SRI LANKA STANDARD 1170 : PART 3 : 1998

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CODE OF PRACTICE ON IDENTIFICATION, GRADING AND MARKING OF IMPORTED CONSTRUCTION TIMBER

PART 3 : PROPERTIES

SRI LANKA STANDARDS INSTITUTION

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SLS 1170:Part 3 : 1998

Gr. 8

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Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD
CODE OF PRACTICE ON IDENTIFICATION, GRADING AND MARKING OF IMPORTED CONSTRUCTION TIMBER
PART 3 : PROPERTIES

FOREWORD

This Sri Lanka Standard Code of Practice was approved by the Sectoral Committee on Timber & Timber Based Products and authorised for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 1998-03-19.

Local timber suitable for structural use is in short supply. In addition, government restrictions on felling to protect the environment as well as controls on transport and marketing of timber, have also contributed to the spiralling timber costs. In spite of higher costs, timber is found to be indispensable as a construction material in Sri Lanka. To cater for the demand, the government is now encouraging the import of construction timber by granting import duty reductions, and this trend is expected to continue for some time.

Timber is a perishable material which needs great care in specification, selection and handling of bulk imports. Dealers and users also need to be educated to help them sell/select their requirements. Import inspections should be comprehensive and streamlined. Past experience on import of timber to Sri Lanka, which sometimes discouraged the prospective users, has further underlined the need for establishing some guidelines to help the importers, timber merchants and the users.

For most effective use of construction timber, it must be structurally designed to suit the specific application. To accomplish this goal, timber, over the years, was evolved as an engineering material in spite of its high variability and inherent strength reducing defects by the development of stress-graded timber. As most timber exporters provide stress-graded timber, the required design information as well as the stress-graded timber can be made available to the structural engineers who can pass on the benefits of economy and performance to the user. Availability of stress-graded imported timber will also encourage the stress-grading of local timber in the near future. Hence a need exists for a Sri Lanka Standard on imported construction timber which provides information on selection of species, durability, treatability, timber grades, design stresses as well as guidelines on implementing and checking the grading process.

This part of the standard (Part 3) specifies mechanical properties for structural design, end uses, working quality, natural durability and treatability of imported construction timber. The other parts of this standard are as follows;

Part 1 : Grading, marking and guidance on usage;
Part 2 : Nomenclature, identification, and general information; and
Part 4 : Documentation for grading.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or observation, shall be rounded off in accordance with **CS 102**. The number of significant figures to be retained in the rounded off value shall be the same as that of the specified value in this standard.

The Sri Lanka Standards Institution gratefully acknowledges the use of the publications of the Malaysian Timber Industry Board, the British Standards Institution, the Bureau of Indian Standards, the American Society for Testing and Materials and the Standards Australia.

1 SCOPE

This part of Sri Lanka Standard specifies mechanical properties for structural design, end uses, working quality, natural durability and treatability of imported construction timber for structural use.

2 REFERENCES

CS 102 - Presentation of numerical values
SLS 1109 - Timber preservation by means of copper/chrome/arsenic compositions
Part 1 - Treatment process
SLS 1170 - Code of practice on imported construction timber
Part 1 - Grading, marking, and guidance on usage
Part 2 - Nomenclature, identification, and general information
BS 144 - Coal tar creosote for the preservation of timber

3 DEFINITIONS

For the purpose of this part of the standard the definitions given in **SLS 1170 : Part 1 : 1998** shall apply:

4 NATURAL DURABILITY AND TREATABILITY

Information on natural durability, treatability and working qualities of imported construction timber is given in **A.2** of Appendix **A.**

Natural durability is based on burial tests on 50 mm x 50 mm x 600 mm untreated specimens buried such that 150 mm protrude above ground and the average life classified as follows:

Non-durable	-	0 - 2 years
Moderately durable	-	2 - 5 years
Durable	-	5 - 10 years
Very durable	-	More than 10 years

Species of timber that are not classified as very durable or durable shall be imported either after preservative treatment or without preservative treatment. However, timber of those species shall be sold to users only after preservative treatment, and the preservative treatment carried out shall comply with **SLS 1109** or **BS 144**. Species of timber that are classified as very durable or durable require no preservative treatment.

Treatability is based on tests on 65 mm x 65 mm x 75 mm specimens subjected to standard open-tank treatment with 50 per cent creosote and 50 per cent diesel oil heated to 88 ^{0}C for 21/2 hours and holding at this temperature for 16 hours. The classification with respect of average absorption is as follows:

Extremely easy	320	kg/m^3
Very easy	190 - 320	kg/m^3
Easy	130 - 190	kg/m^3
Average	95 - 130	kg/m^3
Moderately difficult	65 - 95	kg/m^3
Difficult	30 - 65	kg/m^3
Very difficult	0 - 30	kg/m^3

5 WORKING QUALITY

Working qualities of imported construction timber are given in Table **A.2** of Appendix **A**. They are classified as very easy, moderately easy, easy, slightly difficult, difficult and very difficult. Working qualities are based on sawing and machining trials conducted on air-dried timbers.

6 USES

Common uses of various species of imported construction timber are given in Table **A.1** of Appendix **A.** Uses given are only common uses and it does not preclude the possibilities of other uses for a particular species of timber, if it is considered appropriate.

7 MECHANICAL PROPERTIES

Mechanical properties required for structural design of imported construction timber are given in Table **A.1** of Appendix **A**. However, mechanical properties of all the imported construction timbers covered in **SLS 1170 : Part 1 and Part 2 : 1998** are not available presently. The Table **A.1** of Appendix **A** will be enlarged as and when new information is made available in the respective countries of origin of the imported timber.

APPENDIX A
PROPERTIES OF IMPORTED CONSTRUCTION TIMBER
TABLE A . 1 - STRENGTH PROPERTIES AND USES

TABLE A.1

Standard Name	Marking Code	Seasoning Condition	BASIC STRESSES (MPa)				Modulus of Elasticity (MPa)		Uses
			Bending/ Tension	Compression Parallel To Grain	Compression Perpendicular To Grain	Shear	Mean	Minimum	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1.BALAU	BAL/1	Green	35.2	33.5	2.62	4.00	18,400	13,500	HEAVY CONSTRUCTION (UNTREATED), BRIDGES, WHARVES, PILING, POWERLINE POSTS, DOCK BLOCKS, RAILWAY SLEEPERS, FRAMEWORKS OF CARRIAGES, RUBBER COAGULATING TANKS, BEER VATS, HEAVY DUTY FURNITURE, DOOR AND WINDOOR FRAMES.
		Dry*	--	--	--	--	--	--	
2. BALAU, RED	BRE/1	Green	21.9	19.5	1.93	2.90	14,000	10,000	HEAVY CONSTRUCTION (UNTREATED), FRAMING OF BOATS, SHIPS, CARRIAGES, HEAVY DUTY FLOORING, FAVOURITE TIMBER IN TIN MINES FOR BOTTOMS OF CHUTES AND FOR PACKING FOR ROLLER SHAFTS OF DREDGERS, HEAVY DUTY FURNITURE, DOOR AND WINDOW FRAMES, RAILWAY SLEEPERS, POWERLINE POSTS.
		Dry	25.2	22.3	1.93	3.24	14,700	10,600	
3. BITIS	BIT/1	Green	37.6	40.3	4.28	3.52	21,900	18,400	HEAVY CONSTRUCTION (UNTREATED),BRIDGES, WHARVES, PILING, RAILWAY SLEEPERS, PAVING BLOCKS, WHEEL HUBS, CART AXLES, SHOULDER POLES, MALLETS, THE TIMBER OF POLE-SIZED TREES MAKES EXCELLENT HANDLES FOR STRIKING TOOLS, HEAVY DUTY FLOORING, PARQUET FLOORING, POWER LINE POSTS.
		Dry	45.0	45.1	4.28	4.14	22,900	19,200	
4. CHENGAL	CHE/1	Green	39.4	37.7	4.21	4.34	18,100	13,200	HEAVY CONSTRUCTION, BRIDGES, RAILWAY SLEEPERS, SAWN POWERLINE POSTS, BOAT-BUILDING, HEAVY DUTY FLOORING, MOTOR VEHICLE BODYWORK, RUBBER COAGULATING TANKS, MANY OTHER USES WHERE GREAT STRENGTH AND DURABILITY ARE REQUIRED.
		Dry	44.8	39.9	4.21	4.34	19,000	13,200	
5. GIAM	GIA/1	Green	32.5	27.4	3.38	4.55	14,700	8,800	HEAVY CONSTRUCTION (UNTREATED), BRIDGES, WHARVES, PILING HEAVY DUTY FLOORING, POWERLINE POSTS, KEELS AND FRAMEWORK OF BOATS , DOCK BLOCKS, BEARING BLOCKS, BRAKE BLOCKS, MALLETS, BUFFERS, RAILWAY SLEEPERS, CARRIAGE AND WAGON FRAMES, WAGON BEDS, FLOOR-BOARDS, LORRY AND TRUCK BODY FRAMES, BEER VATS, RUBBER COAGULATING TANKS, HEAVY DUTY FURNITURE.
		Dry	37.2	29.2	3.79	4.97	16,100	9,700	
6. KEKATONG	KEK/1	Green	32.8	27.6	3.79	3.79	17,000	11,700	ALL HEAVY CONSTRUCTION WORK, DARKER PORTION OF CORE WOOD, ATTRACTIVELY STREAKED - USED FOR DECORATIVE PURPOSES; POLES, POSTS, BEAMS, DOOR AND WINDOW FRAMES, HAMMER HANDLES, HEAVY DUTY FLOORING, PARQUET FLOORING
		Dry	41.7	32.9	3.86	4.41	18,400	12,700	

TABLE A.1 (Contd.....2)

Standard Name	Marking Code	Seasoning Condition	BASIC STRESSES (MPa)				Modulus of Elasticity (MPa)		Uses
			Bending/ Tension	Compression		Shear	Mean	Minimum	
				Parallel To Grain	Perpendicular To Grain				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
7. KERANJI	KER/1	Green Dry	29.4 34.3	23.2 28.6	3.03 3.65	2.55 3.38	18,800 19,800	13,900 14,700	HEAVY CONSTRUCTION, GYMNASIUM EQUIPMENT, DECORATIVE PANELLING,PARQUET FLOORING , HEAVY DUTY FLOORING, HANDLES FOR STRIKING TOOLS, CARPENTERS TOOL HANDLES, MALLETS, SHOULDER POLES, WALKING STICKS, OIL PRESSES, COGWHEELS, AXLES, WHEEL HUBS ETC., FAVOURITE TIMBER FOR SLEDGES USED IN EXTRACTION OF LOGS IN FORESTS, POWERLINE POSTS, RAILWAY SLEEPERS.
8. MERBAU	MER/1	Green Dry	26.3 30.8	19.6 32.3	2.21 2.76	3.24 3.52	13,900 14,800	8,600 9,100	MEDIUM CONSTRUCTION, ATTRACTIVE FIGURE MAKES IT SUITABLE FOR INTERIOR FINISHING, PANELLING, FLOORING, HEAVY DUTY FURNITURE. DECORATIVE FURNITURE, DOOR AND WINDOW FRAMES.
9. RESAK	RES/1	Green Dry*	20.4 --	16.1 --	1.72 --	2.48 --	13,900 --	6,800 --	HEAVY CONSTRUCTION, BRIDGES, PILING, WHARVES, BEAMS, HEAVY DUTY FLOORING, TELEGRAPH AND POWERLINE POSTS, FRAME-WORK OF BOATS, DOCK BLOCKS, RAILWAY SLEEPERS, WAGON FRAMES,WAGON BEDS, BEER VATS, WINE CASKS, BUTTER CHURNS, RUBBER COAGULATING TANKS, SPOOLS, BOBBINS, SHUTTLES, RULERS, STRAIGHT EDGES, TRIPODS, SLICED VENEERS, HEAVY DUTY FURNITURE.
10. TEMBUSU	TEM/1	Green Dry	21.6 25.7	18.0 19.9	2.48 2.48	2.55 2.55	12,600 13,400	6,400 6,800	HEAVY CONSTRUCTION, BRIDGES, WHARVES, BOAT FRAMING, HEAVY DUTY FLOORING, PARQUET FLOORING, CUTTING BLOCKS (BUTCHERS), PRINTING DYES, T-SQUARES, STRAIGHT EDGES, SET-SQUARES, RULERS, BOWLS, TUBS, CASKS, BUTTER CHURNS ETC. GOOD CARVING TIMBER, PANELLING, HEAVY DUTY FURNITURE, POWERLINE POSTS.
11. KAPUR	KAP/2	Green Dry*	24.1 -	21.5 -	1.79 -	2.34 -	13,200 -	9,400 -	FOR VARIOUS HOUSE BUILDING CONSTRUCTION ELEMENTS: POSTS, BEAMS, JOISTS, RAFTERS, DOOR AND WINDOW FRAMES, FLOORING, KEELS, RIBS AND FRAMEWORK OF BOATS, CARRIAGE AND MOTOR VEHICLE FRAMES, HEAVY DUTY FURNITURE, HEAVY DUTY FLOORING, VENEER AND PLYWOOD.
12. KASAI	KAS/2	Green Dry	17.2 19.9	15.7 19.5	1.38 1.66	2.76 3.65	11,000 11,700	6,200 6,600	BEAMS, POSTS, JOISTS, RAFTERS, DOOR AND WINDOW FRAMES, SILLS, KITCHEN FURNITURE, BOAT FRAMING, MASTS, SPARS, POLICE BATONS, SPOOLS, BOBBINS, TRIPODS, GYMMASIUM FURNITURE, HEAVY DUTY FLOORING.
13. KELAT	KEL/2	Green Dry	17.2 19.9	24.1 30.3	1.59 1.86	2.76 3.79	11,000 11,700	6,200 6,600	POSTS, BEAMS, JOISTS, RAFTERS AND MEDIUM HEAVY STRUCTURES, SLEEPERS FOR TRAMWAYS AND LIGHT RAILWAYS, FRAMEWORK OF TRUCKS AND LORRIES, FENCE POSTS, SHIP BUILDING, BRIDGES, WHARVES

TABLE A . 1 (Contd... 3)

Standard Name (1)	Marking Code (2)	Seasoning Condition (3)	BASIC STRESSES (MPa)				Modulus of Elasticity (MPa)		Uses (10)
			Bending/ Tension (4)	Compression		Shear (7)	Mean (8)	Minimum (9)	
				Parallel To Grain (5)	Perpendicular To Grain (6)				
14.KELEDANG	KEE/2	Green Dry	17.9 19.9	14.2 16.1	1.38 1.59	2.41 2.48	11,600 11,900	7,000 7,200	FOR VARIOUS HOUSE BUILDING CONSTRUCTION, DECORATIVE WORK, PARQUET FLOORING, JOINERY, CABINET MAKING, HULLS, DECKING, MASTS, SPARS, CABIN FITTINGS AND FRAMEWORK OF BOATS, COOKED FOOD CONTAINERS, "T" SQUARES, TRIPODS, FANCY BOXES AND CHESTS, POLICE BATONS, WHEEL HUBS, SPOOLS, BOBBINS, VENEERS AND PLYWOOD, FAVOURITE FOR EXPENSIVE HEWN COFFINS.
15.KEMPAS	KEM/2	Green Dry	25.9 29.2	27.9 31.2	2.21 2.41	3.10 3.52	16,600 18,600	13,100 14,000	TREATED WITH PRESERVATIVE SUITABLE FOR ALL HEAVY CONSTRUCTION, RAILWAY SLEEPERS, TELEGRAPH AND POWERLINE POSTS, FENCE POSTS ETC., UNTREATED TIMBER SUITABLE FOR ALL STURCTURES UNDER-COVER WHERE TERMITES ARE NOT A HAZARD, INCLUDING POSTS, BEAMS, JOISTS, RAFTERS, VERY ATTRACTIVE FOR PARQUET FLOORS, WALKING STICKS, FAVOURITE FOR CHARCOAL MANUFACTURE, DECORATIVE VENEERS.
16.KERUING	KEI/2	Green Dry	21.2 25.7	19.3 23.2	1.45 1.52	2.34 2.70	15,000 16,300	12,300 13,300	HEAVY CONSTUCTION, POSTS, BEAMS, JOISTS, RAFTERS, STAIR-CASE STRINGERS, WHARF AND BRIDGE DECKING, KEELS AND FRAMEWORK OF BOATS, FRAMEWORK OF CARRIAGES AND WAGONS, WAGON FLOORING, TRUCK BODYWORK, FENCE POSTS, FLOORING ETC, ONE OF THE PREFERRED TIMBERS IN ENGLAND FOR GYMNASIUM EQUIPMENT, TREATED FOR RAILWAY SLEEPERS, CONTAINER FLOORING.
17.KULIM	KUL/2	Green Dry	25.1 30.9	23.9 28.1	1.52 1.66	3.00 3.24	13,300 14,300	10,200 11,000	MEDIUM HEAVY CONSTRUCTION, POSTS, BEAMS, JOISTS, RAFTERS, DOOR AND WINDOW FRAMES AND SILLS, BRIDGES, SALT WATER PILING, KEELS AND FRAME-WORK OF BOATS, RAILWAY SLEEPERS, FENCE POSTS, FLOORING, RAILWAY SLEEPERS (TREATED) FOR LIGHT TRAFFIC.
18.MATA ULAT	MUL/2	Green Dry*	35.0 -	29.5 -	2.41 -	3.72 -	16,300 -	15,000 -	MEDIUM HEAVY CONSTRUCTION, BEAMS, JOISTS, POSTS, RAFTERS, DOOR AND WINDOW FRAMES, PANELLING AND FLOORING, HEAVY DUTY FURNITURE, POWERLINE POSTS (TREATED) .
19.MENGKUL-ANG (KEMBANG)	MEN/2	Green Dry*	22.1 -	20.0 -	1.45 -	2.34 -	14,800 -	11,100 -	DECORATIVE WORK, SUPERIOR JOINERY, FURNITURE, PANELLING, PARQUET FLOORING, SHOWCASES, COUNTER TOPS, OFFICE FITTINGS, DOOR AND WINDOWS FRAMES, STAIR TREADS AND STRINGERS, SHIP AND BOAT FRAMING, PLANKING, DECKING, RAILWAY COACHWORK, SLICED VENEERS, RATORY CUT VENEER PLYWOOD, ETC.
20.MERPAUH	MEP/2	Green Dry	21.6 26.5	19.2 23.0	1.66 2.07	2.90 3.59	14,600 15,700	9,400 10,100	MEDIUM-HEAVY CONSTRUCTION, PANELLING, PLYWOOD, PALLETS, POWERLINE POLES (TREATED).
21.PUNAH	PUN/2	Green Dry	20.7 27.4	15.5 22.1	1.31 1.72	2.76 2.97	12,800 14,500	7,400 8,400	MEDIUM-HEAVY CONSTRUCTION, POSTS, BEAMS, JOISTS, RAFTERS, DOOR AND WINDOW FRAMES AND SILLS, PAINTED FURNITURE, FLOORING, RAILWAY SLEEPERS (TREATED) FOR LIGHT TRAFFIC.

TABLE A . 1 (Contd.... 4)

Standard Name	Marking Code	Seasoning Condition	BASIC STRESSES (MPa)				Modulus of Elasticity (MPa)		Uses
			Bending/ Tension	Compression		Shear	Mean	Minimum	
				Parallel To Grain	Perpendicular To Grain				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
22.RENGAS	REN/2	Green Dry	23.7 28.9	15.2 19.1	1.86 2.34	3.45 3.93	14,000 14,600	11,000 11,500	DECORATIVE WORK, SUPERIOR JOINERY, PANELLING, CABINET MAKING , FANCY BOXES, PICTURE FRAMES, TRAYS, FANCY HANDLES, JOINERS WOOD PLANES, WALKING STICKS, PAPER WEIGHTS, TURNERY, ROTARY VENEERS, FAVOURITE WOOD FOR WEIGHING SCALES, PARQUET FLOORING.
23.SIMPOH	SIM/2	Green Dry*	20.4 -	22.8 -	1.72 -	2.21 -	14,300 -	9,400 -	POSTS, BEAMS, JOISTS, RAFTERS, DOOR AND WINDOW FRAMES AND SILLS, STAIR TREADS AND STRINGERS, FLOORING, CEILINGS, FRAMES AND BOTTOM BOARDS OF BOATS, OARS, SLICED VENEERS ETC.; IF QUARTER SAWN HAS ATTRACTIVE SILVER FIGURE AND IS VERY SUITABLE FOR PANELLING, FURNITURE, PARQUET FLOORING, FANCY BOXES AND OTHER DECORATIVE WORK, RAILWAY SLEEPERS (TREATED) FOR LIGHT TRAFFIC, PALLETS.
24.TUALANG	TUA/2	Green Dry	28.6 32.7	22.8 25.6	2.48 2.69	3.17 4.28	16,400 17,500	9,400 11,500	POSTS, BEAMS, JOISTS, RAFTERS, PARQUET FLOORING, PANELLING, FURNITURE, WALKING STICKS, OFFICE AND SHOP FITTINGS, ROTARY VENEER, PLYWOOD ETC.; WHEN TREATED WITH PRESERVATIVES MAKES GOOD QUALITY RAILWAY SLEEPERS AND SUITABLE FOR ALL HEAVY CONSTRUCTION, HEAVY DUTY FLOORING AND POWERLINE POSTS.
25.BINTAN-GOR	BIN/3	Green Dry	14.7 19.9	13.3 17.7	0.89 0.97	2.21 2.97	12,100 14,000	8,300 9,700	LIGHT CONSTRUCTION, CEILING, FLOORING, PANELLING, JOINERY, FURNITURE, MASTS, SPARS, HELM AND PLANKING OF BOATS, FANCY BOXES, TRAYS, ROTARY-CUT VENEER, PLYWOOD, PACKING BOXES AND PALLETS, POWER LINE POSTS.
26.DURIAN	DUR/3	Green Dry	16.9 20.3	12.6 15.7	1.03 1.24	2.28 2.41	10,500 11,200	7,900 8,500	LIGHT CONSTRUCTION, DOOR AND WINDOW FRAMES, CEILING , PANELLING, FLOORING, PLANKING, PLYWOOD, COFFINS AND FURNITURE,; COELOSTEGIA GRIFFITHIS IS A FAVOURITE FOR CLOG, MANUFACTURE, ,PACKING BOXES AND PALLETS.
27.GERONGG-ANG	GEO/3	Green Dry*	11.8 -	8.2 -	0.69 -	1.52 -	8,000 -	6,300 -	DECORATIVE WORK, JOINERY, FURNITURE, SHOWCASES, COUNTER TOPS, LABORATORY BENCH TOPS, PANELLING, INTERNAL FITTINGS, FLUSH DOORS, FANCY BOXES, TRAYS, TOYS, BLACK-BOARDS, DRAWING BOARDS, PLYWOOD, FLOORING, PACKING, BOXES AND WOOD-WOOL CEMENT BOARDS.
28. GERUTU	GEU/3	Green Dry*	20.1 -	19.6 -	1.52 -	1.86 -	13,300 -	10,100 -	SUITABLE FOR MODERATELY HEAVY CONSTRUCTION UNDER COVER, AND FOR FLOORING, WALL BOARDING AND POSSIBLY PANELLING, FURNITURE, PLYWOOD, PACKING BOXES AND PALLETS.
29.JELUTONG	JEL/3	Green Dry	11.9 14.2	10.0 11.6	0.62 0.83	1.59 1.66	8,000 8,100	5,500 5,600	PATTERN MAKING, CARVING, FRETWORK, PICUTURE FRAMING, BATTERY SEPARATORS, DRAWING BOARDS, TOYS, PACKING CASES, LADIES SHOE SOLES, COFFINS, PENCIL, MATCH SPLINTS, PACKING BOXES.

TABLE B . 1 (Contd..... 5)

Standard Name (1)	Marking Code (2)	Seasoning Condition (3)	BASIC STRESSES (MPa)				Modulus of Elasticity (MPa)		Uses (10)
			Bending/ Tension (4)	Compression		Shear (7)	Mean (8)	Minimum (9)	
				Parallel To Grain (5)	Perpendicular To Grain (6)				
30.KEDON-DONG	KED/3	Green Dry	17.6 21.1	14.5 18.2	1.10 1.59	2.00 2.48	11,400 11,900	8,300 8,700	LIGHT CONSTRUCTION, DOORS AND WINDOW FRAMES, FLOORING, CEILING, TILING BATTENS, PLANKING, BOXES, CRATES, COFFINS, PLYWOOD, FURNITURE PARTS, GENERAL CARPENTRY WORKS AND PALLETS.
31. KEMBANG SEMANGKOK	KEB/3	Green Dry*	26.1 30.1	22.3 27.1	1.03 -	2.55 2.83	15,500 16,600	12,900 13,900	FANCY VENEERS, BOTH ROTARY PEELED AND SLICED, FURNITURE MANUFACTURE, MATCH BOXES AND SPLINTS, PANELLING AND PARTITIONING.
32.KUNGKUR	KUN/3	Green Dry	21.0 23.9	16.0 18.1	1.45 1.86	2.55 2.90	10,400 10,500	7,200 7,300	LIGHT CONSTRUCTION, DECORATIVE WORK, SUPERIOR JOINERY, FURNITURE, MUSICAL INSTRUMENTS, PANELLING, FANCY BOXES, CARVING, ROTARY-CUT VENEERS, PACKING BOXES AND CRATES.
33. MACHANG	MAC/3	Green Dry	13.7 17.4	11.7 14.8	1.66 2.07	2.34 3.24	12,900 14,100	6,400 7,000	LIGHT CONSTURCTION, PLANKING, CEILING, FLOORING, PACKING BOXES, CRATES, COFFINS, PLYWOOD AND GENERAL CARPENTERY WORK,; STREAKY COREWOOD MUCH SOUGHT AFTER AS DECORATIVE TIMBER, SLICED VENEER, ETC.
34.MEDANG	MED/3	Green Dry	16.9 19.6	14.5 17.9	0.83 0.97	2.14 2.41	9,400 9,900	7,900 8,200	LIGHT CONSTRUCTION, INTERNAL FITTINGS, SWITCH BOARDS, PANELS, SUPERIOR JOINERY, PIANO CASES, FURNITURE, BOWLS, PLATTERS, TRAYS, "T" SQUARES, TRIPODS, FANCY HANDLES, POLICE BATONS, PATTERN MAKING, VENEERS, PLYWOOD, FLOORING, PACKING BOXES AND PALLETS.
35.MELANTAI	MEL/3	Green Dry*	14.8 -	13.1 -	0.83 -	1.86 -	11,300 -	8,100 -	SUITABLE FOR USES AS RECOMMENDED UNDER LIGHT-RED MERANTI BUT WITH ITS MORE ATTRACTIVE FIGURE, IDEALLY SUITED FOR CABINET AND DECORATIVE WORK, SUPERIOR JOINERY, FURNITURE, SHOWCASES, PANELLING, FANCY BOXES, SLICED VENEERS, ROTARY-CUT VENEER AND PLYWOOD.
36.MELUNAK	MEU/3	Green Dry	18.3 20.3	17.1 19.7	1.24 1.38	2.34 2.90	11,200 11,700	5,400 5,700	LIGHT CONSTRUCTION, SUPERIOR JOINERY, FURNITURE, PANELLING, CEILINGS, FLOORING, POLICE BATONS, DIVING BOARD AND PALLETS.
37.MEMPI-SANG	MEI/3	Green Dry	16.5 20.1	20.0 24.1	1.03 1.31	2.41 2.62	13,000 13,700	6,300 6,700	LIGHT CONSTRUCTION, FURNITURE, ROTARY-CUT VENEERS, BOXES, TOYS, CEILINGS, FLOORING, PACKING CASES AND CRATES.
38.MERANTI BAKAU	MBA/1	Green Dry*	20.2 -	15.4 -	1.17 -	2.21 -	14,700 -	11,000 -	BEAMS, JOISTS, RAFTERS, DOOR AND WINDOW FRAMES, BOAT FRAMING, FLOORING, PLANKING, DECKING, RAILING, COACH WORK, LORRY AND TRUCK BODYWORK, PLYWOOD, SELECTED MATERIAL FOR PANELLING, THE BETTER CLASSES FOR JOINERY, SHOP AND OFFICE FITTINGS.
39. MERANTI RED	MDA/3	Green Dry	18.6 22.8	14.3 17.4	0.90 1.24	2.07 2.62	11,300 11,900	9,000 9,400	JOINERY, FURNITURE, SHOP AND OFFICE FITTINGS, COUNTER TOPS, PANELLING, FLOORING, POSTS, BEAMS, JOISTS, RAFTERS, DOOR AND WINDOW FRAMES, BOAT PLANKING, DECKING, RAILING, & FRAMING, STAIR TREADS, COACHWORK, MOTOR LORRY AND TRUCK BODYWORK, PLYWOOD, ETC.

TABLE A . 1 (Contd..... 6)

Standard Name (1)	Marking Code (2)	Seasoning Condition (3)	BASIC STRESSES (MPa)				Modulus of Elasticity (MPa)		Uses (10)
			Bending/ Tension (4)	Compression		Shear (7)	Mean (8)	Minimum (9)	
				Parallel To Grain (5)	Perpendicular To Grain (6)				
40.MERANTI LIGHT RED	MLT/3	Green Dry	14.4 16.6	11.9 14.3	0.69 0.83	1.45 1.52	9,300 9,800	6,900 7,200	DECORATIVE WORK, SUPERIOR JOINERY, FURNITURE, SHOP AND OFFICE FITTINGS, SHOW CASES, COUNTER TOPS, PANELLING, CEILINGS, FLOORING, SHELVING, DOOR AND WINDOW FRAMES, BOAT PLANKING, DECKING, RAILING AND CABIN FITTINGS, COACHWORK, WOODEN TUBS,FANCY BOXES, COFFINS, SLICED VENEERS, ROTARY-CUT VENEER, AND PLYWOOD.
41. MERANTI WHITE	MWH/3	Green Dry*	18.7 -	16.8 19.3	0.90 1.10	1.66 2.07	10,800 11,200	6,100 6,400	POSTS, BEAMS, JOISTS, RAFTERS, DOOR AND WINDOW FRAMES, STAIR STRINGERS, TREADS, AND RAILINGS, PLANKING, DECKING, HEWN COFFINS, TUBS, VATS, WINE CASKS, BUTTER CHURNS, MOTOR LORRY BODYWORK, POLICE BATONS , PLYWOOD ETC.
42. MERANTI YELLOW	MYE/3	Green Dry*	14.6 16.5	12.5 15.6	1.03 -	1.45 1.72	11,000 11,800	8,000 8,600	SHIP DECKING, PLANKING, DECK RAILING, CEILINGS, FLOORING, INTERNAL FITTINGS, SHOP AND OFFICE FITTINGS, PANELLING, JOINERY,FURNITURE, TUBS, PLYWOOD ETC.
43.MERSAWA	MES/3	Green Dry*	15.9 -	12.7 -	1.86 -	2.14 -	9,200 -	5,000 -	LIGHT CONSTRUCTION, DOOR AND WINDOW FRAMES, PANELLING, PARTITION BOARDS, WEATHER BOARDS, FLOORING, CEILINGS, COFFINS, SLICED VENEERS, PLYWOOD, FURNITURE, PACKING BOXES AND CRATES.
44.NYATOH	NYT/3	Green Dry*	17.1 20.3	16.6 20.4	1.10 -	2.62 2.97	11,300 12,000	8,100 8,700	MEDIUM HEAVY CONSTRUCTION, BEAMS, RAFTERS, JOISTS, DOOR AND WINDOW FRAMES, PANELLING, PARTITION BOARDS, SCANTLINGS, FLOORING, PARQUET FLOORING, CEILINGS, BOAT FRAMING AND PLANKING, JOINERY, FURNITURE, ROTARY VENEER, SLICED VENEER AND DECORATIVE PLYWOOD.
45.PENARA-HAN	PEH/3	Green Dry*	15.8 -	14.1 -	1.45 -	2.14 -	9,400 -	7,600 -	MATCH BOX AND SPLINTS, PATTERN MAKING, MANUAL TRAINING, TEMPORARY LIGHT CONSTRUCTION, PACKING CASES, CRATES, PLYWOOD, PANELLING AND FLOORING.
46.PERUPOK	PEU/3	Green Dry	21.8 25.8	17.4 21.4	1.17 1.66	2.14 2.34	11,300 12,100	8,800 9,500	LIGHT CONSTRUCTION, DOOR AND WINDOW FRAMES, ROTARY VENEER,PANELLING, FURNITURE, FLOORING, FANCY BOXES, "T" SQUARES, SET SQUARES, STRAIGHT EDGES, RULERS, TRAYS, INSTRUMENT BOXES AND PLYWOOD, PACKING CRATES.

TABLE A.1 (Concluded)

Standard Name	Marking Code	Seasoning Condition	BASIC STRESSES (MPa)				Modulus of Elasticity (MPa)		Uses
			Bending/ Tension	Compression Parallel To Grain	Compression Perpendicular To Grain	Shear	Mean	Minimum	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
47.PULAI	PUL/3	Green Dry	9.0 11.2	6.7 9.6	0.41 0.69	1.45 1.52	6,300 7,000	3,500 3,900	PATTERN MAKING, FRETWORK, CARVING, PICTURE FRAMES, DRAWING BOARDS, TOYS, MATCH BOXES AND SPLINTS, PACKING CASES, CRATES, COFFINS, MANUAL TRAINING ETC., A GOOD SUBSTITUTE FOR JELUTONG.
48.RAMIN	RAM/3	Green Dry	17.2 24.0	15.6 21.3	1.24 1.66	2.07 2.41	14,200 15,700	11,000 12,100	INTERIOR JOINERY, CEILINGS, PANELLING, "T" SQUARES, SET SQUARES, RULES, TRIPODS, STRAIGHT EDGES, TRAYS, HANDLES OF NON-STRIKING TOOLS, BRUSH BACKS, PATTERN MAKING, TOYS, TURNERY, PLYWOOD, PENCILS.
49.RUBBER-WOOD	RUB/3	Green Dry	15.9 17.4	11.4 13.4	1.24 1.52	3.03 3.52	8,800 9,100	6,200 6,400	GENERAL UTILITY TIMBER, FURNITURE, BLACK BOARD CORES, BOXES AND CRATES, WOODEN PALLETS, PULP AND PAPER AND POSSIBLY FOR THE PRODUCTION OF RAYON.
50.SEPETIR	SEE/3	Green Dry	13.7 16.5	11.9 14.1	1.52 1.86	2.69 3.31	11,700 13,000	6,800 7,600	LIGHT CONSTRUCTION, DECORATIVE WORK, SUPERIOR JOINERY, CABINET-MAKING, WARDROBES, PANELLING, FURNITURE TRAYS, PICTURE FRAMES, WALKING STICKS, FANCY BOXES, FANCY HANDLES, SLICED AND ROTARY-CUT VENEERS.
51.SESENDOK	SES/3	Green Dry*	13.6 -	11.4 -	0.62 -	1.79 -	8,500 -	7,100 -	MATCH BOXES AND SPLINTS, PATTERN MAKING, DRAWING BOARDS, BLACK BOARDS, TRAYS, FURNITURE PARTS, PLYWOOD CHESTS, PACKING CASES, CRATES, COFFINS, TOYS, MANUAL TRAINING, ETC., A FAVOURITE FOR CLOG-MAKING.
52. TERAP	TER/3	Green Dry*	13.0 14.7	10.1 11.2	1.03 1.03	2.21 2.62	9,900 10,100	5,400 5,500	LIGHT CONSTRUCTION, PLANKING, PATTERN MAKING, HANDLES OF NON-STRIKING TOOLS, BOXES, COFFINS, CRATES, MANUAL TRAINING, PLYWOOD ETC., ATTRACTIVELY FIGURED TIMBER VERY SUITABLE FOR SUPERIOR JOINERY, FURNITURE, PANELLING, TRAYS AND OTHER DECORATIVE WORK.
53. TEREN-TANG	TEN/3	Green Dry	8.1 10.1	6.6 8.7	0.41 0.62	1.38 1.66	5,700 6,600	3,000 3,400	MATCH BOXES AND SPLINTS, BLACK BOARDS, DRAWING BOARDS, PACKING CRATES, PLYWOOD AND PLANKING, COFFINS, CIGAR BOXES, INSTRUMENT BOXES AND PLYWOOD CHEST FOR PACKING TEA AND RUBBER; FAVOURITE TIMBER FOR ORTHOPAEDIC LIMBS AND LADIES SHOES AND WOODEN SANDALS.
54.DAMAR MINYAK	DMI/3	Green Dry	12.1 16.4	10.4 14.3	0.62 0.76	1.93 1.93	10,600 11,700	6,800 7,400	SUPERIOR CABINET WORK, FURNITURE, VATS, BATTERY SEPARTOR AND BUTTER BOXES, HIGH CLASS PANELLING, SHOW CASES COUNTER-TOPS, SLICED AND ROTARY CUT VENEERS AND DECORATIVE PLYWOOD.

* Where no values are given, tentative values for the dry condition can be obtained from corresponding green values by the following computations:-
Column (5) x 1.094; Column (6) x 1.058; Column (7) x 1.000; Column (8) x 1.000; Column (9) x 1.010; Column (10) x 1.000
Example: Dry basis stress for bending or tension of BALAU = 35.2 x 1.094 = 38.5 Mpa. (F.n. Table 3.doc)

TABLE A. 2 - WORKING QUALITY, DURABILITY & TREATABILITY OF IMPORTED CONSTRUCTION TIMBER

Name (1)	Code (2)	Working Quality (3)	Natural Durability (4)	Treatability (5)
1.BALAU	BAL/1	Difficult	Very durable, can be used for marine construction	Difficult
2. BALAU,RED	BRE/1	Slightly difficult	Moderately durable	Very difficult
3. BITIS	BIT/1	Difficult	Durable	Difficult
4. CHENGAL	CHE/1	Slightly difficult	Durable; suitable for marine constructions	Moderately difficult
5. GIAM	GIA/1	Difficult	Very durable; for all purpose construction	Very difficult
6. KEKATONG	KEK/1	Difficult	Moderately durable	Very difficult
7. KERANJI	KER/1	Difficult	Moderately durable	Difficult
8. MERBAU	MER/1	Slightly Difficult	Durable; but sapwood highly susceptible to powder - post beetle attack	Very difficult
9. RESAK	RES/1	Difficult	Very durable; suitable for all purpose construction	Very difficult

Table A.2 (Contd.2)

Standard Name (1)	Marking Code (2)	Working Quality (3)	Natural Durability (4)	Treatability (5)
10. TEMBUSU	TEM/1	Easy	Durable	Very difficult
11. KAPUR	KAP/2	Moderately easy	Durable	Difficult
12. KASAI	KAS/2	Slightly difficult	Moderately durable	Very difficult
13. KELAT	KEL/2	Moderately easy	Moderately durable	Difficult
14.KELEDANG	KEE/2	Difficult	Non-durable but nuterately durable against marine borers	Very difficult
15.KEMPAS	KEM/2	Difficult	Non- durable; very prone to powder - post beetle attack	Easy
16.KERUING	KEI/2	Slightly difficult	Moderately durable	Average
17.KULIM	KUL/2	Difficult	Moderately durable	Average
18.MATA ULAT	MUL/2	Easy	Moderately durable	Very difficult
19.MENGKULANG	MEN/2	Difficult	Non-durable	Average
20.MERPAUH	MEP/2	Very difficult	Non-durable	Very easy
21.PUNAH	PUN/2	Easy	Moderately durable	Moderately difficult
22.RENGAS	REN/2	Slightly difficult	Moderately durable	Very difficult

Table A.2 (Contd.3)

Standard Name (1)	Marking Code (2)	Working Quality (3)	Natural Durability (4)	Treatability (5)
23.SIMPOH	SIM/2	Moderately easy	Non-durable	Easy
24.TUALANG	TUA/2	Slightly difficult	Moderately durable	Easy
25.BINTANGOR	BIN/3	Easy	Moderately durable	Average
26.DURIAN	DUR/3	Easy	Non-durable	Very easy
27.GERONGGANG	GEO/3	Easy	Non-durable	Extremely easy
28. GERUTU	GEU/3	Slightly difficult	Non-durable	Very difficult
29.JELUTONG	JEL/3	Easy	Non- durable; highly susceptible to blue stain and powder - post beetle attacks	Extremely easy
30.KEDONDONG	KED/3	Slightly difficult	Moderately durable	Very difficult
31.KEMBANG SEMANGKOK	KEB/3	Easy	Moderately durable	Very easy
32. KUNGKUR	KUN/3	Easy	Moderately durable	Difficult
33.MACHANG	MAC/3	Moderately easy	Non durable	Very easy
34.MEDANG	MED/3	Easy	Non-durable	Very difficult
35 MELANTAI	MEL/3	Easy	Non-durable	Difficult
36.MELUNAK	MEU/3	Difficult	Moderately durable	Very difficult

Table A.2 (Contd.4)

Standard Name (1)	Marking Code (2)	Working Quality (3)	Natural Durability (4)	Treatability (5)
37.MEMPI-SANG	MEI/3	Easy	Non-durable	Extremely easy
38.MERANTI BAKAU	MBA/3	Easy	Moderately durable	Easy
39.MERANTI DARK RED	MDA/3	Easy	Moderately durable	Difficult
40.MERANTI LIGHT RED	MDR/3	Easy	Moderately durable	Difficult
41.MERANTI WHITE	MWH/3	Difficult	Non-durable;susceptible to blue stain attack	Easy
42.MERANTI YELLOW	MYE/3	Easy	Non-durable; highly susceptible to powder-post beetle attack	Moderately difficult
43.MERSAWA	MES/3	Difficult	Moderately durable	Difficult
44..NYATOH	NYT/3	Difficult	Moderately durable	Very difficult
45.PENARA-HAN	PEH/3	Very easy	Non -durable; highly susceptible to powder-post beetle attack	Very easy
46.PERUPOK	PEU/3	Easy	Moderately durable	Average
47.PULAI	PUL/3	Easy	Non-durable; susceptible to blue stain attack	Extremely easy
48.RAMIN	RAM/3	Easy	Non-durable; highly susceptible to powder - post beetle & blue stain attacks	Very easy

Table A.2 (Contd.5)

Standard Name (1)	Marking Code (2)	Working Quality (3)	Natural Durability (4)	Treatability (5)
49.RUBBERWOOD	RUB/3	Easy	Non-durable	Easy
50.SEPETIR	SEE/3	Difficult	Moderately durable;sapwood highly susceptible to powder - post beetle attack	Very difficult
51.SESENDOK	SES/3	Easy	Non-durable; susceptible to blue stain attack	Extremely easy
52.TERAP	TER/3	Slightly difficult	Non-durable	Moderately difficult
53.TERENTANG	TEN/3	Easy	Non-durable	Easy
54.DAMAR MINYAK	DIM/3	Easy	Non-durable	Extremely easy

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