



**FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS
INFORMATION NOTE I**

A large-scale reconstruction project of a timber processing plant. The structure is made of a complex network of wooden beams and supports, with a corrugated metal roof. Stacks of processed lumber are visible in the foreground and background.

**PROCUREMENT OF TIMBER FOR
TSUNAMI RECONSTRUCTION
IN INDONESIA**



Guideline I



Guideline II



Information
Note II





INFORMATION NOTE I



This information note was produced jointly by the Food and Agriculture Organization of the United Nations (FAO), the Ministry of Forestry (MoF) of Indonesia and the Provincial Forest Service (DISHUT) of Nanggroe Aceh Darussalam (NAD) Province under the "Forestry Programme for Early Rehabilitation of Asian Tsunami Affected Countries" (OSRO/GLO/502/FIN), financed by the Government of Finland.

This information note is part of a series of guidelines and information notes prepared to assist with the procurement and use of suitable timber for rehabilitation and reconstruction in NAD and Nias. They are:

- Guideline 1 : Required Documentation for Transportation of Timber within Indonesia for Tsunami Reconstruction;
- Guideline 2 : Clearance Procedures for Timber Imported into Indonesia for Tsunami Reconstruction;
- Information Note 1 : Procurement of Timber for Tsunami Reconstruction in Indonesia; and
- Information Note 2 : Timber Usage for Tsunami Reconstruction in Indonesia.

These documents are available at: <http://www.fao.org/forestry/site/tsunami/en>

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OBJECTIVES

The objective of this Information Note is to provide information to facilitate the procurement of timber and ensure that it is suitable for its designated purpose.

OVERVIEW

Wood procurement involves the ordering, purchasing and delivery of timber. Adopting clear and appropriate guidelines for timber procurement for post-tsunami reconstruction ensures that:

- the wood purchased complies with the product specifications for its intended purpose;
- ordering imported timber using the standard timber specifications from the country of origin expedites the delivery against the order¹.

PROCUREMENT PLANNING ISSUES

Procurement strategy

Procurement of timber should take into account the following:

- Timber is a highly variable product in terms of species and grade. Appropriate use of timber requires an understanding of the attributes of different species and grades. The buyer of timber products needs to provide clear specifications for the goods to be purchased and implement sufficient quality control procedures to ensure the delivered goods comply with the specifications.
- Because timber is often ordered in large quantities, the required amount may not be available from one source. Large procurement orders may require sourcing from multiple suppliers.
- An order of timber from overseas may take many weeks due to the time entailed for the following tasks:
 - specification, tendering, ordering and contract negotiation (approx 2-4 weeks);
 - consolidation of the consignment (approx 2 weeks);
 - arranging shipping services (approx 1-2 weeks);
 - shipping of goods to a regional hub, e.g. Singapore (approx 10 days);
 - trans-shipment to secondary hub, e.g. Lhokseumawe (approx 1 week);
 - customs clearance (1-3 days);
 - processing transport permits a letter of recommendation from BRR “Tim Terpadu” and an authorization letter from P3KB (1-2 days);
 - trans-shipment to final destination (2 days).
- It is recommended that customs clearance be obtained before arrival of the shipment to avoid the possibility of demurrage². This involves submitting the bill of lading to customs prior to arrival, preferably pre-shipment.

¹ This is a significant issue for tsunami reconstruction because many of the international participants in construction have no local experience in timber usage and encounter difficulties identifying the products required.

² A charge required as compensation for the delay of a ship or freight car or other cargo beyond its scheduled time of departure.

- Organizations with large, long-term construction programmes should consider long-term supply agreements so that procurement and delivery processes can be regularized.
- Long-term storage in the tropics requires adequate warehousing facilities, although in the short term timber can be stored outside.
- Containerization of timber has advantages in terms of ease of shipment and handling. Containers also provide a good long-term storage option for timber. Container handling facilities are available at the ports in Medan and Lhokseumawe, but are not available at other ports in NAD province.

Product from legal and sustainable managed sources

All timber purchasers should ensure that they procure timber that complies with the laws of Indonesia. The minimum requirement for legality is that the purchased timber has documentation to verify that it has been harvested from a legally recognized source (e.g. a licensed production, plantation or conversion forest).

For organizations that wish to purchase timber from sustainably managed forests, the simplest way to do this is to obtain timber from concessionaires who are accredited under a nationally-recognized certification scheme.

SPECIFICATIONS AND BILLS OF QUANTITIES

Overview

The first stage in timber procurement is preparation of a list of materials to be purchased and specification of the attributes of those materials. The timber specifications are determined by the design plan of the building in question. The selection of species, grades, and sizes of timber will depend on several factors:

- the availability of species;
- mechanical properties of the species (e.g., strength, stiffness);
- physical grade characteristics (e.g., knots, splits, etc) that affect its engineering attributes;
- natural durability of the timber;
- the probability of exposure to natural hazards and their intensity;
- the standard sizes available.

The bill of quantity and associated timber specifications should be sufficiently detailed to ensure that the materials obtained meet requirements. The specification is usually simplified when timber-grading rules are available. In the absence of robust and comprehensive grading rules, the bill of quantity and related timber specifications should include the following information:

- dimensions, number of pieces and/or volume of the timber;
- grading system to be used and grade of the timber;
- minimum grade attributes for the timber;³;
- allowable species;
- durability of the timber;
- chemical treatments required.

³ This is especially required for domestic sales because of the lack of robust and transparent domestic timber grading rules.

In addition, the purchased timber should have documentation to validate that it is legal according to the rules and regulations of the country of origin.

Sample timber specification / Bill of Quantity

An example of timber specification/Bill of Quantity that conforms these guidelines is shown below :

Roofing Timber			
Product	Dimension	No. Pieces	Volume (m3)
Roofing beams	5cmx10cmx4m	16	0.320
Roofing cross beams	5cmx5cmx4m	18	0.180
Corner wall beams	10cmx10cmx2.5m	4	0.100
External wall supporting beams	5cmx10cmx2.5m	18	0.225
Allowable Species	Ampupu, Bangkirai, Bayur, Berumbung, Bintangur, Bungo, Cemara Laut, Cengal, Kapur, Keruing, Meranti batu, Merawan, Nangka, Resak, Semantok, Sentang, Sungkai, Tanjung.		
Durability Class:	Class I-III, under the roof, no ground contact and well ventilated.		
External Walls			
Product	Dimension	No. Pieces	Volume (m3)
External wall planks	2cmx20cmx6m	16	1.560
Allowable Species	Ampupu, Bayur, Berumbung, Bintangur, Keruing, Meranti batu, Merawan, Semantok, Tanjung.		
Durability Class	Class I-II, exposed to weather, but kept dry and ventilated.		
All Timber			
Legality Status	Must be purchased from a timber merchant licensed by the Dinas Trade and Industries Service.		
Treatment Required	Pressure treated CCB with topical application on ends during construction for termite resistance. Must attain hazard class II.		
Grading System / Grade	Local grading system, Class II		

Timber sizes

Timber is available in three main surfaces: rough sawn, planer gauged and dressed. For a nominal (call) size, the actual (finished) dimension will vary depending on the way it is finished. The table below describes the actual finish size for a given call size and finish.

STANDARD CALL AND FINISH SIZES			
Call size	Timber finish		
	Rough sawn (mm)	Gauged (mm)	Dressed (mm)
25	25	-	19
30	30	-	25
40	40	37	35
50	50	47	45
75	75	69	65
100	100	94	90
125	125	119	115
150	150	144	140
200	200	194	180
225	225	219	205
250	250	244	230

Source : NZS 3601

Tolerances

The margins of permissible variations around stated dimensions (usually referred to as “tolerances”) should be specified when purchasing timber. This is especially the case for rough sawn timber. In the case of gauged/dressed/finished timbers, the variability around the stated dimensions is usually smaller than for rough sawn timber, but tolerances should still be stated.

The Malaysian Timber Industry Board specifies size tolerance rules for tropical hardwoods as follows:

- The sizes of sawn timber, unless otherwise specified, shall be within the margin of permissible variations stated hereunder :
 - for widths, depths or thicknesses not exceeding 75 mm, within 5 mm of the specified size;
 - For widths, depths or thicknesses exceeding 75mm, within 10 mm of the specified size.
- The finished sizes for joinery, unless otherwise specified, shall be within the margin of permissible variation stated hereunder :
 - for widths, within 3 mm of the specified finished size;
 - for thicknesses, within 2 mm of the specified finished size.

When specifying the dimensions of “green” timber, an over-cut allowance should be specified to account for shrinkage during drying. The degree of shrinkage, and the respective over-cut allowance, differs between species and the change in moisture content. Shrinkage when drying wood from green to air-dried state is typically between 2-6 percent of the thicknesses and width of the green timber⁴.

INTERNATIONAL PROCUREMENT ⁵

When procuring timber from abroad, it is necessary that the purchaser know the species available and the timber specifications used in that country. This will facilitate the rapid procurement and transportation of the timber. Examples are provided below.

Australia

➤ **Species**

Australia has a large selection of species suitable for construction. For the purposes of this manual, the discussion is restricted to *Pinus radiata*.

➤ **Structural grades and end uses**

In Australia, timber grading rules for visual stress grading of softwoods are described in AS 2858-1986. The Australian grading process has three steps :

1. The timber species being graded is classified into a species strength group (strength group SD6 for dry radiata pine has been used in this report);
2. The timber is then sorted into five structural grades using visual grading rules (Structural Grade Numbers 1 through to 5); and
3. These Structural Grades are based on strength groups and provide for basic working stress in bending for design purpose. These stress grades are termed "F" grades. The "F" grades are aligned to the 5 structural grades on the basis of in-grade testing results.

The minimum strength requirements for various mechanical properties are given for each Australian Stress Grade ("F" grade) in the table below:

Minimum Strength Requirements (Mpa) of Australian Stress Grades

Mechanical Properties (Mpa)	Australian Stress-Grades ("F" Grades)					
	F4	F5	F7	F8	F11	F14
Bending Stress (Fb)	13	16	20	25	35	40
Tension // to grain (Ft)	6.5	8.2	10	13	17	21
Compression // to grain (Fc)	9.7	12	15	20	25	30
MOE (E)	6,100	6,900	7,900	9,100	10,500	12,500

*Source: AS 2858-1986 standards

⁴ “Shrinkage” is the greatest tangentially over the radial direction with little loss along the length of the board, etc, i.e. “shrinkage” occurs mainly in the timber thickness and width and shrinkage in timber length is very small.

⁵ The information on timber grading in the selected countries has been extracted from <http://www.timbersa.co.za/ICD/GradingComparison/gradingcomparison.asp>.

➤ **Common dimensions**

Common dimensions for Australian structural timbers include :

Width (mm)	Thickness (mm)			
		25		25
50	√	50	√	50
75	√	75	√	75
100	√	100	√	100
150		150		150

New Zealand

➤ **Species**

The vast majority of structural timber exported from New Zealand is radiata pine. Douglas fir is the next most commonly produced structural timber but its use in the tropics is not recommended due to difficulty in chemically preserving this species. For the purposes of this manual, the discussion is restricted to *Pinus radiata*.

➤ **Structural grades**

In New Zealand, timber grading rules are described in NZS 3631. The New Zealand structural grading system uses three different structural grades (№ 1 Framing, № 2 Framing and Engineering). Basic working stresses are assigned to each of the structural grades. The minimum strength requirements for various mechanical properties are given for each New Zealand structural grade in the table below:

Minimum Strength Requirements (Mpa) of New Zealand Structural Grades

Mechanical Properties (Mpa)	New Zealand Structural Grades		
	No. 2 Framing	No. 1 Framing	Engineering
Bending Stress (Fb)	16	17.7	27.7
Tension // to grain (Ft)	8.2	10.6	16.5
Compression // to grain (Fc)	12	20.7	25.9
MOE (E)	6900	8000	10500

➤ **Common dimensions**

Common dimensions for New Zealand structural timbers are provided in the table below :

Width (mm)	Thickness (mm)			
	25	40	50	100
50	√		√	
75	√	√	√	
100	√	√	√	√
150			√	
200	√			

Southern USA

➤ **Species**

The southern United States terms the species used in structural construction as southern yellow pine. This term is the commercial grouping of several different species including *Pinus elliotii*, *roxburghii* and *taeda*. This timber is generally straight, even grained and with a medium texture.

➤ **Structural grades**

Nearly all dimension lumber is graded under the American Lumber Standards (ALS). The grading system divides the timber into various grade categories. These categories are further divided into grades within the categories. The grade categories, as well as all the various grades used in the US, are shown in the table below:

Grades used in the Southern United States and Canada

Grade Categories		Grades	
		SEL	Select Structural
		No. 1	No. 1 Structural
J&P	Joists and Planks	No. 2	No. 2 Structural
SLF	Structural Light Framing	No. 3	No. 3 Structural
LF	Light Framing	Const	Construction
		Std	Standard
		Util	Utility

The minimum strength requirements of the ALS system are shown in the table below:

Minimum Strength Requirements (Mpa) of Southern United States Structural Grades

Mechanical Properties (Mpa)	Southern States Structural Grades										
	SEL (SLF)	SEL (J&P)	No.1 (SLF)	No.1 (J&P)	No.2 (SLF)	No.2 (J&P)	CONST (LF)	STD (LF)	No.3 (SLF)	No.3 (J&P)	UTIL (LF)
Bending Stress (Fb)	11.7	10.3	8.2	7.2	8.2	7.2	6.9	5.1	6	5.3	4.1
Tension // to grain (Ft)	9.1	8	6.3	5.5	6.3	5.5	4.4	2.5	3.3	3	1.2
Compression // to grain (Fc)	11.3	11.3	10.2	10.2	8.9	8.9	7.8	5.9	6.8	6.8	4.3
MOE (E)	9000	9000	7500	7500	7500	7500	7500	7500	6500	6500	7500

*Source: BS5268 : Part2 : 1991

➤ **Grading rules in the USA**

The American Lumber Standards Committee maintains seven specific sets of grading rules. The detailed information on these grading rules can be obtained from:

1. *Standard Grading Rules for Northeastern Lumber*; published by the Northeast Lumber Manufacturers Association (NeLMA), 272 Tuttle Road, P.O. Box 87A, Cumberland Center, ME 04021; 207.829.6901; 207.829.4293 (fax); e-mail info@nelma.org

2. *Standard Grading Rules*; published by the Northern Softwood Lumber Bureau (NSLB), 272 Tuttle Road, P.O. Box 87A, Cumberland Center, ME 04021; 207.829.6901; 207.829.4293 (fax); e-mail info@nelma.org
3. *Standard Specifications for Grades of California Redwood Lumber*; published by the Redwood Inspection Service (RIS), 405 Enfrente Drive, Suite 200, Novato, CA 94949; 415.382.0662; 415.382.8531 (fax); e-mail info@calredwood.org
4. *Standard Grading Rules for Southern Pine*; published by the Southern Pine Inspection Bureau (SPIB), 4709 Scenic Highway, Pensacola, FL 32504; 850.434.2611; 850.433.5594 (fax); e-mail spib@spib.org
5. *Standard Grading Rules for West Coast Lumber*; published by the West Coast Lumber Inspection Bureau (WCLIB); Box 23145, Portland, OR 97281-3145; 503.639.0651; 503.684.8928 (fax); e-mail info@wclib.org
6. *Western Lumber Grading Rules*; published by Western Wood Products Association (WWPA); Yeon Building, 522 SW Fifth Avenue, Portland Oregon 97204-2122; 503.224.3930; 503.224.3934 (fax); e-mail info@wwpa.org
7. *Standard Grading Rules for Canadian Lumber*; published by the National Lumber Grades Authority (NLGA); 406 First Capital Place, 960 Quayside Drive, New Westminster, BC V3M 6G2; 604.524.2393; 604.524.2893; e-mail info@nlga.org

➤ **Common dimensions**

The southern United States has various dimension combinations, which are divided up into the various structural grade categories. These grade categories, with their corresponding dimension range, are shown in the table below:

Southern United States Structural Grades Dimension Ranges

Structural Category	Width Range		Thickness Range	
	Min	Max	Min	Max
Light Framing (LF)	38 mm	100 mm	38 mm	
Structural Light Framing (SLF)	38 mm	100 mm	38 mm	100 mm
Structural Joists and Planks (J&P)	114 mm	387 mm	38 mm	100 mm

Canada

➤ **Species**

The Canadian sawmilling industry uses a variety of softwood species in the production of structural timber. Although timber from the various species is used for similar applications there are differing mechanical properties and stress values assigned to the different groupings of the species. The more common groupings include:

- Douglas fir and larch
- Sitka spruce
- hemlock and fir
- spruce, pine and fir

➤ **Structural grades**

Canadian lumber is manufactured to conform to grading rules meeting Canadian and US requirements. Canadian structural grades are divided into the same grade categories as used in the US. The minimum strength requirements of the Canadian grading system are shown in the table below:

Minimum Strength Requirements (Mpa) of Canadian Structural Grades

Mechanical Properties (Mpa)	Canadian Structural Grades (rules)										
	SEL (SLF)	SEL (J&P)	No.1 (SLF)	No.1 (J&P)	No.2 (SLF)	No.2 (J&P)	CONST (LF)	STD (LF)	No.3 (SLF)	No.3 (J&P)	UTIL (LF)
Bending Stress (Fb)	16.5	16.5	11.8	11.8	11.8	11.8	5.4	4	7	7	3.2
Tension // to grain (Ft)	7.1	6.2	4.9	4.3	4.9	4.3	4.3	4.3	4.3	4.3	4.3
Compression // to grain (Fc)	14.5	14.5	11.5	11.5	11.5	11.5	6.1	4.6	7	7	3.4
MOE (E)	7500	7500	6500	6500	6500	6500	6000	6000	5500	6000	6000

➤ **Common dimensions**

Canadian lumber dimensions are virtually identical to the southern United States dimensions. The grade categories with corresponding dimension ranges are shown in the table below :

Canadian Structural Grades Dimension Ranges

Structural Category	Width Range		Thickness Range	
	Min	Max	Min	Max
Light Framing (LF)	38 mm	100 mm	38 mm	
Structural Light Framing (SLF)	38 mm	100 mm	38 mm	100 mm
Structural Joists and Planks (J&P)	114 mm	387 mm	38 mm	100 mm

Europe

➤ **Species**

In European markets, common softwood species used for structural timbers include fir, larch, spruce, hemlock and various pine species. For the purposes of this document it should be noted that the strength classes listed include most of the pine species.

➤ **Structural grades**

Eurocode (EN 338) is one of several grading systems for specifying strength of softwood timber in Europe. European Strength Classes are based on strength groups and provide thresholds for the basic working stress of timber for design purposes. The minimum strength requirements of the Eurocode system are listed in the table below:

Minimum Strength Requirements (Mpa) of European (EN 338) Strength Classes

Mechanical Properties (Mpa)	European (EN 338) Strength Classes ("C-Grades")								
	C14	C16	C18	C22	C24	C27	C30	C35	C40
Bending Stress (Fb)	14	16	18	22	24	27	30	35	40
Tension // to grain (Ft)	8	10	11	13	14	16	18	21	24
Compression // to grain (Fc)	4.3	4.6	4.8	5.1	5.3	5.6	5.7	6.0	6.3
MOE (E)	7,000	8,000	9,000	10,000	11,000	12,000	12,000	13,000	14,000

*Source: Eurocode En338

➤ **Common dimensions**

Common dimensions vary considerably between specific markets. The most common dimension used in Europe is 100 x 50 mm nominal size. Common dimensions for European structural timbers include:

Width (mm)	Thickness (mm)								
	36	38	44	47	50	63	75	100	150
75	√	√	√	√	√				
100	√	√	√	√	√	√	√	√	
125	√	√	√	√	√	√	√		
150	√	√	√	√	√	√	√	√	√
175		√	√	√	√	√	√		
200		√	√	√	√	√	√	√	√
225		√	√	√	√	√	√		
250			√	√	√		√	√	
300			√	√	√		√	√	√

South Africa

➤ **Species**

Pine is the most common species used by the structural timber industry:

Species	MOR (BENDING)	MOE (E)	Density
<i>Pinus elliottii</i>	71	9,264	494
<i>Pinus patula</i>	60	11,042	498
<i>Pinus pinaster</i>	70	13,086	697
<i>Pinus radiata</i>	68	13,721	611
<i>Pinus taeda</i>	94	11,225	578

➤ **Grades and end uses**

The South African timber industry has three broad grade categories; structural, appearance and utility. The specific grades found within those categories and examples of the typical uses for those grades are shown in the table below:

Structural Timber	Appearance Timber	Utility Timber
Black Cross (XXX)	Clears	Industrial
Stress Grade 5 (S5)	Semi-clears	Crating
Stress Grade 7 (S7)	Furniture grade	
Stress Grade 10 (S10)		

Grade	Examples Of End Use
Structural	Used in designed timber construction and general building construction (beams, wall framing, trusses, joists).
Clears	Long and short length timber for use as mouldings, turnery, furniture, joinery and panelling.
Semi-clears	For uses requiring one good face and two edges (moulding, furniture, joinery and panelling)
Furniture Grade	For decorative uses requiring tight knots (furniture, decking, skirting, ceiling, flooring).
Industrial	Used for formwork in building construction, and other temporary uses.
Crating	Pallets, fruit boxes and other container type uses.

➤ **Common dimensions**

The most common South African structural lumber dimensions are shown in the table below:

Most Common Sizes of South African Structural Pine Available

Board Width (mm)	Board Thickness (mm)		
	38	50	76
38	√	√	√
50		√	√
76	√	√	√
114	√	√	√
152	√	√	√
228	√	√	√

* Source: SALMA Timber Manual

For further information, please contact:

Ministry of Forestry	Provincial Forest Service NAD	FAO
<p>Director General of Forestry Production, Gedung Manggala Wanabakti, Block I, Lantai V, Jl. Gatot Subroto Jakarta 10276 Indonesia</p> <p>tel +62 (021) 5730240 fax +62 (021) 5732721</p> <p>www.dephut.go.id</p>	<p>Dinas Kehutanan NAD Jl. Sudirman No 21 Banda Aceh 23239</p> <p>tel +62 (0651) 42277 fax +62 (0651) 43628</p>	<p>Rehabilitation Support and Coordination Unit Jl. Angsa No. 12 Ateuk Deah Tanoh Banda Aceh 23244</p> <p>tel +62 (0651) 7428576 fax +62 (0651) 635636</p> <p>FAO Representation, Indonesia Menara Thamrin Kav. 3 Jakarta 10250 PO. BOX 2587, Jakarta 1001</p> <p>tel +62 (021) 3141308 fax +62 (021) 3900282</p> <p>www.fao.org</p>





