M., 2016. Guide d'utilisation des bois africains éco-certifiés en Europe. Volume 1, ATIBT, 100 pages. https://www.atibt.org/files/upload/technical-publications/ATIBT-GUIDE-BOIS-AFRICAINS-NUM-V2.pdf
76. AFNOR, 2016. Structural Timber – Strength Classes. Standard NF EN 338 (1 July 2016), 15 pages.
77. AFNOR, 2024. Structural Timber – Strength Classes – Allocation of visual classes and species. Standard NF EN 1912 (2024), 19 pages.

4.1.2 STABILITY

The stability of timber, meaning its ability to resist deformation due to changes in ambient temperature and air humidity, is determined by four measurable physical properties in laboratory conditions:

Gérard et al., 2016[78]

- ***Fibre saturation point (FSP, in %)***

In freshly cut timber, some of the water fills the cellular and intercellular spaces to varying degrees. The removal of this free water occurs without any shrinkage.

Once the free water has completely disappeared, the timber only contains water that is chemically bound to the cell walls. The removal of this bound water during drying causes shrinkage, leading to timber deformation.

The fibre saturation point corresponds to the moisture content at which the timber is fully saturated with bound water.

Below this threshold, the timber starts to shrink as it dries.

The FSP usually ranges between 20% and 40%, depending on the species, but generally falls around 30%.

- ***Volumetric shrinkage coefficient (Rv, in % per %)***

When a piece of timber dries below its fibre saturation point (FSP), its volume decreases. Conversely, if it absorbs moisture, its volume increases until it reaches the FSP.

If moisture uptake continues beyond the FSP, the volume remains unchanged.

- The volumetric shrinkage coefficient (Rv - *retrait volumique*, or volume shrinkage) quantifies these volume variations and corresponds to the volumetric shrinkage of a timber piece when its moisture content changes by 1%.

- ***Total tangential shrinkage (Rt) and total radial shrinkage (Rr) (in %)***

Until the fibre saturation point (FSP) is reached, timber does not shrink during drying. Below this threshold, it undergoes dimensional changes as its moisture content fluctuates.

Shrinkage below the FSP occurs in three directions within the timber: longitudinal, tangential, and radial.

Longitudinal shrinkage is very small compared to tangential and radial shrinkage - typically only a few tenths of a percent. However, it can have a significant impact on the dimensional stability of long timber pieces.

Total tangential shrinkage (Rt) and total radial shrinkage (Rr) are commonly measured to assess timber behaviour during drying or more generally when there are humidity variations.

- ***Ratio of the two transverse shrinkages Rt/Rr***

The ratio of total tangential shrinkage to total radial shrinkage (Rt / Rr) provides an indication of the deformations a timber piece undergoes when exposed to moisture fluctuations.

This parameter is particularly important for non-oriented cuts (off-quarter sawn timber). A ratio of Rt / Rr greater than 2 suggests that a species is prone to deformation. The closer this value is to 1, the more stable the timber is, regardless of the cutting method.

78. Gérard J. (ed), Guibal D., Paradis S., Cerre J.C. et al., 2016. Atlas of tropical timbers. Editions Quae, Practical guide collection, print / pdf / epub version, 1000 pages. http://www.quae.com/fr/r4976-atlas-des-bois-tropicaux.html

4.1.3 APPEARANCE

The aesthetic character of timber is a matter of subjective appreciation. Tropical species cover a wide range of colours, some of which are not found in European species.

The arrangement of the various tissues that make up the timber material, along with certain unique features, can provide it with highly sought-after aesthetic qualities. These qualities contribute to the reputation of certain tropical timbers in industries such as furniture-making, joinery, cabinetmaking and interior decoration (Martin and Vernay, 2016).

African tropical sawn timber is subject to a visual grading system based on rules that consider the number of standard defects in relation to the dimensions of the pieces.

These grading rules define the piece with the most defects for each grade; pieces meeting a higher grade may, of course, also be accepted. Unless otherwise specified, each piece must be graded based on its worst side (Gérard and Groutel, 2023[79]).

4.1.4 NATURAL DURABILITY AGAINST BIOLOGICAL DEGRADATION AGENTS AND USAGE CLASSES

Martin and Vernay, 2016

Natural durability is a property that is intrinsic to each timber species; it refers to its ability to resist against biological degradation over time, including attacks from fungi, timber-boring insect larvae, termites, and marine borers.

There is no such thing as completely rot-proof timber.

To assess this property, laboratory tests are conducted using a standardised protocol (NF EN 350[80]).

The results are validated and confirmed through real-world experience.

The most commonly used durability classifications relate to decay fungi.

Five natural durability classes of timber against decay fungi are defined as follows:

- very durable timber: class DC1 (durability class 1), referred to as «class 1»;
- durable timber: class DC2, referred to as «class 2»;
- moderately durable timber: class DC3, referred to as «class 3»;
- slightly durable timber: class DC4, referred to as «class 4»;
- non-durable timber: class DC5, referred to as «class 5».

- ***The usage class concept***

The usage class corresponds to the level of exposure to different biological degradation agents based on the service conditions of a timber component or structure. It may change following modifications to the structure's design or positioning.

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79. Gérard J., Groutel E., 2024. Main grading rules for sawn tropical timber. Booklet no. 3, 9 pages. https://www.atibt.org/files/upload/technical-publications/Contrats-et-usages-Bois-tropicaux/PAMPHLET-3-MAIN-GRADING-RULES-FOR-SAWN-TROPICAL-TIMBER_03062025.pdf
80. AFNOR, 2016. Durability of timber and timber-based materials – Test methods and classification of durability against biological agents of timber and timber-based materials. Standard NF EN 350 (28 October 2016), 64 pages.

The service life of timber must be interpreted based on the species and the severity of the exposures. It depends on the natural durability of the timber but also on other factors, such as the design details of a structure (risk of water traps, timber ventilation, etc.), the type of maintenance that is planned, and local climatic conditions.

It is important not to confuse the concepts of «fungal resistance class» and «usage class,» as their qualification criteria differ.

Service conditions have been grouped into usage classes (standard NF EN 335[81]), previously referred to as «hazard classes» until 2013.

Each class refers to a category of uses associated with the same level of biological degradation risk:

Usage class	General use
1	Indoors, under dry conditions
2	Indoors or under shelter, no exposure to bad weather. Possibility of water condensation
3	Outdoors, above ground, exposed to bad weather. Class 3 is subdivided into 2 sub-classes: 3.1 Short-term moisture exposure - 3.2 Prolonged moisture exposure
4	Outdoors, in contact with soil or fresh water
5	Regularly or permanently immersed in seawater

Specificities of usage class 5: A timber species that naturally meets (without preservation treatment) usage class 5 generally also meets class 4, except for a few rare species that only meet class 3, or even just class 2 (Basralocus, Garapa, Iroko, Louro vermelho, Sougué).

The European standard NF EN 460 (February 2023)[82] proposes a correspondence table (below) linking the natural durability of solid timber to its potential use within a given risk class.

As indicated in the table, for usage classes 2 to 5, the correspondences are not precisely defined for certain durability levels. **The corresponding values should therefore be used with caution and professional judgement.**

81. AFNOR, 2013. Durability of timber and timber-based materials – Usage classes: definitions, application to solid timber and timber-based materials. Standard NF EN 335, May 2013, 16 pages.
82. AFNOR, 2023. Durability of timber and timber-based materials – Guide for determining performance. Standard NF EN 460, February 2023, 28 pages.

Use Class	Durability Class				
	1	2	3	4	5
1	o	o	o	o	o
2	o	o	o	(o)	(o)
3.1	o	o	(o)	(o)	(o) - (x)
3.2	o	o	(o)	(o) - (x)	x
4	o	(o)	(x)	x	x
5	o	(x)	(x)	x	x

o natural durability sufficient

(o) natural durability is normally sufficient, but for certain end uses conferred durability (preservative treatment or wood modification) or enhancement of performance (e.g. coatings, design) can be advisable

(o)-(x) natural durability may be sufficient, but depending on the wood species, its permeability and end use conferred durability (preservative treatment or wood modification) or enhancement of performance (e.g. coatings, design) can be necessary

(x) conferred durability (preservative treatment or wood modification) or enhancement of performance (e.g. coatings, design) is normally advisable, but for certain end uses natural durability can be sufficient

x conferred durability (preservative treatment or wood modification) necessary

In addition to standard NF EN 460, documentation booklet FD P 20 651[83] serves as a reference source. Its objectives are:

- to contribute to the identification of usage classes;
- to ensure the reliable specification of timber species based on the durability requirements for different observed usage classes (natural and conferred durability).

It serves as a guide for the development of DTUs (Documents Techniques Unifiés – Unified Technical Documents) and design standards to provide a consistent approach to understanding the behaviour of timber elements and structures in terms of managing biological durability.

83. AFNOR, 2011. Durability of timber elements and structures. Documentation booklet FD P 20-651, June 2011, 35 pages.
84. 84. Martin P., Vernay M., 2016. Guide to the use of eco-certified African timber in Europe. ATIBT, 100 pages. https://www.atibt.org/files/upload/technical-publications/ATIBT-GUIDE-BOIS-AFRICAINS-NUM-V2.pdf
85. Martin P., Groutel E., 2023. Guide to the local use of timber in Central Africa. ATIBT-RIFFEAC, 116 pages. https://www.atibt.org/files/upload/technical-publications/ATIBT-GUIDE-TOME-2-FSC.pdf

4.2 PERFORMANCE AND FUNCTIONAL REQUIREMENTS BY PRODUCT FAMILY

In this section of the Guide, the descriptions from the two reference works Guide to the Use of Eco-Certified African Timber in Europe[84] (Martin and Vernay, 2016) and Guide to the Local Use of Timber in Central Africa[85] (Martin and Groutel, 2023), which are essential resources for all users of tropical timber from Central Africa, are extensively used as references to define the performance and functional requirements of the 13 product families described.

TERRACES, DECKING, AND FLOORING

• NATURE OF THE STRUCTURE

These products consist of outdoor installations composed of timber planks forming a flooring surface for pedestrian use and circulation. The upper surface of the structure is positioned at a maximum height of 1 metre above the underlying continuous surface (ground, concrete slab, etc.), in line with the application scope of standard NF DTU 51.4[86].

If this height exceeds 1 metre, the structure is no longer considered flooring but a timber framework, which falls under standard DTU 31.1[87].

• INSTALLATION CONSTRAINTS

The decking planks are laid horizontally on a support that can be of various materials (timber, concrete, metal).

As a result, they are highly exposed to bad weather conditions: water effects with risks of stagnation, exposure to cold, UV radiation, and heat, with the risk of moisture absorption from the underside.

For poolside decks, the timber must withstand splashes of chlorinated or salty water.

Two possible service situations exist:

- planks without contact with the ground or a prolonged source of moisture: this pertains to usage class 3.
- planks in contact with the ground or a prolonged source of moisture: this pertains to usage class 4.

In line with the specifications of standard NF DTU 51.4 Pl-1 (CCT), the following three moisture content categories can be defined:

- category 1: between 12 and 17% (generally for kiln-dried timber) with a target moisture content of 14%;
- category 2: between 18 and 22% with a target moisture content of 20%;
- category 3: from 23% up to the fibre saturation point (FSP), with a target moisture content that is in line with the FSP. This category is only applicable to treated timber, as it has been pre-dried before treatment.

For untreated timber, the moisture content of the planks must therefore be below 22%.

86. AFNOR, 2018. Building works - Exterior timber decking - Part 1-1. Standard technical specifications (CCT) - P1.2. General material selection criteria (CGM) - P2. Standard special administrative clauses (CCS). Standard NF DTU 51.4 (December 2018), 92 pages.
87. AFNOR, 2017. Building works - Timber structures - Part 1-1: Standard technical specifications - Part 1-2: General material selection criteria - Part 2: Standard special administrative clauses. Standard NF DTU 31.1 (June 2017), 79 pages.

• SPECIFIC REGULATORY FRAMEWORK

The properties required for decking boards used in terraces or decking are described in standard NF B 54-040[88].

This standard defines and specifies the relevant characteristics, as well as the appropriate evaluation methods, for solid timber boards, fresh from production and used in outdoor decking. The boards must have a surface condition that ensures long-term user safety.

The installation requirements for these structures are defined in standard NF DTU 51.4 or in the Design and Construction Guide for Wooden Terraces[89]. This guide refers to the standard, specifying the various possible scenarios during the construction of a terrace.

The DTU standard consists of 3 parts: Part 1-1: Standard Technical Specifications (CCT - *Cahier des clauses techniques*), Part 1-2: General Material Selection Criteria (CGM – Critères généraux des matériaux), Part 2: Special Administrative Clauses (CCS – *Cahiers des clauses spéciales)*.

Specifically, this DTU standard defines the concepts of standard design and elaborate design (which relate to the notions of draining designs, whether moderate or moisture-trapping, from FD P 20-651).

Any decking that is not of elaborate design is considered to have a standard design.

Elaborate design involves implementing construction techniques that reduce moisture retention points, thereby improving the longevity of the decking (see principles and details in the DTU).

• MAIN SUITABLE TIMBER SPECIES

Afrormosia, Alep, Angueuk, Azobé, Bété, Bilinga, Clear Bossé, Dark Bossé, Congotali, Difou, Douka, Doussié, Eyoum, Iatandza, Iroko, Izombé, Kanda, Landa, Limbali, Makoré, Moabi, Monghinza, Mukulungu, Niové, Okan, Osanga, Ovengkol, Pachy, African Padauk, Tali...

The technological descriptions of these species - including durability classes, usage classes, and mechanical classes - can be consulted in the Tropix data sheets[90].

The correspondence between the standardised names of the timbers (above) and their vernacular or botanical names is provided in ATIBT's General Nomenclature of Tropical Timbers (2016)[91].

• ENVIRONMENTAL AND HEALTH DECLARATION SHEET (FDES - *FICHE DE DÉCLARATION ENVIRONNEMENTALE ET SANITAIRE*)

Three collective FDES (Environmental and Health Declaration Sheets)[92] were developed as part of the DRYADES project[94] (life cycle analysis of timber products from the Congo Basin), funded by the PPECF programme[95] of the COMIFAC[96]:

- *FDES: decking boards made using all tropical timber species from the Congo Basin, all configurations (v.1.1)*
- *FDES: cladding boards made using all tropical timber species from the Congo Basin, all configurations (see the description «Cladding and exterior coverings»)*[98]
- *FDES: laminated timber scantlings*[97] *made using all tropical timber species from the Congo Basin, all configurations (excluding*

88. AFNOR, 2018. Outdoor wooden decking boards – Characteristics. Standard NF B 54-040 (December 2018).
89. https://www.lecommercedubois.org/files/documents/file/Guide-Terrasse-FNB-LCB-ATB-ARBUST-FCBA-avec-liens-BD-yxmo.pdf
90. https://tropix.cirad.fr/fiches-disponibles
91. https://www.atibt.org/files/upload/Nomenclature-Generale-des-Bois-Tropicaux-7eme-edition.pdf
92. An Environmental and Health Declaration Sheet (FDES) is a Type III environmental declaration as defined by standard ISO14025. It contains the results of the Life Cycle Assessment of a product as well as health-related information in the perspective, in particular, of calculating the environmental and health performance of the building for its eco-design. The FDES must comply with the requirements of: (1) standard EN 15804 and its national supplement; (2) the decrees and orders in effect regarding environmental declarations for construction and decoration products in France; (3) the INIES programme regulations.

installation accessories) (v.1.1) (see the description on «Windows, exterior doors, shutters, and joinery assemblies»)

For the «Decking made using timber boards from the Congo Basin» FDES[93], the functional unit is a one-square-metre platform outside a building, consisting of decking made of timber boards from the Congo Basin over a reference lifespan of 50 years.

The reference product is a decking made using timber boards from the Congo Basin, meaning an outdoor flooring system consisting of boards mechanically fixed to timber joists, which are themselves attached to the support using metal fasteners or PVC pedestals.

The boards can have different thicknesses and profiles. Most often, they are profiled to allow for a draining design. Installation is carried out on-site. The boards can be mounted on different types of joist structures (single, double, or crossed). The horizontality of the joist bed is ensured by a system of plastic shims (except in cases where adjustable PVC pedestals are used).

Osanga decking bordering an infinity pool – Supplies by *Fibres Industries Bois,* Made by *Agencement Tiby*, La Réunion (France). © David Bodelu, *Fibres Industries Bois* (photo extracted from the Atlas of Tropical Timbers 2016[99]).

93. https://base-inies.fr/consultation/infos-produit/37684
94. https://www.fair-and-precious.org/fr/news/824/analyses-de-cycle-de-vie-des-bois-tropicaux-latibt-presente-les-resultats-finaux-du-projet-dryades
95. http://www.ppecf-comifac.com/accueil.html
96. Central African Forest Commission, https://comifac.org/
97. The market for tropical timber windows is highly developed in France.
98. The FDES entitled «Cladding in wooden slats from the Congo Basin, all tropical species, all configurations» will be included in the description of the Cladding and exterior coverings product family.
99. https://www.itto.int/files/itto_project_db_input/3028/Technical/F-TMT-SPD-010-12-R1-M-Atlas%20des%20bois%20tropicaux.pdf

DOCKS, BRIDGES, AND PATHWAYS OVER WATER

• NATURE OF THE STRUCTURE

These products pertain to all outdoor structures located over 1 meter above the ground, generally serving as a connection between two buildings or two discontinuous supports, composed of timber slats forming a decking surface for pedestrian access and circulation.

A dock is a structure built on discontinuous supports, such as piles, columns, etc., to support an access path to a lighthouse, facilitate the docking of small boats, etc.

• INSTALLATION CONSTRAINTS

The decking slats are installed horizontally on their support.

Like decking, terraces, and boardwalks, they are highly exposed to poor weather conditions: water effects with risks of stagnation, exposure to cold, UV rays, and heat, but without the risk of moisture absorption from the underside.

For user safety, the timber used for these structures must meet usage class 4 requirements.

The properties of decking slats suitable for these structures are described in the NF B 54-040 standard or in the Guide to the design and construction of timber terraces[100].

The slats must have a surface condition that ensures long-term safety for users.

The joists onto which the slats are screwed serve as structural elements in this case, and their specifications must comply with structural timber recommendations:

- the main stresses are mechanical;
- although generally sheltered, lightweight structures may be subject to occasional or light moisture exposure (condensation, sea spray, etc.);
- mechanical strength is subject to visual or mechanical grading; furthermore, the timber must have good machinability and a favourable strength-to-density ratio;
- depending on service conditions and the risks of exposure to biological degradation agents, a fungicide-insecticide treatment may be necessary if the natural durability of the chosen wood species is insufficient.

• SPECIFIC REGULATORY FRAMEWORK

These structures are considered timber structures and therefore fall under the NF DTU 31.1 standard.

This DTU (*Document Technique Unifié* – Unified Technical Document) standard consists of three parts: Part 1-1: a standard technical clauses document; Part 1-2: the general criteria for material selection; Part 2: a standard administrative clauses document.

This DTU defines the calculation or justification rules applicable to timber framework work, in accordance with Eurocode 5, which notably specifies or calculates service classes, deflection limit values for structures or structural elements, joints, and joist arrangements.

100. https://www.lecommercedubois.org/files/documents/file/Guide-Terrasse-FNB-LCB-ATB-ARBUST-FCBA-avec-liens-BD-yxmo.pdf
101. https://tropix.cirad.fr/fiches-disponibles

The dimensions used for calculations are those adjusted to 12% moisture content, regardless of the intended service class. Since the commercial sections of solid timber are given at 20% moisture content, a conversion must therefore be carried out beforehand to obtain the calculation section.

Depending on the conditions of exposure to moisture (as defined by the service class), the durability of structural timber elements must be ensured through the use of either naturally durable timber species or timber species with conferred durability. The assignment of the service class depends on the geographical location as well as both the massiveness and the design of the relevant element. This last parameter is introduced in the form of three design categories: draining, moderate, or moisture-trapping.

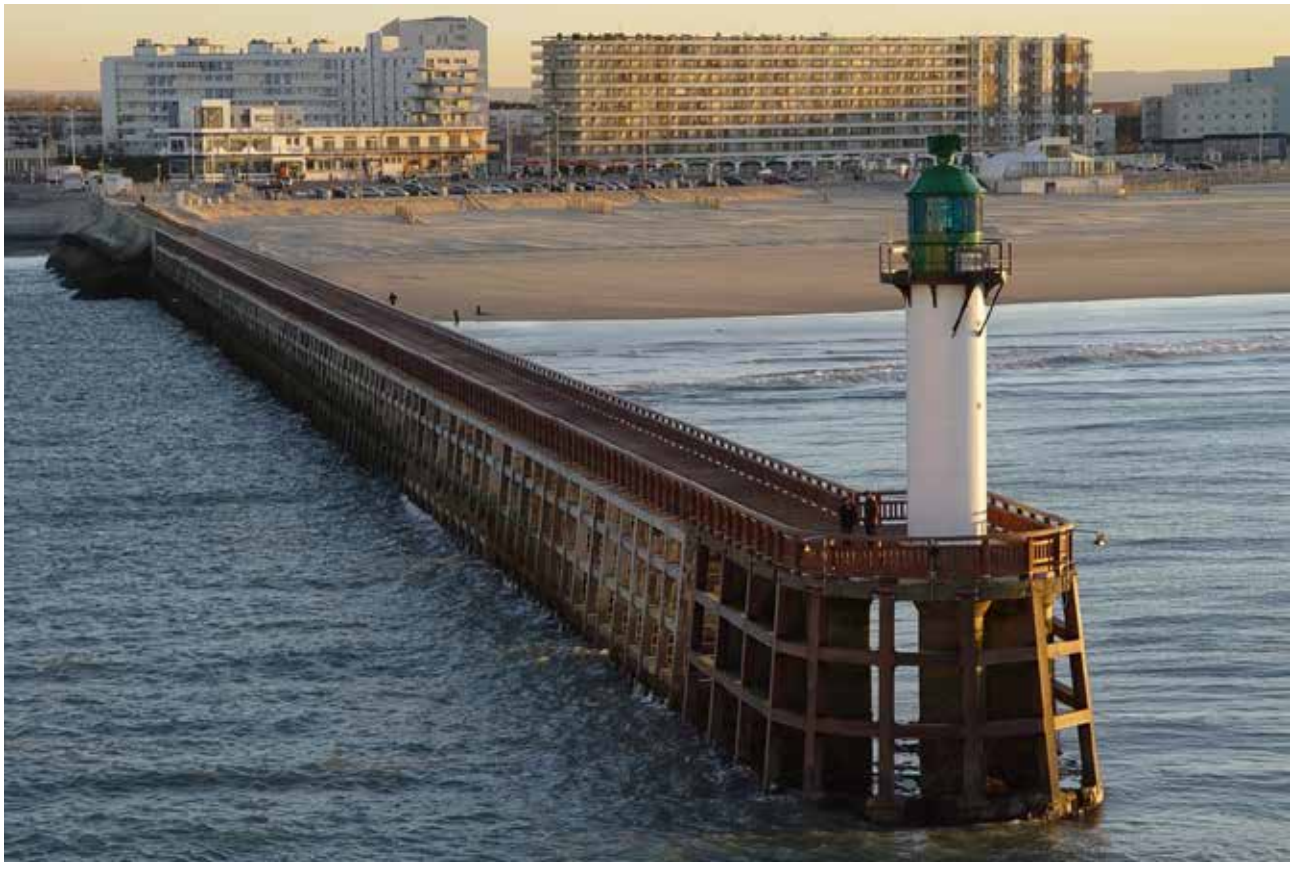
It is important to check the compatibility of the timber that is used with the nature of nearby materials to avoid reactions (such as façade renders that may react upon contact with tannins from certain timber species).

• PRINCIPAL SUITABLE SPECIES

Afrormosia, Alep, Azobé, Bété, Bilinga, Congotali, Difou, Douka, Doussié, Eveuss, Eyoum, Kanda, Landa, Makoré, Moabi, Monghinza, Mukulungu, Niové, Okan, Osanga, Pachy, African Padauk, Tali, Wamba...

The technological descriptions of these species, including the durability classes, service classes, and mechanical classes, can be found in the Tropix data sheets[101].

The correspondences between the standardised trade names of the timbers (above) and their vernacular or botanical names are provided in ATIBT's General Nomenclature of Tropical Timbers (2016).



Decking of the Calais jetty in Azobé – Completed by Bois et Loisirs, France
© Denis Delequeuche, *Bois et Loisirs* (photo from the Tropical Timber Atlas 2016)

GUARDRAILS, HANDRAILS, AND OTHER VERTICAL FALL PROTECTION SYSTEMS

• NATURE OF THE STRUCTURE

A guardrail is a generally openwork barrier designed to ensure the safety of people using a staircase or walkway. It is a structure intended to prevent people from falling when they are on an element elevated above their immediate surroundings.

It is installed at the edge of an area presenting a fall risk and aims to prevent tipping over, passing underneath, or slipping through.

A balustrade consists of a series of balusters fixed between a base and a handrail, forming an openwork guardrail that ensures safety while contributing to the architectural style.

Guardrails and balustrades designed to protect against falls from heights greater than one metre are subject to specific mandatory regulations and standards.

The upper handrail provides users with a point of support.

• INSTALLATION CONSTRAINTS

Guardrails and balustrades are often exposed to bad weather conditions and are subject to strict construction rules. The assembly methods must minimise or eliminate any risk of water infiltration or water trap.

Bolted assemblies are preferable.

Horizontal surfaces must be effectively drained. The «draining» design approach is highly recommended for this type of structure.

Base elements exposed at the «end grain» must include a water drainage system such as a «drip edge.»

Applying a water-repellent product to the ends of timber components is advised to prevent end splits, especially in elements with small cross-sections.

Due to the safety-critical nature of guardrails and balustrades, the timber's characteristics are specified with very strict requirements:

- moisture content rate must be suitable for installation conditions to minimise timber shrinkage effects.
- natural durability class must be appropriate: all exterior elements must belong to usage class 4 or usage class 3, depending on the installation conditions. Guardrails installed indoors fall under usage class 2.
- low tolerance for defects, particularly no traces of sapwood, knots, or splits, especially in joint areas.

The strength of guardrails must be validated in terms of structure, infill, and fixings. Static tests are required when guardrail formats do not conform to standardised calculation methods.

For guardrails where the infill hasn't been verified through testing or prior references, dynamic tests are necessary.

The pre-sizing tables in the *Design and installation guide for guardrails*[102] allow for the sizing of most timber guardrails.

• SPECIFIC REGULATORY FRAMEWORK

Guardrails fall under different standards depending on their use:

- for **road safety** equipment (including those with impact attenuators), the series of NF

EN 1317 standards 1 to 5[103] and timber subject to CE marking;

- for **civil engineering** structures (road bridges, footbridges, etc.), standard XP P 98 405[104], which also covers pedestrian protection, but only on civil engineering structures;

- for **protective devices** against falls of over one metre in buildings, standards NF P 01 012[105] and NF P 01 013[106];

- for ***protective devices*** against falls **in industrial installations**, standard NF EN ISO 14122-3[107].

• MAIN SUITABLE SPECIES

Afrormosia, Alep, Bilinga, Congotali, Difou, Douka, Doussié, Eyoum, Kanda, Landa, Makoré, Moabi, Mukulungu, Niové, Okan, Osanga, Ovéngkol, Pachy, African Padauk, Tali...

The technological descriptions of these species, including durability classes, use classes, and mechanical classes, can be found in the Tropix data sheets[108]. The correspondences between the standardised wood names (above) and their vernacular or botanical names are provided in ATIBT's General Nomenclature of Tropical Timbers (2016).

«Het Wrakhout» bridge and its guardrail (Azobé, Okan, and Tali), connected to a bike path and a pedestrian walkway – Welduine, Belgium © van Wijma Kampen

102. Action Programme for Construction Quality and the Energy Transition - Pact, 2020. Guide to the Design and Implementation of Guardrails. 120 pages. https://www.proreno.fr/documents/guide-conception-et-mise-en-oeuvre-des-garde-corps
103. AFNOR, 2010. Road restraint systems - Part 1: Terminology and general provisions for test methods. Standard NF EN 1317-1 (September 2010).
AFNOR, 2010. Road restraint systems - Part 2: Performance classes, acceptance criteria for crash tests, and test methods for safety barriers, including edge-of-structure barriers. Standard NF EN 1317-2 (September 2010).
AFNOR, 2010. Road restraint systems - Part 3: Performance classes, acceptance criteria for crash tests, and test methods for crash cushions. Standard NF EN 1317-3 (September 2010).
AFNOR, 2012. Road restraint systems - Part 5: Product requirements and conformity assessment for vehicle restraint systems. Standard NF EN 1317-5/IN2 NF EN 1317-5+A2 (June 2012).
104. AFNOR, 1998. Road safety barriers - Guardrails for bridges and civil engineering structures - Design, manufacturing, and implementation. Standard XP P98-405 (April 1998).
105. AFNOR, 1988. Guardrail dimensions - Safety rules for the dimensions of guardrails and stair handrails. Standard NF P01-012 (July 1998).
106. AFNOR, 1988. Guardrail tests - Methods and criteria. Standard NF P01-013 (August 1988).
107. AFNOR, 2017. Machinery safety - Permanent means of access to machinery - Part 3: stairs, step ladders, and guardrails. Standard NF EN ISO 14122-3 (March 2017).
108. https://tropix.cirad.fr/fiches-disponibles

STAIRS AND TIERED DECKING

• NATURE OF THE STRUCTURE

Staircases are assembled structural elements designed for the vertical movement of people. They consist of a series of steps and, in most cases, a guardrail. They allow access from one level to another or facilitate movement across significant elevation changes in a more or less linear manner. This specification applies to **outside staircases.**

Like walkways, pathways and platforms, **tiered decking** is an external installation located over 1 metre above ground level, unlike terraces, decking, and standard timber platforms. It consists of timber boards forming a deck that accommodates and guides pedestrian movement.

• IMPLEMENTATION CONSTRAINTS

- As an outdoor structure, the **staircase** is subjected to bad weather conditions and varying loads depending on foot traffic intensity.

A staircase is an elevated structure that must remain durable over time. The timber that is used must exhibit excellent longevity and high resistance at assembly points.

The surface of the steps must be non-slip in all weather conditions. The timber should have good indentation resistance and high wear-resistance to resist frequent foot traffic.

Staircases are subject to strict and precise construction regulations. The assembly design must prevent any risk of water infiltration or trapping. Bolted assemblies are preferable. Horizontal surfaces, especially steps, must feature effective drainage while maintaining compatibility with the anti-slip system.

- **Tiered decking boards** are installed horizontally on their support structure. They are highly exposed to poor weather conditions, including water stagnation, cold, UV rays and heat, but do not risk moisture absorption from underneath.

To ensure user safety, the timber used for these structures must comply with usage class 4.

The properties of the decking boards suitable for these installations are defined in standard NF B 54-040[109] or the Guide to the design and construction of timber terraces[110].

The boards must have a surface finish that ensures long-term user safety.

The joists onto which the boards are screwed are structural elements and must meet timber framing recommendations:

- they are primarily subjected to mechanical stresses;

- although generally sheltered, lightweight structures may occasionally be exposed to slight moisture (e.g., condensation, sea spray);

- the mechanical resistance is determined through visual or mechanical grading. Additionally, the timber must be easy to shape and have an optimal strength-to-density ratio;

109. AFNOR, 2018. NF B54-040 (December 2018) Timber decking boards for external use – Characteristics.
110. https://www.lecommercedubois.org/files/documents/file/Guide-Terrasse-FNB-LCB-ATB-ARBUST-FCBA-avec-liens-BD-yxmo.pdf

- depending on the service conditions and the risk of exposure to biological degradation agents, a fungicidal or insecticidal treatment may be necessary if the natural durability of the chosen species is insufficient.

- **SPECIFIC REGULATORY FRAMEWORK**

- The installation rules for both interior and exterior **timber staircases** are governed by DTU (*Documents Techniques Unifié* – Unified Technical Document) 36.3 (September 2014) Building works – Timber staircases and associated guardrails.

This DTU is structured into 3 parts: *Part 1-1: standard technical specifications (CCT), Part 1-2: general material selection criteria (CGM) - Part 2: standard special administrative clauses (CCS) - Part 3: design rules.*[111]

The NF P 21-210 (August 2016) Timber staircases – vocabulary standard remains in effect.

DTU 36.3, which is very specific, offers standard clauses for implementation specifications for the installation of staircases made of timber and timber-based materials, and their associated handrails or parts of staircases made of timber and timber-based materials.

These structures can be installed either indoors or outdoors for residential buildings, offices, commercial spaces, schools and hospitals, excluding furniture works.

The DTU applies to both new constructions and renovation projects.

The FCBA DTU 36.3 Standard Info – Building works – Timber staircases and associated guardrails[112] summarises the key provisions of DTU 36.3.

- As with platforms, walkways, and paths over water, **tiered decking** is classified as a timber structure and is therefore subject to the NF DTU 31.1 standard: Building works – Timber framing.

This DTU consists of 3 parts: Part 1-1 - standard technical specifications; Part 1-2 - general material selection criteria; Part 2 - standard special administrative clauses.

This DTU defines the calculation and verification rules applicable to timber framing works, based on Eurocode 5, which establishes service classes, deflection limits for structures and structural elements, assembly guidelines, and joist sizing.

Calculations are based on dimensions adjusted to a 12% moisture content, regardless of the target service class. Since commercial dimensions for solid timber are provided at a 20% moisture content, a conversion must be performed beforehand to determine the correct calculation section.

Depending on moisture exposure conditions (defined by the usage class), the durability of timber structural elements must be ensured through the use of either naturally durable timber species or of timber with enhanced durability. The assignment of a usage class depends on geographical location, timber thickness, and the relevant element's design. The latter factor is classified into three design categories: draining, moderate, or moisture-trapping.

It is important to verify the compatibility of the timber used with the nature of the surrounding materials to prevent adverse reactions, such as façade renders reacting with tannins from certain timber species.

111. It replaces the provisions of chapter VIII of the approved NF P 21-203-1 standard (May 1993) and its amendments A1 (February 1998) and A2 (August 2002), «Timber framing and staircases» (NF DTU 31.1). It also replaces document XP P 21-211 (September 2003), «Timber staircases – specifications».

112. https://www.fcba.fr/wp-content/uploads/2021/01/fcbainfo_2015_28_norme_dtu_36_3_travaux_de_batiment_escaliers_en_bois_et_garde_corps_associes_stephane_graissaguel.pdf

• MAIN SUITABLE TIMBER SPECIES

Afrormosia, Alep, Bilinga, Congotali, Difou, Douka, Doussié, Eveuss, Eyoum, Kanda, Landa, Makoré, Moabi, Mukulungu, Niové, Okan, Osanga, Ovengkol, Pachy, African Padauk, Tali, Wamba...

The technological specifications of these species, such as their durability classes, their usage classes and their mechanical classifications, can be found in the Tropix data sheets[113].

The correspondences between the standardised names of these timber species (listed above) and their vernacular or botanical names are provided in ATIBT's General Nomenclature of Tropical Timbers (2016).

Elevated staircase and decking made of Afrormosia – Created by Terrasse Nature, Antony (France).
© Terrasse Nature (photo from the Tropical Timber Atlas 2016).

113. https://tropix.cirad.fr/fiches-disponibles

WINDOWS, EXTERIOR DOORS, SHUTTERS, AND JOINERY

- **NATURE OF THE STRUCTURE**

- **Doors** and **windows** are joinery assemblies that provide both access and closure between the interior and exterior of a building.

These assemblies consist of a frame (fixed casing) that holds a door, a French door, or a window. The fixed casing, which connects the opening component to the wall, is called the chassis.

- The closures, most often **shutters**, are movable elements that protect the openings in the facades.

Timber shutters generally come in two types: solid slats or louvred slats.

The shutters complement external joinery on building façades.

They serve as security elements by protecting against unauthorised access and restricting visibility from outside.

Shutters also help regulate airflow, ventilation, and light. Positioned externally in openings, they provide additional protection for joinery elements.

- **IMPLEMENTATION CONSTRAINTS**

- Due to their position, external joinery is exposed to two distinct climatic environments. The faces of sashes and frames are subject to different humidity and temperature variations between the interior and the exterior.

Opening components endure mechanical stress from repeated opening and closing operations and are also exposed to wind action.

These elements are evaluated based on air and water tightness, as well as thermal and acoustic insulation.

Two quality options are available depending on the desired finish: transparent or opaque.

The required usage class for joinery ranges from class 3, for elements exposed to harsh weather conditions, to class 2, for sheltered applications.

- Both faces (inside and outside) of shutters experience varying cycles of moisture absorption and drying, depending on façade orientation and shutter positioning.

Shutters must not deform under their own weight. Also, they must be sufficiently durable to protect joinery elements from bad weather conditions.

The timber that is used shouldn't be too dense, to facilitate handling and to ensure the durability of fastenings and hinges.

The timber of slats is profiled in order to create a watertight assembly, so as to absorb natural expansion and contraction.

The rigidity and squareness of the panels must be meticulously ensured to prevent sagging.

To prevent water infiltration from runoff on façades, the upper section of the shutters must be protected by an effective assembly or covering system.

The framework - whether made with stiles and rails or braces and crossbars - must ensure the rigidity and flatness of the shutters.

Timber protection can be ensured using a finishing treatment with regular maintenance.

This type of structure falls under service class 3 due to its exposure to poor weather conditions, but with the possibility of drying between successive phases of moisture exposure.

- **SPECIFIC REGULATORY FRAMEWORK**

The installation of windows and external doors is governed by DTU 36.5 *Building works – Installation of windows and outside doors (October 2010)*[114].

The assessments and performances for doors and windows are described in standard EN 14351[115]. CE marking ensures that their performance is displayed.

In France, the «AEV» classification provides the characteristics of joinery: air permeability, water tightness, and wind resistance[116].

The NF P 23-305 standard (December 2014)[117] defines the minimum design and manufacturing characteristics of windows, French doors, outside doors, and timber joinery units. These joinery products are manufactured either in factories or in workshops, with or without glazing. These specifications help meet the durability performance requirements defined by the NF EN 14351 standard.

The NF P20-302 standard (November 2019)[118] defines the characteristics of windows.

The NF EN 172013 standard (March 2020)[119] describes the rules for product categories (RCP - règles des catégories de produits) for Type III environmental declarations related to windows and pedestrian door sets as defined by the NF EN 14351-1 and NF EN 14351-2 standards. Windows and pedestrian door sets also feature fire resistance and/or smoke tightness characteristics in accordance with the NF EN 16034 standard, and they are also covered by this document.

The installation of shutters and blinds is governed by DTU 34.4 Building works – Installation of shutters and blinds (July 2015)[120].

- **MAIN SUITABLE TIMBER SPECIES**

African Mahogany, Afrormosia, Andoung, Angueuk, Bété, Bodioa, Light Bossé, Dark Bossé, Bubinga, African Cordia, Difou, Douka, Doussié, Ebiara, Ekaba, Ekoune, Etimoé, Eyoum, Framiré, Gombé, Iatandza, Iroko, Izombé, Kanda, Kosipo, Kotibé, Landa, Limbali, Makoré, Mambodé, Moabi, Movingui, Niangon, Niové, Osanga, Ovengkol, Pachy, Sapelli, Sipo, Tchitola, Tiama, Tola, Wengé...

The technological descriptions of these species, including durability classes, service classes, and mechanical classes, can be found in the Tropix data sheets[121].

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114. AFNOR, 2010. NF DTU 36.5 (October 2010) Building works – Implementation of windows and external doors – Part 1-1: Standard technical specifications document – Part 1-2: general criteria for material selection (CGCM - critères généraux de choix des matériaux) – Part 2: standard special administrative specifications document – Part 3: selection guide based on exposure.
115. AFNOR, 2016. NF EN 14351-1+A2 (November 2016) & NF EN 14351-1/IN2 (November 2016) Windows and doors – Product standard, performance characteristics – Part 1: Windows and external pedestrian door sets.
116. https://www.cstb.fr/nos-offres/toutes-nos-offres/certification-nf-fenetres-blocs-baies-pvc-aluminium-rupture-pont-thermique
117. AFNOR, 2014. NF P23-305 (December 2014) Timber joinery – Technical specifications for windows, French doors, outside doors, and assembled timber joinery.
118. AFNOR, 2019. NF P20-302 (November 2019) Characteristics of windows.
119. AFNOR, 2020. NF EN 17213 (March 2020). Doors and windows – Environmental product declarations – Product category rules for windows and pedestrian door sets.
120. AFNOR, 2015. NF DTU 34.4 (July 2015) Building works – Implementation of shutters and blinds – Part 1-1: standard technical specifications document – Part 1-2: general criteria for material selection – Part 2: standard administrative specifications document – Part 3: selection guide for project managers.
121. https://tropix.cirad.fr/fiches-disponibles

The correspondences between the standardised timber names (above) and their vernacular or botanical names are provided in ATIBT's General Nomenclature of Tropical Timbers (2016).

Folding shutter made using Movingui
Fibres Industries Bois, La Réunion
© David Bodelu, Fibres Industries Bois (photo from the Tropical Timber Atlas 2016)

FDES (Fiche de déclaration environnementale et sanitaire - Environmental and health declaration sheet): laminated scantlings made of timber from the Congo Basin, all tropical species, all configurations (excluding installation accessories) (v.1.1)

- **ENVIRONMENTAL AND HEALTH DECLARATION SHEET (FDES)**

As mentioned earlier in the product family description for Terraces, decking, and timber planking, three collective FDES sheets have been developed as part of the DRYADES project (life cycle analysis of timber products from the Congo Basin), funded by COMIFAC's PPECF programme:

- FDES: timber planks from the Congo Basin, all tropical species, in all configurations (v.1.1) (see «Terrace, decking and planking» description)

- FDES: timber cladding from the Congo Basin using all tropical species, in all configurations (see «Cladding and exterior cladding» description)

- FDES: laminated scantlings made using Congo Basin timber of all tropical species, in all configurations (excluding installation accessories) (v.1.1)

For the laminated scantlings FDES using Congo Basin timber, the functional unit consists of one cubic meter of laminated timber scantlings over a reference lifetime of 30 years (excluding installation accessories). A laminated timber scantling is a joinery or interior fitting element used for the arrangement or renovation of interior buildings. The fastening elements are not included in the scope of this study.

Timber joinery/arrangement elements made of glued timber are used for:

- the furnishing or renovation of interior spaces in buildings

- joinery: the manufacture of door and window frames, casings, etc.

- arrangements: the manufacture of cupboards, handrails, interior guardrails, etc.

- furniture: factory-manufactured products are completed and ready for installation and assembly.

(https://base-inies.fr/consultation/infos-produit/38364)

• NATURE OF THE WORK

Cladding is an exterior facade covering that is made of solid timber boards, either profiled or not, and that is mechanically fixed onto a frame.

It provides protection for the facades and contributes to the thermal insulation of buildings, while also serving as an aesthetic cladding capable of withstanding external aggressions.

Timber cladding primarily plays a role in fulfilling one or more of the following requirements: appearance, protection against harsh weather, and possibly water-tightness, enhanced thermal insulation, and both protection and resistance against impacts.

• IMPLEMENTATION CONSTRAINTS

Exterior cladding and facings are self-supporting and do not experience specific mechanical stresses.

Climatic stresses vary depending on the orientation of the facades and affect subsequent maintenance.

The timber species that are used must exhibit good stability.

Manufacturing criteria require that the exposed width of the board be less than 7.5 times its thickness.

Most of the timber species that are used require pre-drilling for their fixings. The implementation must adhere to spacing rules during installation to avoid any eventual creep or deformation issues.

In most cases, usage class 3 is required. Depending on the construction system used and the orientation of the facades, class 3.1 is required for short-term humidification conditions, and class 3.2 for prolonged humidification conditions.

• SPECIFIC REGULATORY FRAMEWORK AND SCOPE OF APPLICATION

The installation of cladding is carried out according to the prescriptions of the NF-DTU 41.2 standard (August 2015) Building Works - Exterior Timber Cladding[122], which is the main reference for this family of products.

This DTU consists of three parts:

Part 1.1: Technical specifications document (CCT - *Cahier des clauses techniques*)

Part 1.2: General material selection criteria (CGM - *Critères généraux de choix des matériaux*)

Part 2: Standard special administrative clauses document (CCS - *Cahier des clauses administrative spéciales types*)

It provides standard clauses for the implementation of exterior cladding works using timber or timber-derived materials, specifically:

- Exterior timber cladding for sheltered or unsheltered walls, either vertical or slightly inclined outward (walls whose axis is between 0° and 15° relative to the vertical), referred to as timber cladding;

122. AFNOR, 2015. NF-DTU 41.2 Building Works – Exterior Timber Cladding – Part 1-1: Standard Technical Specifications Document (CCT) – Part 1-2: General criteria for material selection (CGM) – Part 2: Standard special administrative clauses document (CCS).

- External cladding for sheltered horizontal underside structures; these are generally coverings applied to horizontal structures that are not directly exposed to sunlight and/or rain. For example, these could include eaves closures, undersides of balconies, loggia ceilings, or covered passageways.

This DTU applies to cladding boards designed to direct water away from the façade and prevent any water retention. It also defines the specifications for the secondary frameworks on which the timber cladding is installed.

For cladding installed in front of a timber-framed wall, two cases must be distinguished due to the consideration of the walls' watertightness:

- the wall has no openings, and the maximum allowable height from the building's exterior ground level is limited to 28 m;

- the wall has openings: the maximum allowable height from the building's exterior ground level is limited to 6 m, 10 m, or 28 m, depending on the technical solutions for integrating joinery into the timber-framed walls.

DTU 41.2 applies in all French climatic or natural zones for the installation of external coverings on concrete or masonry structures. It is only applicable in metropolitan France for installations on timber or timber-based structures that comply with DTU 31.2[123]. It doesn't apply to agricultural buildings.

The NF EN 14951 standard (June 2006)[124] defines the characteristics of cladding boards (and paneling) made of hardwood. This document refers to the standard dimensional norms used in the industry. It defines the characteristics of solid hardwood cladding boards, with or without grooves and/or tongues, for either indoor or outdoor use.

The characteristics of timber products intended for use in cladding (wall and sheltered ceiling coverings for outdoor use), as well as the appropriate testing methods, are defined in the NF EN 14915+A2 standard (January 2020)[125].

- **MAIN SUITABLE TIMBER SPECIES**

African Mahogany, Afrormosia, Bilinga, Light Bossé, Dark Bossé, Dabéma, Difou, Douka, Doussié, Ebiara, Ekaba, Ekoune, Etimoé, Eyoum, Framiré, Gombé, Iatandza, Ilomba, Kanda, Limbali, Makoré, Movingui, Mukulungu, Niangon, Niové, Osanga, Ovengkol, Pachy, Tchitola, Tiama, Tola, Wengé...

The technological descriptions of these species, including their durability classes, usage classes, and mechanical classes, can be found in the Tropix[126] data sheets.

The relationships between the reference names of the timber species (above) and their vernacular or botanical names are provided in ATIBT's General Nomenclature of Tropical Timbers (2016).

- **ENVIRONMENTAL AND HEALTH DECLARATION SHEET (FDES)**

As previously mentioned in the description of the Terrace, decking and flooring product family, three collective FDES sheets[127] have been developed as part of the DRYADES[128] project (life cycle analysis of timber products from the Congo Basin), funded by the PPECF[129] programme of COMIFAC[130]:

123. AFNOR, 2019. Standard NF DTU 31.2 (May 2019). Building works - Construction of timber-framed houses and buildings - Part 1-1: Standard technical specifications document (CCT) - Part 1-2: General criteria for material selection (CGM) - Part 2: Standard special administrative specifications document (CCS).
124. AFNOR, 2006. NF EN 14951 (June 2006). Solid hardwood panelling and cladding - Machined profiled boards.
125. AFNOR, 2020. NF EN 14915+A2 (January 2020). Timber panelling and cladding - Characteristics, requirements and marking.
126. https://tropix.cirad.fr/fiches-disponibles

- FDES: *timber planks from the Congo Basin, all tropical species, in all configurations (v.1.1) (see «Terrace, decking and planking» description)*

- *FDES: timber cladding from the Congo Basin using all tropical species, in all configurations (see «Cladding and exterior cladding» description)*[131]

- FDES: *laminated scantlings made using Congo Basin timber of all tropical species, in all configurations (excluding installation accessories) (v.1.1)*

For cladding, the functional unit is defined as one square metre of cladding boards made of timber from the Congo Basin, over a reference lifespan of 50 years.

The standard product is a cladding system composed made of timber boards from the Congo Basin, which are mechanically fixed to timber battens that are in turn attached to the main structure.

The boards may vary in thickness and profile. In most cases, they are profiled to ensure a draining design.

Installation is primarily carried out on-site but can also be done in a workshop (pre-fabrication of timber-framed walls).

The boards can be installed horizontally, vertically, or diagonally in various ways, including open-jointed, overlapping, and tongue-and-groove.

The rain barrier, rodent protection grids, and other components not listed in this FDES are not considered and are therefore are not covered. Some of these components have their own FDES sheet.

Cladding boards made from timber from the Congo Basin are intended for covering the exterior walls of all types of buildings, including housing, offices, commercial spaces, schools, industrial and agricultural buildings, and other public facilities.

African Padauk Façade at the Ministry of Water and Forests, Libreville (Gabon) © Jean Gérard, Cirad
(photo from the Tropical Timber Atlas 2016)

127. Environmental and Health Declaration Sheet (*Fiche de Déclaration Environnementale et Sanitaire*)
128. https://www.fair-and-precious.org/files/upload/news/DRYADES/ATIBT_Restitution_projet_DRYADES_231005.pdf
129. http://www.ppecf-comifac.com/accueil.html
130. Central African Forest Commission, https://comifac.org/
131. https://base-inies.fr/consultation/infos-produit/39924

URBAN FURNITURE

- **NATURE OF THE STRUCTURE**

Street furniture encompasses a wide range of products or structures installed in public spaces and which facilitate both access and usage of these areas. It is intended to enhance public spaces by promoting social interaction, comfort, and safety.

It is hard to compile an exhaustive list of all products and structures classified as street furniture, but the most common ones include:

- **Bollards and posts** installed on sidewalks, squares, small plazas, and along streets. Bollards differ from posts in shape and size: bollards are more massive and shorter, while posts are thinner and taller. Both can be fixed or removable.

- **Trash bins** positioned throughout public spaces, on sidewalks, squares, small plazas, in public parks, picnic areas, roadside rest areas, and along pedestrian paths. To ensure seamless integration, they should match the surrounding street furniture.

- **Display boards**, which vary in shape and purpose, are sometimes made of timber.

- **Public benches** enhance parks and gardens, squares, and avenues. Benches are by their very nature multifunctional.

- **Tables** are distinguished by their shape, and are available in square, rectangular, oval, or round formats, and are often accompanied by benches for various uses.

- **Bicycle racks and shelters** are located near service areas, on sidewalks, squares, small plazas, and at public park entrances. For long-term use, they are typically placed near schools, workplaces, or performance venues.

- **Bus shelters** (also known as waiting shelters) are often paired with other street furniture elements such as benches and trash bins.

- **Planters**, which are installed on sidewalks, squares, small plazas and in public parks. Planters serve various functions, including defining boundaries such as those involving parking areas, traffic lanes, or pedestrian zones.

- **Urban lighting**, typically found along roads and squares, contributes to the appearance and structure of an urban landscape.

- **IMPLEMENTATION CONSTRAINTS**

The service conditions of these products and structures expose them to bad weather, including contact with the ground and water.

Furthermore, some of these installations are subject to mechanical stress, making them vulnerable to failure under significant loads.

Since street furniture is in direct contact with the public, the timber that is used must maintain its structural integrity and surface appearance over time.

The timber should be resistant to splitting, cracking and breaking.

Additionally, its surface condition should remain stable and must not pose any risk to users.

Likewise, the material must have good resistance against both impacts and acts of vandalism. It must also exhibit a high level of resistance to biological degradation caused by timber-decaying fungi and dry-timber insects.

The timber species that are used must demonstrate good stability and a uniform grain.

The construction and machining of these components must be carried out in a way that minimises the risk of injury from sharp points or sharp edges that have not been chamfered.

The design of joints must ensure the proper drainage of rainwater. Timber joints involving cut-outs (tenons/mortises) should be avoided in favour of bolted or screwed joints.

The design of horizontal surfaces must incorporate open-joint construction to facilitate rainwater drainage (e.g., table surfaces, bench seats).

The quality of finishing and maintenance plays a key role in preserving the aesthetic appearance of structures. The use of film-forming finishes can create water traps if maintenance is neglected.

These structures generally fall under usage class 4. Only certain sheltered elements and some well-drained vertical infill components correspond to usage class 3 (3.2 or even 3.1).

These construction constraints, along with the technical requirements for the timber elements of urban furniture, are summarised in the Guide to urban furniture specification assistance (UNIFA, 2016)[132].

• SPECIFIC REGULATORY FRAMEWORK

To fulfil its function, urban furniture must blend into the architectural and aesthetic environment of the city. Regardless of the material that is used (cast iron, stainless steel, timber, stone, plastic resin, etc.), it must comply with both construction and installation standards.

The general framework for installing urban furniture falls under article L113-2 of the roads and highways code[133], which requires all occupants of the public domain to obtain authorisation from a competent authority. All private stakeholders must therefore secure permission from the local council. Furthermore, as the competent body, a municipal authority must itself comply with the construction and installation standards outlined by regulations.

There are numerous standards governing urban furniture, covering various aspects from manufacturing to installation, including safety, aesthetics, accessibility, durability, and usability.

- Safety standards aim to minimise the risks of accidents for users of public spaces. These standards cover aspects relating to the dimensions, materials, stability, and strength of the urban furniture.

- Accessibility standards ensure that all citizens, including those with reduced mobility, have access to public spaces.

- Environmental standards seek to minimise the environmental impact of urban planning by promoting the use of sustainable, recyclable, and low-emission materials.

- Aesthetic standards aim to ensure harmony and aesthetic coherence in the urban environment by establishing criteria for design, colours, and finishes.

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132. National Union of French Furniture Industries (UNIFA - *Union Nationale des Industries de L'Ameublement Français*), 2016. Guide for urban furniture specification assistance. 8 pages. https://www.ameublement.com/uploads/attachments/synthese_guidemobilierurbain2016.pdf

133. https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000017924078/

From a technical perspective, two main standards govern the characteristics of urban furniture:

- Standard NF P 99-610 (December 2014)[134] defines the safety, strength, and stability requirements that seating furniture must meet under normal conditions of use and defines the corresponding test methods. Its informative Annex A specifies certain installation and implementation conditions.

- Standard NF P 99-650 (June 2013)[135] defines the minimum maintenance requirements for urban furniture intended for public spaces and cleanliness to ensure user safety, comfort, and quality of life. This document applies to all types of urban furniture designed for public areas and cleanliness - whether they are prefabricated or not - once installed and received.

• MAIN SUITABLE TIMBER SPECIES

Afrormosia, Angueuk, Bété, Difou, Douka, Doussié, Eyoum, Gombé towé, Iatandza, Iroko, Kanda, Landa, Makoré, Moabi, Niové, Okan, Osanga, Pachy, African Padauk, Wamba...

The technological descriptions of these species, including their durability classes, service classes, and mechanical classes, can be consulted in the Tropix fact sheets[136].

The correspondences between the standardised timber names (above) and the vernacular or botanical names of the timber species are provided in ATIBT's General Nomenclature of Tropical Timbers (2016).

Iroko table-bench set (manufactured by Cassecroute, Dilbeek – Belgium)
© Cassecroute

134. AFNOR, 2014. NF P99-610 (December 2014) Street furniture for public spaces and cleanliness – Seating furniture – Strength and stability characteristics of seating furniture.
135. AFNOR, 2013. NF P99-650 (June 2013) Street furniture for public spaces and cleanliness – Maintenance of street furniture for public spaces and cleanliness – Organisation and monitoring of maintenance.
136. https://tropix.cirad.fr/fiches-disponibles

OUTDOOR FURNITURE

• NATURE OF THE STRUCTURE

Outdoor furniture, sometimes also referred to as garden furniture, although this term is more restrictive[137], includes all seating and table furniture intended for outdoor use in private, domestic, or professional settings, such as restaurant terraces or swimming pools.

It also includes lightweight folding furniture used for camping or hiking.

The difference between outdoor furniture and street furniture, primarily public benches and tables, is that outdoor furniture is not installed in public spaces.

Outdoor furniture includes the following products:

- Seating and tables designed for outdoor use, including deck chairs[138], but always in a domestic or professional setting; seating and tables form the bulk of outdoor furniture.
- Hanging chairs, such as «egg chairs» or swing seats.
- Hammocks.
- Parasols (including timber parasol bases).
- Camping equipment, such as folding tables and chairs (timber is rarely used for these).

• INSTALLATION CONSTRAINTS

As is the case with street furniture, these products are exposed to bad weather. They may come into contact with the ground and water, although it is always recommended to bring them indoors during winter and extended periods of harsh weather.

These items are subject to mechanical stress and are therefore at risk of breakage under significant strain.

Outdoor furniture combines an aesthetic function with mechanical durability. The choice of timber must ensure that both its performance and surface appearance remain stable over time.

The timber must be highly resistant to splitting, checking, and breakage. Its surface condition should not deteriorate or pose any risks to users.

The timber used must have a high resistance to biological degradation caused by timber-decaying fungi and dry-timber insects. It should also demonstrate excellent stability and a straight, uniform grain.

The manufacturing and assembly of these products must eliminate the risk of injury from sharp edges, protruding parts, or non-chamfered corners.

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137. Outdoor furniture is by definition used in open spaces and must be specifically designed to withstand climatic conditions such as rain, sun, and air humidity fluctuations.
On the other hand, garden furniture, sometimes referred to as patio furniture, is often considered to be specially designed for use on a covered terrace with open sides and façade, or on a fully enclosed terrace that is not directly exposed to rain. As a result, the timber used can be of lower durability than that required for outdoor furniture, as this type of use corresponds to service class 3.1.
138. Also called a deck chair, folding deck chair, sun lounger, or reclining chair. These terms all refer to the same product, defined as a foldable timber frame fitted with a textile seat. Originally, the term «folding deck chair» referred to a reclining chair without armrests, while the «deck chair» had them.

As with urban furniture, the design of joints must ensure the proper drainage of rainwater. Timber joinery techniques such as mortise and tenon should be avoided in favour of bolted or screwed assemblies.

The design of horizontal surfaces (such as table tops and seat surfaces) should preferably incorporate an open-joint structure to facilitate water drainage.

The quality of the finish and maintenance plays a significant role in preserving the aesthetic appearance of the products. The use of film-forming finishes can create water traps if not properly maintained.

These products generally fall within usage classes 3.2 to 4, depending on their intended use. However, the use of timber naturally suited to service class 4 without the need for preservative treatment should be favoured.

Certain technical requirements for the timber components of outdoor furniture are described in the Guide to prescribing urban furniture (UNIFA, 2016)[139].

• SPECIFIC REGULATORY FRAMEWORK

The characteristics and specifications of outdoor furniture are primarily governed by three standards: NF EN 581-1[140], NF EN 581-2[141], and NF EN 581-3[142], which apply to seating and tables for domestic, communal, and camping use[143].

The NF EN 581-1 standard defines the general safety requirements for seating and tables used in domestic, communal, and camping settings - regardless of the materials used - and the design or manufacturing process. It does not apply to spectator seating[144].

The NF EN 581-2 standard defines the minimum requirements for the safety, strength, and durability of all types of outdoor seating - regardless of the materials used – as well as the design/construction or manufacturing processes[145].

The NF EN 581-3 standard defines the minimum requirements for the safety, strength, and durability of all types of outdoor tables - regardless of the materials used - as well as the design/construction or manufacturing processes[146].

The characteristics and specifications of adjustable deck chairs are governed by standards NF D61-062[147] and NF D61-062/A1[148], which define and validate the safety features of chairs for domestic, collective, and camping use, for both adults and children. In particular, they ensure the reliability of the locking system (whether with notches or with other mechanisms).

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139. UNIFA (*Union Nationale des Industries de l'Ameublement Français* – National Union of French Furniture Industries), 2016. Guide to urban furniture recommendations. 8 pages. https://www.ameublement.com/uploads/attachments/synthese_guidemobilierurbain2016.pdf
140. AFNOR, 2017. NF EN 581-1 (September 2017) Outdoor furniture – Seats and tables for domestic, communal, and camping use – Part 1: General safety requirements.
141. AFNOR, 2016. NF EN 581-2 (January 2016) Outdoor furniture – Seats and tables for domestic, communal, and camping use – Part 2: Safety, strength, and durability requirements for seating
142. AFNOR, 2017. NF EN 581-3 (October 2017) Outdoor furniture – Seats and tables for domestic, communal, and camping use – Part 3: Mechanical safety requirements for tables.
143. The NF EN 581-2 and NF EN 581-3 standards are scheduled for revision: PR NF EN 581-2 (November 2024) and PR NF EN 581-3 (November 2024).
144. This standard does not include requirements concerning the durability of upholstery materials, castors, adjustment or tilting mechanisms, or seat height adjustment systems.
145. CThis standard does not apply to urban furniture. It does not cover removable upholstery and coverings. It does not include requirements regarding the durability of wheels/castors and height adjustment mechanisms. It does not cover electrical safety requirements. It does not include provisions on resistance to ageing or deterioration caused by light, temperature or humidity. The test requirements set out in this standard are based on use by individuals weighing up to 110 kg.
146. This standard does not apply to urban furniture. Except for stability tests, it does not assess the usability of storage elements incorporated into tables. It does not include requirements for the durability of wheels/castors and height adjustment mechanisms. It does not cover electrical safety requirements. It does not include provisions on resistance to ageing and deterioration caused by light, temperature or humidity.

These two standards also define and describe the corresponding tests. They apply to adjustable outdoor chairs of the deck chair type, which can be set in one or more predefined positions using a support leg.[149]

• MAIN SUITABLE TIMBER SPECIES

Afrormosia, Difou, Douka, Doussié, Gombé towé, Iatandza, Iroko, Makoré, Moabi, Osanga, Pachy, African Padauk, Wamba...

Technological descriptions of these species, including their durability classes, usage classes, and mechanical classes, can be found in the Tropix data sheets[150].

The correspondences between the standardised timber names (above) and the vernacular or botanical names are provided in ATIBT's General Nomenclature of Tropical Timbers (2016).

Outdoor coffee table made of Bilinga, Le Nyari (Port-Gentil, Gabon)
© Emmanuel Groutel (WALE)

147. AFNOR, 2015. NF D61-062 (December 2015) Outdoor furniture – Folding deck chairs of the adjustable type – General safety requirements – Mechanical tests and specifications.
148. AFNOR, 2019. NF D61-062/A1 (December 2019) Outdoor furniture – Folding deck chairs of the adjustable type – General safety requirements – Mechanical tests and specifications..
149. These standards do not apply to other types of folding deck chairs of the adjustable type or other outdoor chairs. They do not include any requirements regarding resistance to ageing and deterioration caused by light, temperature or humidity.
150. https://tropix.cirad.fr/fiches-disponibles

LANDSCAPING STRUCTURES AND CONSTRUCTIONS

• NATURE OF THE STRUCTURE

Landscape design structures and constructions made of timber belong to a broad family of products.

The characteristics and specifications required for their timber components are very similar to those required for street furniture, mainly due to their public use, high levels of wear, and direct contact with users.

In addition to playgrounds and fitness trails, this product category includes fences, barriers, gates and wicket gates, pergolas, edging, screens, landscape sleepers, and roadside noise barriers. This list is not exhaustive.

Street furniture is sometimes considered as being part of landscape design structures, but it is specifically described in this Guide.

• IMPLEMENTATION CONSTRAINTS

The in-service conditions of landscape design constructions expose them to bad weather; they may be in direct contact with the ground and water.

These products and installations are frequently subject to mechanical stress, which means that they are at risk of failure under significant loads.

As they are in contact with the public, it is essential to use timber species whose behaviour and surface appearance remain stable over time.

The timber must be resistant to splitting and breakage, though the acceptance of such defects varies depending on the type of product or structure and its aesthetic function.

The surface condition of the timber should not deteriorate or pose any risks to users.

Similarly, the material must offer good resistance to impacts and vandalism and high durability against biological degradation caused by lignivorous fungi and dry-timber insects.

The design of joints must ensure proper drainage of rainwater. Timber-cut joints (tenon/mortise) should be avoided in favour of bolted or screwed connections.

These structures correspond to a usage class between 3.2 to 4, depending on their geographical location (dry or humid climate).

Landscape design structures and constructions require regular maintenance to preserve their original characteristics, appearance, and integration into the environment over time. Maintenance work follows well-defined professional standards that are outlined in the Maintenance work for landscape constructions[151] document.

151. National Union of Landscaping Companies (UNEP - Union Nationale des Entreprises du Paysage), 2018. Maintenance work on landscape structures. Professional rules C.E.1-R0, UNEP | AITF | FFP | HORTIS, Editions de Bionnay, 32 pages. https://documents.lesentreprisesdupaysage.fr/pub/documents/c-e-1-r0-entretien-construction.pdf

• SPECIFIC REGULATORY FRAMEWORK

Certain timber landscaping products and structures are subject to specific standards and professional guidelines.

- The design of playgrounds is covered by the FD S54-2023 (2024)[152] standard, which applies to the creation of a new public play area, the redevelopment, or the extension of an existing play area.

It applies to fences and gates, street furniture, decorative elements (single posts or other decorative features), terrain features (mounds used in play areas), the location of playgrounds (proximity to watercourses, etc.), access points, and their juxtaposition with other facilities (multi-sport fields, fixed outdoor fitness equipment, health trails, skate parks, parkour areas, etc.).

For playgrounds, a series of 11 standards also defines safety requirements and general test methods[153].

- Fences, including timber fences, are subject to professional guidelines detailed in the Construction of fences[154] document. These guidelines cover fences made of metal (steel and aluminium), timber, composites, PVC, concrete, mineral materials, inert vegetation (heather screening), and access elements (gates, pedestrian gates, etc.).

- The construction of noise barriers to reduce road traffic noise, including timber noise barriers, is regulated by 6 standards, NF EN 1793-1 to NF EN 1793-6[155], which define the test methods for assessing the acoustic performance of these barriers. These 6 standards are currently under revision.

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152. AFNOR, 2024. FD S54-203 (March 2024) Playgrounds – Recommendations for playground design.

153. NF EN 1176-1, Playground equipment and surfacing – Part 1: Safety requirements and general test methods.
NF EN 1176-2, Playground equipment and surfacing – Part 2: Additional specific safety requirements and test methods for swings.
NF EN 1176-3, Playground equipment and surfacing – Part 3: Additional specific safety requirements and test methods for slides.
NF EN 1176-4, Playground equipment and surfacing – Part 4: Additional specific safety requirements and test methods for cableways.
NF EN 1176-5, Playground equipment and surfacing – Part 5: Additional specific safety requirements and test methods for carousels.
NF EN 1176-6, Playground equipment and surfacing – Part 6: Additional specific safety requirements and test methods for oscillating equipment.
NF EN 1176-7:2008, Playground equipment and surfacing – Part 7: Installation, inspection, maintenance, and operation guide.
NF EN 1176-10:2008, Playground equipment and surfacing – Part 10: Additional specific safety requirements and test methods for fully enclosed play equipment.
NF EN 1176-11, Playground equipment and surfacing – Part 11: Additional specific safety requirements and test methods for three-dimensional climbing nets.

154. UNEP (Union Nationale des Entreprises du Paysage - National Union of Landscape Companies), 2018. Construction of fences. Professional guidelines C.C.5-R0, UNEP | AITF | FFP | HORTIS, Editions de Bionnay, 28 pages.
https://documents.lesentreprisesdupaysage.fr/pub/documents/cc5-r0-regles-pro-numerique.pdf

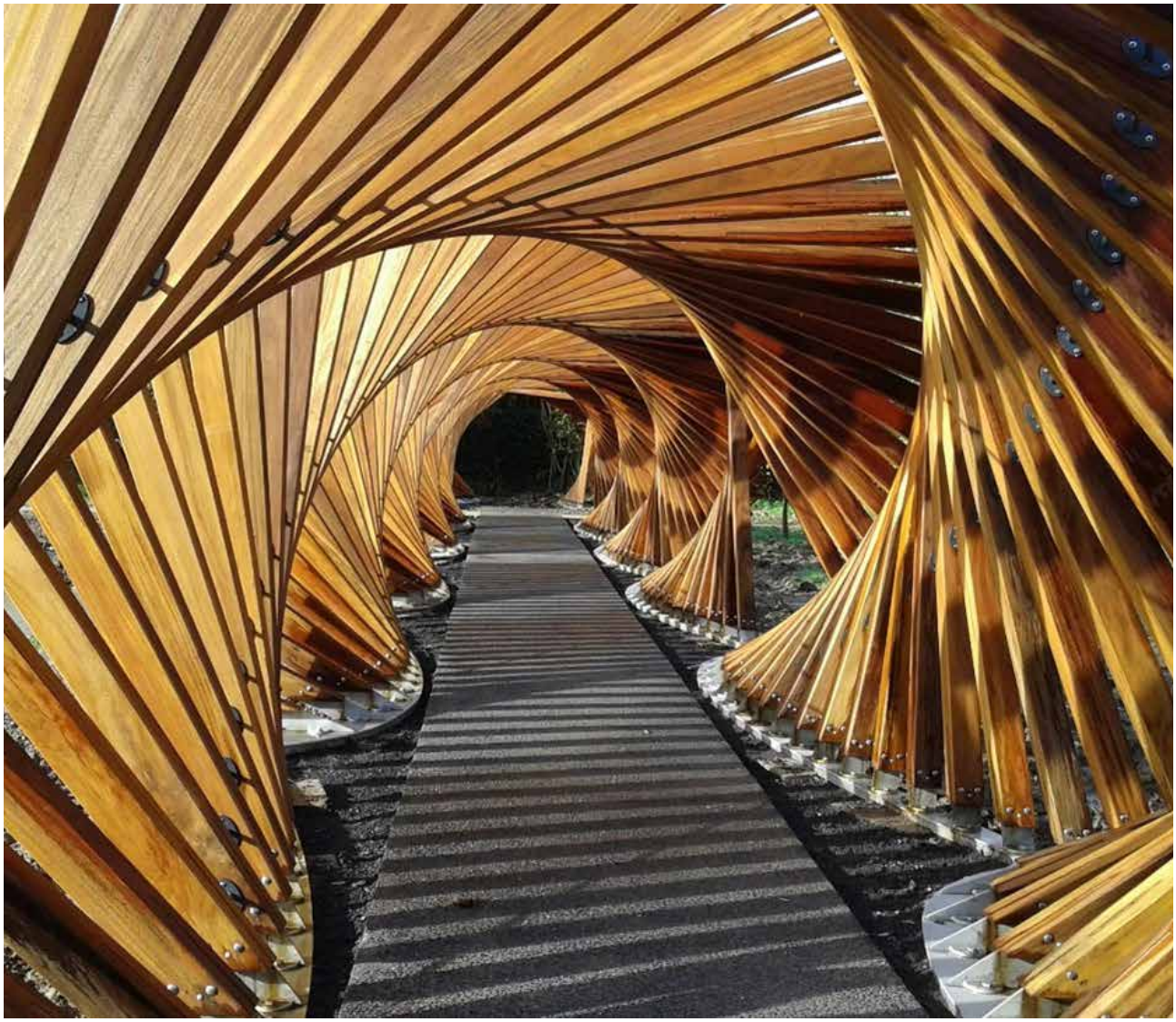
155. AFNOR, 2017. NF EN 1793-1 (May 2017) Road traffic noise-reducing systems – Test method for determining acoustic performance – Part 1: Intrinsic characteristics of sound absorption under diffuse acoustic field conditions.
AFNOR, 2018. NF EN 1793-2 (June 2018) Road traffic noise-reducing systems – Test method for determining acoustic performance – Part 2: Intrinsic characteristics of airborne sound insulation under diffuse acoustic field conditions.
AFNOR, 1997. NF EN 1793-3 (November 1997) Road traffic noise-reducing systems – Test method for determining acoustic performance – Part 3: Normalised traffic noise spectrum.
AFNOR, 2015. NF EN 1793-4 (August 2015) Road traffic noise-reducing systems – Test method for determining acoustic performance – Part 4: Intrinsic characteristics – In situ values of acoustic diffraction.
AFNOR, 2016. NF EN 1793-5 (May 2016) Road traffic noise-reducing systems – Test method for determining acoustic performance – Part 5: Intrinsic characteristics – In situ values of sound reflection under direct acoustic field conditions.
AFNOR, 2021. NF EN 1793-6+A1 (March 2021) Road traffic noise-reducing systems – Test method for determining acoustic performance – Part 6: Intrinsic characteristics – In situ values of airborne sound insulation under direct acoustic field conditions.

• MAIN SUITABLE SPECIES

Afrormosia, Angueuk, Bété, Difou, Douka, Doussié, Eyoum, Gombé towé, Iatandza, Iroko, Kanda, Landa, Makoré, Moabi, Niové, Okan, Osanga, Pachy, African Padauk, Wamba...

The technological descriptions of these species, including their durability classes, usage classes, and mechanical classes, can be found in the Tropix data sheets[156].

The correspondences between the standardised timber names (above) and the vernacular or botanical names are provided in ATIBT's General Nomenclature of Tropical Timbers (2016).



«Drôle de Carré» (Strange Square), the Mallet-Stevens Gardens – Built by *Bois et Loisirs*, Croix (France)
© Denis Delequeuche, Bois et Loisirs (photo from the Tropical Timber Atlas 2016)

156. https://tropix.cirad.fr/fiches-disponibles

PARQUET AND TIMBER FLOORING

• NATURE OF THE STRUCTURE

Parquets and floorboards consist of timber planks forming floor coverings used in various types of constructions.

The distinction between parquet and floorboards primarily lies in the dimensions of the planks.

A parquet floor is characterised by small-sized planks installed:

• With a pattern:

- Herringbone parquet, consisting of planks of equal length with square-cut ends, laid perpendicularly at a 45° angle to the wall.

- Chevron parquet, composed of planks of equal size with ends cut at a 45° angle, laid edge to edge to form a chevron pattern.

- End-grain parquet, where the exposed surface corresponds to the cross-section of the timber. With this orientation, timber exhibits greater mechanical strength than when it is oriented longitudinally.

• Without a pattern, such as strip parquet, where planks are of equal width but vary in length (random-length strip parquet) or are of uniform length (square-edged strip parquet), laid parallel to each other without chamfers.

Section 10.5.6 Parquet Flooring of the *Mémento du Forestier* (2015)[157] provides a summarised typology of parquet flooring.

Regulations reserve the term parquet (or flooring) for any timber or timber-based floor covering where the wear layer, also called the facing, has a minimum thickness of 2.5 mm.

This includes both semi-solid and solid timber parquet.

• Semi-solid parquet features a wear layer (the top layer) of timber glued onto an intermediate core, which is a reconstituted panel. This type of parquet has the advantage of being more stable than solid timber parquet.

• Solid timber parquet consists of planks made from a single piece of solid timber, machined and planed to create tongue-and-groove elements.

• IMPLEMENTATION CONSTRAINTS

Parquet and floorboards must withstand the operational loads associated with their use (domestic parquet, industrial parquet, and/or intensive-use parquet), as well as indentation stresses and occasional re-humidification.

French regulations define several usage classes - based on foot traffic and service intensity - for these floor coverings.

The thickness of solid timber parquet varies between 12 and 23 mm.

The choice of parquet should be based on the type of use, characterised by the level of foot traffic and the nature of the associated activity, which determines the required minimum hardness.

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157. Gérard J., Gérard C., 2015. Parquet flooring. In: Mille Gilles (ed.), Louppe Dominique (ed.). *Mémento du forestier tropical* (Tropical forester's handbook). Versailles: Ed. Quae, pages. 990-994. https://agritrop.cirad.fr/579577/1/ID579577.pdf http://www.quae.com/fr/r4730-memento-du-forestier-tropical.html

These usage classes are identified by a two-digit number, where the first digit relates to the nature of the activity: 2 (domestic), 3 (commercial), 4 (industrial), and the second digit relates to the intensity of traffic: 1 (moderate), 2 (general), 3 (high), and 4 (very high).

The Parquet usage classes document (2019)[158] defines the criteria for determining the usage class of premises, the selection of parquet depending on the type of premises, and the finishes to apply depending on the usage classes.

African timbers primarily cover the top three hardness classes.

Parquet boards can be nailed, glued, or installed as floating floors.

Parquets and floors fall under usage class 2.

• SPECIFIC REGULATORY FRAMEWORK

Timber parquet and floorboards are described, and their characteristics are defined for numerous standards:

NF B50-005 (November 1985) Parquets, panelling, and raw strips – Vocabulary

NF B53-669 (June 2023) Timber floors and parquet – Usage class classification of parquet and test methods for characterising finishes for parquet

NF B53-676 (March 2015) Parquet – Underlays – Specifications, requirements, and test methods

NF B54-008 (December 2007) Glued parquet – Behavior in climates with different humidity conditions – Test methods and specifications

NF EN 1195 (May 1998) Timber structures – Test methods – Behaviour of structural floors

NF EN 13226 (August 2009) Timber floors – Solid parquet elements with grooves and/or tongues

NF EN 13227 (November 2017) Timber floor – Solid slats

NF EN 13228 (July 2011) Timber floors – Solid parquet elements for covering, including English blocks, with guidance systems

NF EN 13442 (April 2023) Timber floors, parquet, panelling, and timber cladding – Determination of resistance to chemical agents

NF EN 13488 (July 2003) Timber floors and parquet – Mosaic parquet elements

NF EN 13489 (July 2023) Timber floors and parquet – Veneered parquet elements

NF EN 13629 (March 2020) Timber floors – Solid individual or pre-assembled floorboards made using hardwoods

NF EN 13647 (April 2021) Timber floors, panelling, and timber cladding – Determination of geometric characteristics

NF EN 13696 (February 2009) Timber floors – Test methods for determining elasticity, abrasion resistance, and shock resistance

NF EN 13756 (September 2018) Timber floors and parquet – Terminology

NF EN 13810-1 (April 2003) Timber-based panels – Floating floors – Part 1: Functional requirements and specifications

158. FCBA, 2019. The parquet flooring usage classification. Technical document, 7 pages. https://nf-parquet.fr/wp-content/uploads/2019/11/2-Classement-dusage-Parquets-DBu.pdf

NF EN 13990 (September 2004) Timber floors – Solid boards for softwood flooring

NF EN 14342 (September 2013) Timber floors and parquet – Characteristics, conformity assessment and marking

NF EN 1476 (May 2006) Timber floors – Sampling procedures for conformity assessment

NF EN 14761/IN1 (October 2008) Timber floors – Solid timber parquet – Edge-glued, wide, and stone-cut lamella

NF EN 14761+A1 (October 2008) Timber floors – Solid timber parquet – Edge-glued, wide, and stone-cut lamella

NF EN 1533 (October 2010) Timber floors – Determination of bending under a static load – Test methods

NF EN 1534 (January 2020) Timber floors and parquet – Determination of indentation resistance – Test method

NF EN 16929 (December 2018) Test methods – Timber flooring systems – Determination of vibrational properties

NF EN 17456 (April 2021) Timber floors and parquets – Determination of upper layer delamination in engineered timber flooring – Test method

NF EN 1910 (July 2016) Timber floors, panelling, and cladding – Determination of dimensional stability

NF EN ISO 17178 (April 2020) Adhesives – Adhesives for bonding parquet to the floor – Test methods and minimum requirements

NF ISO 4556 (July 2023) Raw timber parquet elements – General characteristics

NF ISO 4561 (July 2023) Raw timber parquet elements – Classification

NF ISO 4562 (July 2023) Timber parquet boards – Classification

NF ISO 5323 (November 2019) Timber floors and parquet – Vocabulary

XP CEN/TS 13810-2 (August 2003) Timber-based panels – Floating floors – Part 2: Test methods

XP CEN/TS 15676 (March 2008) Timber floors – Slip resistance – Pendulum test

XP CEN/TS 15717 (July 2008) Timber parquet – General installation guide

The implementation recommendations are described in the following three DTUs:

NF DTU 51.1 (December 2010) Parquet flooring – Installation of nailed parquet – Part 1-1: Technical specifications document – Part 1-2: General material selection criteria (CGM - *critères généraux du choix des matériaux*) – Part 2: Special conditions document

NF DTU 51.2 (March 2023) Building works – Bonded parquet – Part 1-1: Technical specifications document (CCT – *cahier des clauses techniques*) – Part 1-2: General material selection criteria (CGM)

NF DTU 51.11 (May 2024) Building works – Floating parquet – Part 1-1: Technical specifications document (CCT) – Part 1-2: General material selection criteria (CGM) – Part 2: Special conditions document (CCS - *cahier des clauses spéciales*)

• MAIN SUITABLE TIMBER SPECIES

Very hard species: Bubinga, Difou, Eyoum, Okan, Wengé.

Hard species: Afrormosia, Doussié, Moabi, Mukulungu, Niové, Osanga, Ovéngkol, Ozouga, Pachy, African Padauk.

Medium-hard species: Acajou Cailcédrat, Akossika, Andoung, Awoura, Bété, Bilinga, Light Bossé, Dark Bossé, Diania, Douka, Ebiara, Etimoé, Eyong, Iatandza, Igaganga, Iroko, Izombé, Kanda, Kosipo, Kotibé, Landa, Lati, Longhi, Lotofa, Makoré, Mambodé, Movingui, Mutenyé, Naga, Niangon, Safukala, Sapele.

The technical descriptions of these species, including durability classifications, usage classes, and mechanical classifications, can be found in the Tropix data sheets[159].

The correspondence between the standardised timber names (listed above) and their vernacular or botanical names is provided in ATIBT's General Nomenclature of Tropical Timbers (2016).

Flooring made with Iatandza (produced by Brenco Exotic Woods – United States)
© Brenco Exotic Woods (photo from the Tropical Timber Atlas 2016)

159. https://tropix.cirad.fr/fiches-disponibles

INTERIOR FINISHES

• NATURE OF THE STRUCTURE

Interior cladding often consists of structural and facing elements for interior joinery. It frequently incorporates plywood panels, particleboard panels, and MDF (Medium Density Fibreboard).

Timber is often concealed by a covering or a finish. Timber components rarely play a major mechanical role, as structures are usually lightweight.

Interior cladding includes various types of products serving different functions, such as skirting boards, impact-resistant wall protection skirting, decorative wall and ceiling panels, fitted furniture, and partition screens.

Mouldings are also considered interior cladding. These are timber slats that have been profiled for aesthetic purposes. Mouldings are used in the composition of frames, casings, panel coverings, and various joint covers.

• IMPLEMENTATION CONSTRAINTS

Interior cladding elements are subject to minimal physical and mechanical stress and are generally not exposed to moisture.

However, excessive humidity variations can cause shrinkage or swelling in solid timber, leading to potential issues.

Timber used for interior cladding must have a flawless surface finish due to its aesthetic function.

It should have a straight grain, be easy to sand, and possess good compatibility with stained, varnished, or painted finishes. When applying a non-opaque finish, the uniformity of the timber's colour should be considered.

Timber must be stable to ensure the quality of both the assembly and its adhesion.

Fine-grained species provide the best surface finish and resulting polish.

Many species are suitable for interior cladding. In practice, any species can be used depending on the type of element, whether it involves lightweight structures or facings implemented in various configurations.

Timber moisture levels must be controlled and suited to the ambient conditions of the installation site. The timber must be fully stabilised. For hardwoods, pre-drilling should be considered to prevent splintering or splitting during assembly.

Timber species used for interior cladding may have low or no natural durability against biological degradation agents. An insecticidal treatment may be necessary. Only the intended use and placement of interior cladding elements within buildings can alter durability requirements, depending on ambient climatic conditions.

Service classes 1 and 2 are appropriate for most usage situations.

• SPECIFIC REGULATORY FRAMEWORK

Certain interior cladding elements are subject to specific standards and professional guidelines.

DTU 36.2[160], which provides standard specification clauses for the installation of interior joinery in timber and timber-based materials, defines the characteristics of skirting boards and mouldings, as well as recommendations for their installation.

This same DTU also defines the characteristics of other interior finishing elements such

as flat trims, architraves, plinths, cornices, picture rails[161], astragals[162], and cover strips.

The finishing characteristics of mouldings are specified in standard NF EN 14221[163].

• MAIN SUITABLE TIMBER SPECIES

Abura, Cailcedrat Mahogany, African Mahogany, Afrormosia, Aiele, Ako, Akossika, Andoung, Aniegré, Avodiré, Awoura, Ayous, Bilinga, Bomanga, Light Bossé, Dark Bossé, Bubinga, African Cordia, Dabéma, Diania, Dibétou, Difou, Douka, Doussié, Ébiara, Ékaba, Ékoune, Émien, Essessang, Étimoé, Éyong, Faro, Framiré, Fuma, Red Gombé, Towé Gombé, Iatandza, Igaganga, Ilomba, Iroko, Izombé, Brown Kanda, Pink Kanda, Kondroti, Kosipo, Kotibé, Koto, Landa, Lati, Limba, Longhi, Lotofa, Makoré, Mambodé, Moabi, Movingui, Mutényé, Naga, Niangon, Niové, Okoumé, Olon, Onzabili, Ossoko, Ovengkol, Ozigo, Pachy, African Padauk, Safukala, Sapelli, Sipo, Tchitola, Tiama, Tola, Wengé, Zingana...

The technological descriptions of these species, including their durability classes, usage classes, and mechanical classes, can be found in the Tropix[164] data sheets.

The correspondences between the pilot timber names (above) and the vernacular or botanical names are listed in ATIBT's General Nomenclature of Tropical Timbers (2016).

Crystal Door using Ravier® Bubinga (solid timber and acrylic glass assembly), Amstelveen (Netherlands). Manufactured by Ravier SARL, Domblans (France). © Ravier SARL (photo from Tropical Timber Atlas 2016).

160. AFNOR, 2016. NF DTU 36.2 (May 2016) Building works – Interior timber joinery – Part 1-1: Standard technical specifications – Part 1-2: General criteria for material selection – Part 2: Standard special administrative specifications
161. Upper moulding component of a cornice.
162. Rounded moulding at the junction between the shaft and the capital of a column or at the nosing of a staircase step
163. AFNOR, 2007. NF EN 14221 (January 2007) Timber and timber-based materials in interior windows, door leaves, and door frames – Requirements and specifications.
164. https://tropix.cirad.fr/fiches-disponibles

HYDRAULIC WORKS

• NATURE OF THE STRUCTURE

There are two main groups of hydraulic structures: those implemented in freshwater and those used in brackish water or marine environments.

In both groups, timber can be immersed either intermittently or permanently.

The main hydraulic structures in brackish or marine environments include wharves, jetties, stilt constructions, dolphin piles, timber mooring piles, groynes, riverbank piles and breakwaters, quay installations, and quay fenders.

The main hydraulic structures in freshwater include lock gates, jetties, stilt constructions, mooring piles and quay and riverbank furnishings.

This classification of hydraulic structures is detailed in the Timber for hydraulic structures[166] document.

• IMPLEMENTATION CONSTRAINTS

Depending on the type of structure, these constraints can vary in nature and intensity. However, timber for hydraulic structures generally requires:

- Good mechanical properties (compression strength, impact resistance, bending strength, and rigidity), as such structures are typically subjected to high mechanical stresses.

- High resistance to biological deterioration, including:
  - Resistance to timber-decaying fungi for timber that is frequently exposed above water.
  - Resistance to marine borers (or timber-boring marine organisms) for timber frequently or permanently immersed in marine or brackish water.

Timber elements intended for hydraulic applications must be shaped while still freshly sawn, as drying is neither technically feasible nor economically viable.

Furthermore, and in particular for the large cross-sections required for this type of use, these very hard and dense timbers cannot be machined once they are dry. This point should be emphasised to the relevant authorities in producing countries (such as Ministries of Water & Forests, Customs, etc.) to avoid disrupting this specific supply chain.

Most timbers suitable for marine hydraulic structures have an average density above 0.75.

These timbers, which are generally heavy to very heavy, consequently exhibit high mechanical strength.

Timbers used for hydraulic structures, whether in freshwater, brackish water, or marine environments, must meet usage class 4 requirements without requiring preservative treatment.

Two groups of marine invertebrates are classified as timber-borers because they can perforate and degrade immersed timber: (1) shipworms and pholadidae (bivalve molluscs); (2) various small crustaceans, notably of the Limnoria genus, which is the most widespread.

166. Gérard J., Groutel E., 2020. Timber for hydraulic structures. ATIBT technical sheet no. 14, 18 pages, https://www.atibt.org/files/upload/14-LES-BOIS-POUR-OUVRAGES-HYDRAULIQUES.pdf

Marine molluscs are the most destructive, particularly shipworms, whose geographical distribution and virulence depend on water salinity and temperature.

They are present in all seas but are especially destructive in tropical waters.

Due to climate change, which is causing a general rise in sea temperatures, the virulence of marine borers is increasing in both temperate and cold waters.

The natural resistance of certain tropical species to marine borers is mainly linked to three characteristics: (1) a fine to very fine grain combined with high density; (2) a high silica content; (3) the presence of repellent chemical compounds in the timber (= secondary metabolites or extractives). Among these characteristics, silica content is the most decisive factor.

• SPECIFIC REGULATORY FRAMEWORK

Standard NF EN 275[167] defines a marine field test method to determine the relative effectiveness of a timber preservation product against marine borers.

This protocol is designed to test the efficacy of timber preservatives but can also be extended to assess whether a given species meets the requirements for usage class 5 without preservation treatment.

• MAIN SUITABLE SPECIES

Azobé, Bilinga, Congotali, Monghinza, Mukulungu, Niové, Okan, Sougué, Wamba...

The technological descriptions of these species, including durability classes, usage classes, and mechanical classifications, can be found in the Tropix fact sheets[168].

The correspondence between the pilot names of these timber species (listed above) and their vernacular or botanical names is provided in ATIBT's General Nomenclature of Tropical Timbers (2016).

Installation of an Azobé lock gate (Wijma company – Deventer, Netherlands) © Wijma

167. AFNOR, 1992. NF EN 275 (December 1992) Timber preservation products – Determination of protective effectiveness against marine boring organisms
168. https://tropix.cirad.fr/fiches-disponibles
169. https://www.atibt.org/files/upload/Nomenclature-Generale-des-Bois-Tropicaux-7eme-edition.pdf

TIMBER FRAMES AND TIMBER STRUCTURES

Triangulated structure made of Kosipo with posts made of Tali
Built by J.-Y. Riaux (Mindourou, Cameroon) © Jean-Yves Riaux (photo from the Atlas of Tropical Timbers, 2016)

• NATURE OF THE STRUCTURE

A roof framework consists of a set of elements forming the load-bearing structure of a roof.

It supports the roofing through its various components, such as the tie beam, principal rafter, king post, queen post, purlin, and rafter.

Traditional frameworks are made of solid timber assembled together, while industrial frameworks consist of calibrated sawn timber of small thickness joined with metal connectors.

The term «framework» refers to the horizontal and vertical load-bearing components of a structure, which typically include beams, posts, joists, battens, and bracing.

• IMPLEMENTATION CONSTRAINTS

Roof frameworks are mainly subject to mechanical constraints. The structure directly supports vertical loads (its own weight, roofing, etc.) as well as additional loads related to its function and position within the building, such as operational loads and excessive climatic pressure. Although generally sheltered, lightweight structures can be exposed to slight or occasional moisture (condensation, sea spray, etc.).

The mechanical resistance of timber used in frameworks or structural frames is assessed through visual or mechanical grading.

Beyond the mechanical grading carried out when selecting the pieces, the timber must be receptive to shaping and a favourable strength-to-density ratio.

Depending on its service conditions and the risk of exposure to biological degradation agents, a fungicidal and insecticidal treatment is necessary if the chosen species has insufficient natural durability.

Traditional frameworks are mechanically assembled on-site.

For species with insufficient durability, any cutting or shaping performed on-site must undergo additional treatment.

Industrial frameworks (trusses) are assembled in factories and quickly installed on-site.

Structural wall panels are generally prepared in workshops but can also be assembled on-site.

As with frameworks, species with insufficient durability must be treated after any cutting or shaping performed on-site.

For frameworks, usage class 2 is required in most cases. More severe exposure may require additional protective measures.

Particular attention must be given to the risk of termite attacks. Many timber species naturally provide sufficient durability for the required usage class.

For structural frames, service class 2 is also typically required.

Attention must also be paid to the risk of termite attacks, especially if the walls contain insulation. When the building is intended to be air-conditioned, the vapour barrier should be placed on the exterior (under the cladding) to prevent condensation issues within the walls.

• SPECIFIC REGULATORY FRAMEWORK

Implementation requirements are specifically described in DTU 31.1[170] for traditional frameworks, DTU 31.2[171] for structural frames, and DTU 31.3[172] for industrial frameworks.

DTU 31.1 provides standard specification clauses for calculations, constructions, and implementations for timber framework contracts, including post-and-beam structures, joists, timber-framed walls, half-timbering, belfries, and decking (boards and battens) positioned over one metre above the ground or any underlying surface.

DTU 31.2 applies to prefabricated floor and roof panels. These wall elements have a gap between studs, joists, or rafters of 60 cm or less and are stabilised by a bracing panel on at least one side. This DTU details numerous wall functions, including stability, watertightness, hygrothermal transfer, and insulation. It covers all associated functions, from the outer surface of the rain barrier to the inner surface of the vapour barrier, including the implementation of insulation and sealing systems for water, air, and water vapour.

DTU 31.3 aims to define the specific design and calculation rules for timber frameworks as outlined below, in accordance with current French construction regulations, notably

170. AFNOR, 2017. NF DTU 31.1 (June 2017) Building works – Timber framework – Part 1-1: Standard technical specifications document – Part 1-2: General criteria for material selection – Part 2: Standard special administrative specifications.
171. AFNOR, 2019. NF DTU 31.2 (May 2019) Building works – Construction of timber-framed houses and buildings – Part 1-1: Standard Technical Specifications (CCT - *Cahier des clauses techniques*) - Part 1-2: General Material Selection Criteria (CGM – *Critères généraux des matériaux*) - Part 2: Standard Special Administrative Clauses (CCS – *Cahiers des clauses spéciales*).
172. AFNOR, 2012. NF DTU 31.3 (January 2012) Building works – Timber frameworks assembled with metal connectors or gussets – Part 1-1: Standard Technical Specifications (CCT) - Part 1-2: General Material Selection Criteria (CGM) - Part 2: Standard Special Administrative Clauses (CCS) – Part 3: Design rules.

the Rules for the Design and Calculation of Timber Frameworks (NF P 21-701, referred to as DTU Rules CB 71). It applies to trusses and beams that are fully or partially triangulated and assembled with gussets or metal connectors (also known as «rafter trusses» or industrialised trusses). Trusses or beams that rely on adhesive bonding techniques for their joints, where safety depends on the bond, are not covered by this document.

• MAIN SUITABLE TIMBER SPECIES

African Mahogany, Akossika, Andoung, Aniégré, Bété, Bomanga, Light Bossé, Dark Bossé, Dibétou, Douka, Ébiara, Ékaba, Ékoune, Étimoé, Framiré, Red Gombé, Towé Gombé, Iatandza, Iroko, Brown Kanda, Pink Kanda, Kosipo, Koto, Limba, Longhi, Makoré, Movingui, Naga, Niangon, Olon, Onzabili, Safukala, Sapelli, Sipo, Tchitola, Tiama, Tola...

The technical descriptions of these species, including durability classifications, usage classes, and mechanical classifications, can be found in the Tropix data sheets[168].

The correspondence between the standardised timber names (listed above) and their vernacular or botanical names is provided in ATIBT's General Nomenclature of Tropical Timbers (2016).

168. https://tropix.cirad.fr/fiches-disponibles

5. CONCLUSIONS, GENERAL RECOMMENDATIONS AND OUTLOOK

The aim of this Guide is to address the needs of project owners, mainly architects, who wish to use tropical timber in public procurement due to its specific performance characteristics and who may encounter difficulties in drafting specific technical specifications documents (CCTP - cahiers des clauses techniques particulières).

Given the complexity of these clauses - arising from the multitude of standards, traceability requirements, and new European regulations such as the EUDR - it was deemed appropriate for this Guide to rely on Article R2111-8 of French public procurement law for the formulation of technical specifications.

It is important to note that this Guide is not intended to replace existing CCTP drafting guides, which are sometimes used by project owners and specifiers who can refer to the numerous examples of CCTPs specific to tropical timber that are available online.

This publication also aims to support and promote the eco-certification process, the sustainable management of forest resources, and, consequently, the long-term viability of the Congo Basin's timber industry.

To achieve this, this Guide promotes both the value and benefits of certified tropical timber among public decision-makers, providing arguments for public communication and facilitating a better understanding of the eco-certification process and its widespread adoption.

This Guide can even – and should - evolve in terms of both content and format.

The first edition covers 13 product categories: Terraces, decking, and boardwalks - Jetties, footbridges, and pathways over water - Guardrails, balustrades, and other vertical fall-protection structures - Staircases and tiered decking - Windows, external doors, shutters, and joinery sets - Cladding and external panelling - Urban furniture - Outdoor furniture - Landscape structures and constructions - Parquet and flooring - Interior panelling - Hydraulic structures - Timber frameworks and structural components.

A future edition of this Guide could include additional product categories such as glued laminated timber frameworks, indoor staircases, interior furniture and cabinetry, privacy and windbreak panels, structures and bridges in contact with soil or fresh water, and naval construction.

Descriptions of these additional product families will allow this Guide to reach new stakeholders in the tropical timber industry.

This Guide must also be regularly updated, particularly its sections on standardisation, which can evolve rapidly and require ongoing revisions.

Likewise, the lists of timber species associated with each product category, which are not exhaustive, may be updated and expanded by adding species that have so far been little used but whose use could increase.

Expanding this guide to include tropical timber from regions beyond Africa would also help strengthen and broaden the promotion of certified tropical timber among public decision-makers, raise awareness of the eco-certification process, and reinforce the case for its widespread adoption.

Outdoor decking in tropical timber © Shutterstock

Canebière public bench made of Iroko (Marseille - Old Port)
Photo and manufacture © Urban NT, design © Foster and Partners.

BIBLIOGRAPHIC, NORMATIVE, AND WEB REFERENCES CITED

ATIBT, 2023. Promoting Tropical Timber as a Sustainable Resource. Excerpt from www.atibt.org

Banque Africaine de Développement (BAD – African Development Bank), 2018. *Développement intégré et durable de la filière-bois dans le Bassin du Congo : opportunités, défis et recommandations opérationnelles* (Integrated and sustainable development of the timber sector in the Congo Basin: opportunities, challenges, and operational recommendations). Strategic Report, 308 pages. https://www.afdb.org/sites/default/files/documents/publications/developpement_integre_et_durable_de_la_filiere_bois_dans_le_bassin_du_congo_-_regional_0.pdf

Bayol N., 2018. *Industrialisation filière bois dans les 6 pays du Bassin du Congo* - Vision stratégique Horizon 2030 (Industrialisation of the timber sector in the 6 Congo Basin countries - Strategic vision through 2030). Presentation, 40 pages.

Bayol N., Anquetil F., Bile C., Bollen A., Bousquet M., Castadot B., Cerutti P., Kongape J.A., Leblanc M., Lescuyer G., Meunier Q., Melet E., Penelon A., Robiglio V., Tsanga R., Vautrin C., 2014. *Filière bois d'oeuvre et gestion des forêts naturelles : les bois tropicaux et les forêts d'Afrique centrale face aux évolutions des marchés* (Timber sector and natural forest management: tropical timber and Central African forests facing market changes). In de Wasseige C., Flynn J., Louppe D., Hiol Hiol F., Mayaux Ph. (eds). *Les forêts du bassin du Congo – État des Forêts 2014* (The forests of the Congo Basin – State of the Forests 2014): pages 47-66. https://www.cifor-icraf.org/knowledge/publication/5318/

Cabassud Nicolas, 2024. *Guide RE 2020 Réglementation environnementale* (ER 2020 Environmental regulation guide). Environmental regulation for new buildings (RE 2020), Ministry of ecological transition, energy, climate, and risk prevention, 93 pages. https://www.ecologie.gouv.fr/sites/default/files/documents/guide_re2020_version_janvier_2024.pdf

CIFOR, 2021. *Les forêts du bassin du Congo - État des Forêts 2021* (The Forests of the Congo Basin - State of the Forests 2021). Editors: Richard Eba'a Atyi, François Hiol Hiol, Guillaume Lescuyer, Philippe Mayaux, Pierre Defourny, Nicolas Bayol, Filippo Saracco, Dany Pokem, Richard Sufo Kankeu and Robert Nasi; 474 pages. https://www.observatoire-comifac.net/publications/edf/2021

Ciza S.K., Mikwa J-F., Malekezi A.C., Gond V., Bosela F.B., 2015. *Identification des moteurs de déforestation dans la région d'Isangi, République démocratique du Congo* (Identification of deforestation drivers in the Isangi region, Democratic Republic of the Congo). Bois & Forêts des Tropiques, 324, pages 29-38.

COMIFAC, 2021. *Les forêts du bassin du Congo : état des forêts 2021* (The forests of the Congo Basin: state of the forests 2021). Summary Sheet, 8 pages. https://www.cifor-icraf.org,/wp-content/uploads/sites/35/2024/06/Factsheet-Etat_des_forets_du_Bassin_du_Congo-2021-FR.pdf

European commission, 2015. *Marquage CE des produits de construction étape par étape* (CE marking of construction products, step by step), 25 pages. https://www.rpcnet.fr/pdf/2015-11-12_marquage_CE_etape_etape.pdf

Duhesme C., Gérard J., Groutel E., 2024. Ecocertifications, certifications de légalité et réglementations liées au commerce international des bois / Eco certifications, legality certifications and regulations relating to international trade in tropical timber. Booklet no. 6, 9 pages. https://www.atibt.org/fr/resource-categories/31/0-ouvrages-de-reference?resource_group_id=94#category-list

European Parliament, 2020. European Parliament resolution of 22 October 2020 with recommendations to the Commission on an EU legal framework to halt and reverse EU-driven global deforestation, 2020/2006 (inl). Committee on the Environment, Public Health and Food Safety. https://www.europarl.europa.eu/doceo/document/TA-9-2020-0285_EN.html

FCBA, 2019. *Le classement d'usage des parquets* (Usage classification of parquet flooring). Technical document, 7 pages. https://nf-parquet.fr/wp-content/uploads/2019/11/2-Classement-dusage-Parquets-DBu.pdf

FAO, 2022. The State of the World's Forests 2022: Forest Pathways for Green Recovery and Building Inclusive Economies. Rome: FAO.

Gérard J. (ed), Guibal D., Paradis S., Cerre J.C. et al., 2016. Atlas des bois tropicaux (Atlas of Tropical Timber). Editions Quae, Practical guide collection, paper / pdf / epub version, 1000 pages. http://www.quae.com/fr/r4976-atlas-des-bois-tropicaux.html

Gérard J. (ed), Guibal D., Paradis S., Cerre J.C. et al., 2017. Tropical Timber Atlas. Editions Quae, Practical guide collection, pdf / epub version, 999 pages. http://www.quae.com/fr/r5241-tropical-timber-atlas.html

Gérard J., Gérard C., 2015. *Les parquets* (Parquet flooring). In: Mille Gilles (ed.), Louppe Dominique (ed.). *Mémento du forestier tropical* (Handbook of the tropical forester). Versailles: Ed. Quae, pages. 990-994 https://agritrop.cirad.fr/579577/1/ID579577.pdf http://www.quae.com/fr/r4730-memento-du-forestier-tropical.html

Gérard J., Groutel E., 2020. *Les bois pour ouvrages hydrauliques* (Timber for hydraulic structures). ATIBT technical Sheet no. 14), 18 pages, https://www.atibt.org/files/upload/14-LES-BOIS-POUR-OUVRAGES-HYDRAULIQUES.pdf

Groutel E., Alix Y., 2015. *Le temps du bois - Note stratégique & prospective* (Time for timber - Strategic & forward-looking note). Wale, Sefacil, AFD, FFEM, ATIBT, 85 pages. https://doi.org/10.13140/RG.2.1.2303.3042

Groutel E., Duhesme C., 2023. *RBUE RDUE, on vous en dit plus* (EUTR and EUDR, explained further). ATIBT, 16 pages. https://www.lecommercedubois.org/files/upload/RBUE/BROCHURE-RBUE-RDUE-FR-BD.pdf

Karsenty A., 2019. Certification of tropical forests: A private instrument of public interest? A focus on the Congo Basin. Forest Policy and Economics, vol. 106. https://doi.org/10.1016/j.forpol.2019.101974

Karsenty A., 2021. Fiscal and non-fiscal incentives for sustainable forest management: synthesis of the lessons derived from case studies in Brazil, Cambodia, the Congo, Côte d'Ivoire, Myanmar, Peru, Thailand and Vietnam. ITTO Technical Series no. 48. International Tropical Timber Organization (ITTO), Yokohama, Japan, 35 pages. https://www.itto.int/direct/topics/topics_pdf_download/topics_id=6682&no=1&disp=inline

Karsenty A., 2021. *Problématique de l'économie industrielle du bois en Afrique centrale et de l'interdiction annoncée d'exporter des grumes* (Challenges of the industrial timber economy in Central Africa and the announced ban on log exports). *Les Cahiers d'Analyse et de Prospective de CyclOpe - Comprendre les mutations structurelles des filières de matières premières* (CyclOpe Analytical and Forward-Looking Papers - Understanding the structural changes in commodity sectors), no. 1, September 2021, 8 pages. https://cercle-cyclope.com/cap-cyclope/

Kombila-Mouloungui A.G., 2019. *L'arrêt de l'exportation des grumes au Gabon : enjeux et perspectives* (The ban on log exports in Gabon: issues and perspectives). PhD thesis in geography and planning), University of Pau and the Adour Regions, 448 pages. https://theses.hal.science/tel-04647714v1/file/fix_nH3i6y4s.pdf

Lambert M., Le Nevé S., 2020. *Guide de conception et de réalisation des terrasses en bois* (Design and construction guide for timber decking). *Le Commerce du Bois (LCB) - Association Terrasse Bois* (ATB – Timber Terrace Association) - F*édération Nationale du Bois* (FNB – National Timber Federation) - *Association pour la Revalorisation des Bois Utilisant un Système de Traitement* (ARBUST - Association for the Enhancement of Timber Using a Treatment System) - FCBA, 92 pages. https://www.lecommercedubois.org/files/documents/file/Guide-Terrasse-FNB-LCB-ATB-ARBUST-FCBA-avec-liens-BD-yxmo.pdf

Martin P., Groutel E., 2023. *Guide d'utilisation locale des bois d'Afrique centrale – tome 2* (Local usage guide for Central African timber – volume 2). ATIBT - RIFFEAC, 116 pages. https://www.atibt.org/files/upload/technical-publications/ATIBT-GUIDE-TOME-2-FSC.pdf

Martin P., Vernay M., 2016. *Guide d'utilisation des bois africains éco-certifiés en Europe – tome 1* (Usage guide for eco-certified African timber in Europe – volume 1). ATIBT, 100 pages. https://www.atibt.org/files/upload/technical-publications/ATIBT-GUIDE-BOIS-AFRICAINS-NUM-V2.pdf

ITTO, 2023. International Tropical Timber Organization: Managing Tropical Forests Sustainably. Excerpt from www.itto.int

Programme d'Action pour la Qualité de la Construction et de la Transition Énergétique (Action programme for construction quality and the energy transition) - Pacte, 2020. Design and implementation guide for guardrails. 120 pages. https://www.proreno.fr/documents/guide-conception-et-mise-en-oeuvre-des-garde-corps

Sist P., 2024. *Exploiter durablement les forêts tropicales* (Sustainably harvesting tropical forests). Editions QUAE, 100 pages. https://www.quae-open.com/produit/268/9782759239313/exploiter-durablement-les-forets-tropicales

Union Nationale des Entreprises du Paysage (UNEP – National Union of Landscape Companies), 2018. *Travaux d'entretien des constructions paysagères* (Maintenance work for landscape constructions). Professional rules C.E.1-R0, UNEP | AITF | FFP | HORTIS, Editions de Bionnay, 32 pages. https://documents.lesentreprisesdupaysage.fr/pub/documents/c-e-1-r0-entretien-construction.pdf

Union Nationale des Entreprises du Paysage (UNEP), 2018. *Travaux de réalisation de clôtures* (Fence construction work). Professional rules C.C.5-R0, UNEP | AITF | FFP | HORTIS, Editions de Bionnay, 28 pages. https://documents.lesentreprisesdupaysage.fr/pub/documents/cc5-r0-regles-pro-numerique.pdf

Union Nationale des Industries de l'Ameublement Français (UNIFA - National Union of French Furniture Industries), 2016. *Guide d'aide à la prescription de mobilier urbain* (Urban furniture specifications guide). 8 pages.
https://www.ameublement.com/uploads/attachments/synthese_guidemobilierurbain2016.pdf

Van Dijk S., Stas S., van Benthem M., 2020. *Aperçu des schémas de certification de gestion forestière durable au Gabon* (Overview of sustainable forest management certification schemes in Gabon). Publisher: Stichting Probos, 37 pages.
https://www.atibt.org/files/upload/technical-publications/Etude_schemas_certification__Gabon_-_VF_FR_-_Octobre_2020.pdf

White G., van Benthem M., Oldenburger J., Teeuwen S., 2020. *Comprendre le marché des produits de seconde transformation en bois tropical grâce aux données - Analyse du marché européen des produits de seconde transformation issus de bois tropical certifié en 2019* (Understanding the market for secondary processing of tropical timber products through data – Analysis of the European market for certified secondary processing of tropical timber products in 2019). Publisher: Jonathan Kaufman, 66 pages.
https://www.probos.nl/images/pdf/rapporten/Rapp2020_Comprendre_le_marche_des_produits_de_seconde_transformation_en_bois_tropical.pdf

STANDARDS AND DOCUMENTARY BOOKLETS

FD P 20-651 (June 2011) Durability of timber elements and structures. Documentary booklet, 35 pages.

FD S54-203 (March 2024) Playgrounds – Recommendations for the design of playgrounds.

NF B 54-040 (December 2018) Timber decking boards – Characteristics.

NF B50-005 (November 1985) Parquets, panelling and rough strips – Vocabulary.

NF B53-669 (June 2023) Timber flooring and parquets – Classification of parquet uses and test methods for characterising parquet finishes.

NF B53-676 (March 2015) Parquets – Underlays – Specifications, requirements and test methods.

NF B54-008 (December 2007) Glued parquets – Behaviour in various climatic humidity conditions – Test methods and specifications.

NF D61-062 (December 2015) Outdoor furniture – Adjustable deck chairs – General safety requirements – Mechanical tests and specifications.

NF D61-062/A1 (December 2019) Outdoor furniture – Adjustable deck chairs – General safety requirements – Mechanical tests and specifications.

NF DTU 31.1 (June 2017) Building works – Timber roof structures – Part 1-1: general technical clauses – Part 1-2: general material selection criteria – Part 2: special administrative clauses.

NF DTU 31.2 (May 2019) Building works – Construction of timber-framed houses and buildings – Part 1-1: general technical clauses (CCT - *cahier des clauses techniques types*) – Part 1-2: general material selection criteria (CGM - *critères généraux de choix des matériaux*) – Part 2: special administrative clauses (CCS - *Cahier des clauses administrative spéciales types*).

NF DTU 31.3 (January 2012) Building works – Timber roof structures assembled with metal connectors or gussets – Part 1-1: general technical clauses (CCT) – Part 1-2: general material selection criteria (CGM) – Part 2: special administrative clauses (CCS) – Part 3: design rules.

NF DTU 34.4 (July 2015) Building works – Installation of shutters and blinds – Part 1-1: general technical clauses – Part 1-2: general material selection criteria – Part 2: special administrative clauses – Part 3: selection guide for project managers.

NF DTU 36.2 (May 2016) Building works – Interior timber joinery – Part 1-1: general technical clauses – Part 1-2: general material selection criteria – Part 2: special administrative clauses.

NF DTU 36.5 (October 2010) Building works – Installation of windows and external doors – Part 1-1: general technical clauses – Part 1-2: general material selection criteria (CGCM - *critères généraux de choix des matériaux*) – Part 2: special administrative clauses – Part 3: selection guide based on exposure conditions.

NF DTU 41.2 (August 2015) Building works – External timber cladding – Part 1-1: general technical clauses (CCT) – Part 1-2: general material selection criteria (CGM) – Part 2: special administrative clauses.

NF DTU 51.1 (December 2010) Parquets – Installation of nailed parquet – Part 1-1: general technical clauses – Part 1-2: general material selection criteria (CGM) – Part 2: special clauses.

NF DTU 51.11 (May 2024) Building works – Floating parquet – Part 1-1: general technical clauses (CCT) – Part 1-2: general material selection criteria (CGM) – Part 2: special clauses (CCS).

NF DTU 51.2 (March 2023) Building works – Glued parquet – Part 1-1: general technical clauses (CCT) – Part 1-2: general material selection criteria (CGM).

NF DTU 51.4 (December 2018) Building works – Outside timber decking – Part 1-1: general technical clauses (CCT) – Part 1-2: general material selection criteria (CGM) – Part 2: special administrative clauses (CCS).

NF EN 1195 (May 1998) Timber structures – Test methods – Performance of structural floors.

NF EN 1317-1 (September 2010) Road restraint systems – Part 1: terminology and general provisions for test methods.

NF EN 1317-2 (September 2010) Road restraint systems – Part 2: performance classes, impact test acceptance criteria, and test methods for safety barriers, including edge protection barriers for civil engineering structures.

NF EN 1317-3 (September 2010) Road restraint systems – Part 3: performance classes, impact test acceptance criteria, and test methods for crash cushions.

NF EN 1317-5/IN2 NF EN 1317-5+A2 (June 2012) Road restraint systems – Part 5: product requirements and conformity assessments for vehicle restraint systems.

NF EN 13226 (August 2009) Timber flooring – Solid parquet elements with grooves and/or tongues.

NF EN 13227 (November 2017) Timber flooring – Solid strip flooring.

NF EN 13228 (July 2011) Timber flooring – Solid timber overlay parquet elements, including English blocks, with guiding systems.

NF EN 13442 (April 2023) Timber flooring and parquets, and timber panelling and cladding – Determination of resistance to chemical agents.

NF EN 13488 (July 2003) Timber flooring and timber parquets – Mosaic parquet elements.

NF EN 13489 (July 2023) Timber flooring and parquets – Engineered parquet elements.

NF EN 13629 (March 2020) Timber flooring – Individual or pre-assembled solid hardwood floorboards.

NF EN 13647 (April 2021) Timber flooring, panelling, and timber cladding – Determination of geometric characteristics.

NF EN 13696 (February 2009) Timber flooring - Test methods to determine elasticity, abrasion resistance, and impact resistance.

NF EN 13756 (September 2018) Timber flooring and parquet – Terminology.

NF EN 13810-1 (April 2003) Timber-based panels - Floating floors - Part 1: Requirements and functional specifications.

NF EN 13990 (September 2004) Timber flooring - Solid boards for softwood flooring.

NF EN 14221 (January 2007) Timber and timber-based materials in interior windows, door leaves, and frames of interior doors - Requirements and specifications.

NF EN 14342 (September 2013) Timber flooring and parquet - Characteristics, conformity assessment, and marking.

NF EN 14351-1+A2 (November 2016) & NF EN 14351-1/IN2 (November 2016) Windows and doors - Product standard, performance characteristics - Part 1: windows and external pedestrian doorsets.

NF EN 1476 (May 2006) Timber flooring - Sampling procedures for conformity assessment.

NF EN 14761/IN1 (October 2008) Timber flooring - Solid timber parquet - Edge-glued, wide, and stone-cut lamella.

NF EN 14761+A1 (October 2008) Timber flooring - Solid timber parquet - Edge-glued, wide, and stone-cut lamella.

NF EN 14915+A2 (January 2020) Timber cladding and panelling - Characteristics, requirements, and marking.

NF EN 14951 (June 2006) Solid hardwood timber cladding and panelling - Machined profiled boards.

NF EN 1533 (October 2010) Timber flooring - Determination of bending under static load - Test methods.

NF EN 1534 (January 2020) Timber flooring and parquets - Determination of indentation resistance - Test method.

NF EN 16929 (December 2018) Test methods - Timber flooring systems - Determination of vibrational properties.

NF EN 17213 (March 2020) Doors and windows - Environmental product declarations - Product category rules for windows and pedestrian doorsets.

NF EN 17456 (April 2021) Timber flooring and parquets - Determination of top layer delamination in engineered elements - Test method.

NF EN 1793-1 (May 2017) Road traffic noise reduction systems - Test method for determining acoustic performance - Part 1: intrinsic characteristics of sound absorption under diffuse sound field conditions.

NF EN 1793-2 (June 2018) Road traffic noise reduction devices - Test method for determining acoustic performance - Part 2: intrinsic characteristics of airborne sound insulation under diffuse sound field conditions.

NF EN 1793-3 (November 1997) Road traffic noise reduction systems – Test method for determining acoustic performance – Part 3: standardised traffic noise spectrum.

NF EN 1793-4 (August 2015) Road traffic noise reduction systems – Test method for determining acoustic performance – Part 4: intrinsic characteristics – In-situ values of acoustic diffraction.

NF EN 1793-5 (May 2016) Road traffic noise reduction systems – Test method for determining acoustic performance – Part 5: intrinsic characteristics – In-situ values of acoustic reflection under direct sound field conditions.

NF EN 1793-6+A1 (March 2021) Road traffic noise reduction systems – Test method for determining acoustic performance – Part 6: intrinsic characteristics – In-situ values of airborne sound insulation under direct sound field conditions.

NF EN 1910 (July 2016) Timber flooring, panelling, and cladding – Determination of dimensional stability.

NF EN 1912 (May 2024) Structural timber – Strength classes – Assignment of visual grading classes and species.

NF EN 275 (December 1992) Timber preservation products – Determination of protective effectiveness against marine timber-boring organisms.

NF EN 335 (May 2013) Durability of timber and timber-based materials – Usage classes: definitions, application to solid timber and timber-based materials.

NF EN 338 (1 July 2016) Structural timber – Strength classes.

NF EN 350 (28 October 2016) Durability of timber and timber-derived materials – Test methods and classification of durability against biological agents for timber and timber-derived materials.

NF EN 460 (February 2023) Durability of timber and timber-based materials – Guide for determining performance.

NF EN 581-1 (September 2017) Outdoor furniture – Seating and tables for domestic, public, and camping use – Part 1: general safety requirements.

NF EN 581-2 (January 2016) Outdoor furniture – Seating and tables for domestic, public, and camping use – Part 2: safety, strength, and durability requirements for seating.

NF EN 581-3 (October 2017) Outdoor furniture – Seating and tables for domestic, public, and camping use – Part 3: mechanical safety requirements for tables.

NF EN ISO 14122-3 (March 2017) Machine safety – Permanent means of access to machinery – Part 3: stairs, step ladders, and guardrails.

NF EN ISO 17178 (April 2020) Adhesives – Adhesives for the bonding of parquet flooring – Test methods and minimum requirements.

NF ISO 4556 (July 2023) Unfinished timber parquet elements – General characteristics.

NF ISO 4561 (July 2023) Unfinished timber parquet elements – Classification.

NF ISO 4562 (July 2023) Timber parquet boards - Classification.

NF ISO 5323 (November 2019) Timber flooring and parquet - Vocabulary.

NF P01-012 (July 1998) Dimensions of guardrails - Safety rules regarding the dimensions of guardrails and stair handrails.

NF P01-013 (August 1988) Guardrail testing - Methods and criteria.

NF P20-302 (November 2019) Characteristics of windows.

NF P23-305 (December 2014) Timber joinery - Technical specifications for windows, French doors, exterior doors, and timber joinery assemblies.

NF P99-610 (December 2014) Urban furniture for public spaces and cleanliness - Seating furniture - Strength and stability characteristics of seating furniture.

NF P99-650 (June 2013) Urban furniture for public spaces and cleanliness - Maintenance of urban furniture for public spaces and cleanliness - Organisation and monitoring of maintenance.

XP CEN/TS 13810-2 (August 2003) Timber-based panels - Floating floors - Part 2: test methods.

XP CEN/TS 15676 (March 2008) Timber flooring - Slip resistance - Pendulum test.

XP CEN/TS 15717 (July 2008) Timber parquet - General installation guide.

XP P98-405 (April 1998) Road safety barriers - Guardrails for bridges and civil engineering structures - Design, manufacturing, and installation.

WEBOGRAPHIE

http://www.ppecf-comifac.com/accueil.html

https://base-inies.fr/consultation/infos-produit/37684

https://base-inies.fr/consultation/infos-produit/39924

https://bigmedia.bpifrance.fr/nos-dossiers/loi-agec-synthese-impacts-obligations-anti-gaspillage-pour-les-entreprises#:~:text=La%20loi%20AGEC%20%C3%A9largit%20d,financer%20leur%20gestion%20des%20d%C3%A9chets

https://boutique.cstb.fr/detail/guides-et-livres/droit-et-construction/cctp-recommandations-et-modeles-de-clauses (CCTP : Recommendations and model clauses (CSTB))

https://catalogue-bois-construction.fr/ Assistance with the drafting of CCTPs (FCBA)

https://comifac.org/ (Central African Forest Commission)

https://cucpublications.controlunion.com/certified_companies_and_products.aspx

https://efi.int/sites/default/files/files/publication-bank/2018/efi_policy_brief_3_fra_net.pdf

https://eur-lex.europa.eu/FR/legal-content/summary/fighting-deforestation-and-forest-degradation.html

https://eur-lex.europa.eu/FR/legal-content/summary/voluntary-partnership-agreements-on-forest-law-enforcement-governance-and-trade.html

https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1997R0338:20100815:FR:PDF

https://eur-lex.europa.eu/legal-content/FR/ALL/?uri=CELEX%3A32010R0995

https://eur-lex.europa.eu/legal-content/FR/TXT/PDF/?uri=CELEX:32011R0305&from=FR

https://fr.fsc.org/fr-fr

https://maderajusta.org/

https://normalisation.afnor.org/thematiques/eurocodes/

https://normalisation.afnor.org/wp-content/uploads/2016/05/liste-eurocodes.pdf

https://pafc-certification.org/

https://research.wri.org/fr/gfr/latest-analysis-deforestation-trends

https://search.fsc.org/fr/

https://tashmetum.atibt.org/fr/

https://tropix.cirad.fr/fiches-disponibles

https://tropix.cirad.fr/fiches-disponibles

https://www.agenceecofin.com/bois-et-derives/0204-117557-il-faudrait-repenser-l-interdiction-d-exportation-de-grumes-de-bois-en-afrique-centrale-alain-karsenty-cirad

https://www.atibt.org/files/upload/Nomenclature-Generale-des-Bois-Tropicaux-7eme-edition.pdf

https://www.bureauveritas.fr/besoin/certification-olb

https://www.calculs-eurocodes.com/eurocode_5

https://www.clic-cctp.com/ (CLIC CCTP, online software for drafting and costing CCTPs and DPGFs)

https://www.controlunion.com/certification-program/tlv-timber-legality-verification/

https://www.cstb.fr/nos-offres/toutes-nos-offres/certification-nf-fenetres-blocs-baies-pvc-aluminium-rupture-pont-thermique

https://www.deforestationimportee.ecologie.gouv.fr/reglement-europeen-contre-la-deforestation-et-la-degradation-des-forets/article/reglement-europeen-contre-la-deforestation-et-la-degradation-des-forets

https://www.dvtranslation.com/blog/le-guide-complet-pour-rediger-votre-cctp-en-architecture/ (The complete guide to drafting your CCTP in architecture (D&V Translation Agency))

https://www.ecologie.gouv.fr/politiques-publiques/reglementation-reach#quels-sont-les-objectifs-de-reach-1

https://www.economie.gouv.fr/daj/code-commande-publique-et-autres-textes

https://www.ekopolis.fr/ressources/guide-redaction-de-vos-cctp-contrats-cadres Drafting your CCTPs – Framework contracts (ekopolis / DEMOCLES collaborative platform)

https://www.fair-and-precious.org/files/upload/news/DRYADES/ATIBT_Restitution_projet_DRYADES_231005.pdf

https://www.fair-and-precious.org/files/upload/news/DRYADES/ATIBT_Restitution_projet_DRYADES_231005.pdf

https://www.fair-and-precious.org/fr

https://www.fair-and-precious.org/fr/p/67/operateurs-certifies-bois-tropical

https://www.fcba.fr/prestations/certifier-evaluer/marquage-ce/

https://www.fcba.fr/wp-content/uploads/2021/01/fcbainfo_2015_28_norme_dtu_36_3_travaux_de_batiment_escaliers_en_bois_et_garde_corps_associes_stephane_graissaguel.pdf

https://www.ffbatiment.fr/gestion-entreprise/organiser-mon-chantier/dechets-de-chantier-bonnes-pratiques-environnementales/dossier/dechets-de-chantier-c-est-quoi-la-rep-batiment#:~:text=D%C3%A9chets%20de%20chantier-,D%C3%A9chets%20de%20chantier%20%3A%20c'est%20quoi%20la%20REP%20B%C3%A2timent%20%3F,march%C3%A9%20de%20produits%20et%20mat%C3%A9riaux

https://www.icab.eu/guide/cb71/

https://www.itto.int/files/itto_project_db_input/3028/Technical/F-TMT-SPD-010-12-R1-M-Atlas%20des%20bois%20tropicaux.pdf

https://www.lecommercedubois.org/files/documents/file/Guide-Terrasse-FNB-LCB-ATB-ARBUST-FCBA-avec-liens-BD-yxmo.pdf

https://www.lecommercedubois.org/p/43/rbue

https://www.lecommercedubois.org/p/43/rbue-rdue

https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000017924078/

https://www.legifrance.gouv.fr/codes/texte_lc/LEGITEXT000037701019/

https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000041553759/ (Law no. 2020-105 of 10 February 2020 for the combating of waste and promotion of the circular economy)

https://www.legifrance.gouv.fr/loda/id/JORFTEXT000000693683

https://www.marche-public.fr/ccp/R2111-08-specifications-techniques-normes-documents-performances-exigences-fonctionnelles.htm

https://www.marche-public.fr/ccp/R2111-08-specifications-techniques-normes-documents-performances-exigences-fonctionnelles.htm

https://www.metsagroup.com/fr/metsawood/produits-et-services/produits/kerto-lvl/

https://www.preferredbynature.org/focus/timber

https://www.rpcnet.fr/

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