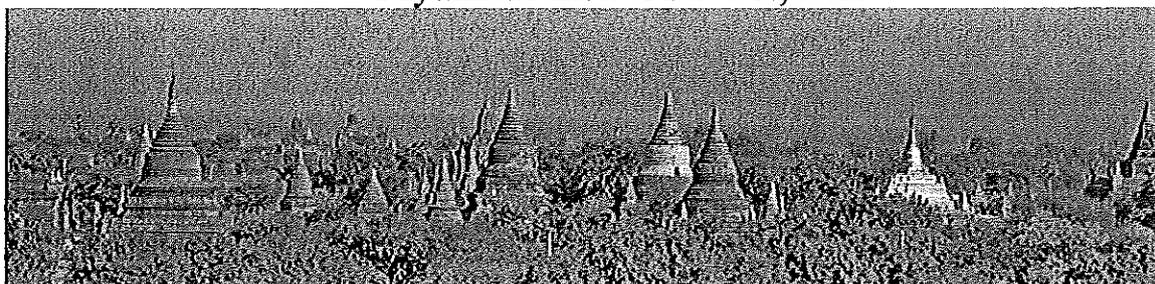


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[Home](#) | [Our services](#) | [Forest management](#) | [Measurement](#) | [Other species](#)

Search this website

| [Teak Log Grading](#) |

## Teak Log

- Grading
- Area of origin
- Characteristics
- Teak Sawn Timber
  - Types
  - MTE Grading
  - FEQ

## Gallery of Logs

- First Quality
- Second Quality
- Third Quality
- Fourth Quality
- Sawing Grade 1
- Sawing Grade 2
- Sawing Grade 3
- Sawing Grade 4
- Sawing Grade 5
- Sawing Grade 6
- Sawing Grade 7
- Sawing Grade 8

Links  
Privacy policy

## Teak Log Grading

### Introduction

Grading is a value adding process as "adding value" is an action that adds worth to something through a specific process. Properly graded timber gives a value of worthiness and satisfaction to the buyer and graded timber of any species enjoys higher prices than ungraded timber. In the early days not many items of timber were traded and grading was mainly by rule of thumb.

Most countries and regions have their own sets of grading rules with different rules for different species; for softwoods and hardwoods. For example, the National hardwood Lumber Association (NHLA) Rules from the United States, the British Columbia Lumber Grading and Quebec Grading Rules from Canada, the Finish Grading Rules and the Malayan Grading Rules (MGR) are some of the well-known rules, to name a few. As a major teak producer, Myanmar has its own sets of grading rules for teak and grading of teak logs and lumber in Myanmar is done according to these rules. Until now there appears to be no collaboration regarding grading among the teak producers in the Region. Teak, whether in the rough or processed is still a natural product, and growth conditions are mainly influenced by soil and climate. Until a wonder technique has been perfected to produce finer specimens of trees, grading rules will remain the arbiter of what a piece of timber is worth.

### Jungle Rejection Rules

The origin of the first modern grading rules for teak logs in Myanmar can be traced back to 1936. The Forest Department established the "Logging Rules and Standard for Jungle Rejection of Teak Logs" and the rules mention the measuring system. Logging system and system of rejection in the jungle. In short, the rules specify the calculation of defects for obligatory and optional timber. Mention of Grades is not noted in these rules.

### Gallant Rules

The "Standard for Jungle Rejection" was followed in April 1998 by "Classification of Teak Logs", popularly known as "Gallant Rules", as they were prepared by Mr. M.M. Gallant, Forest Economist of the Forest Department. This classification covers five grades; viz., five star (or AY), four star, three star, two star and one star. Like the standard for Jungle Rejection, and the Gallant Rules deduct five cubic feet per defect for scaling purposes. Star classes are graded according to the defect value and the limits determining the star class of a log are given in Table 1.

**Table 1: - Star Classes and defect values**

Star Class	Min. Length (Ft)	Min. Girth (Ft)	Min. Volume (Cu.Ft)	Defect
AY (5*)	15	6	-	0.5/50 Cu.Ft
4*	15	5	30	1.0/50 Cu.Ft
3*	12	5	30	2.0/50 Cu.Ft
2*	10	4	20	3.0/50 Cu.Ft

1*	10	4	20	5.0/50 Cu.Ft
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**Note** - Logs are graded by calculating the defects per 50 Cubic Feet.

#### Grading Rules for Teak Veneer Logs

The late 1950s saw the rise of the teak veneer market started much earlier. The quality of the logs harvested then was very good and therefore logs graded under the Gallant Rules were also acceptable as veneer logs, mainly because of the superior quality of the logs. Logs inferior in quality to those harvested earlier, increased in quantity as time passed. Market conditions also pinpointed defects previously not recognized. Aesthetic value is now being considered in addition to other quality defects. A new set of rules prepared by the Myanmar Timber Enterprise (MTE) came into being are called the "Grading Rules for Teak Veneer Logs", and are currently applied. Defects considered in the Gallant Rules and the Veneer Log Rules are shown below as comparisons:

#### Gallant Rules

Bear Bites; Bee Hole; Bend; Bird Holes; Buttress( no defects); Doyo; Drag Hole; Ellipse; Flute; Holes (End); Knots; Shakes; Shatter; Snout(no defects); Sun Cracks, Inbark; Twist.

#### Veneer Log Rules

Bee Hole; Bump; Curvature; Elephant Skin; End Flute marks; Flutes; Green Band; Heart(Diagonal, Double, Spongy, Hole, End); Inbark; Knots(sound, Pin); Pig Eyes; Pitch Pockets; Shape(Elliptical, Triangular); Shake(Ring, Cup); Splits; Sun Cracks; Twist; Wavy Grain; Interlocked grain; Black Spots; sapwood pockets and Syphilis)

Permissible defects are scheduled according to the location and magnitude. These defects are then classified as either mild or serious. One serious defects (S) equals to mild(M) defects, and each grade limits 3(S) or 6(M). In the Veneer Log Rules, log scaling, i.e. estimating the net contents of a log, which equals the gross or full contents less deduction for defects, is not taken into account. This is one difference from the preceding rules but like its predecessors, each log has to be graded separately.

One of the disadvantages in the log trade is that one has to sell only what was extracted. Up to the mid-seventies, a larger percentage of First, Second and Third quality logs were available for export. What was not exported in log form was used in the local mills. The 1980s witnessed an entirely different scenario when fewer veneer logs were obtained and more sawing-quality logs become available.

The need for introducing rules for sawing quality teak logs that do not fit in the previous rules engendered a new set of rules for sawing quality logs that are inferior to the 1 Star Class. Gallant Rules require that logs are to be butted clean at both end. The same applies to veneer logs. But, the sawing quality logs sold today are unbutted and offered for sale as they come out of the forest. A comparison of dimensions is shown in Table (2).

**Table 2: - Comparison Between Gallant Rules and Veneer Log Rule**

Gallant Rules	Min Dimension Length x Girth	Veneer Log Rule	Min Dimension
AY	L15' x G6'	Special	L15' x G6'
4*	L15' x G5' - min.30Cft	First	L8' x G4'-2"
3*	L12' x G5' - min.30Cft	Second	L8' x G4'-2"
2*	L10' x G4' - min.20Cft	Third	L8' x G4'-2"
1*	L10' x G4' - min.20Cft	Fourth	L8' x G4'
-	-	Sawing Grade - 1	L8' x G5'
-	-	Sawing Grade - 2	L8' x G5'
-	-	Sawing Grade - 3	L8' x G3' to 4'-11"

-	-	Sawing Grade - 4	L8' x G4'
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Note - In veneer logs there is no minimum volume(vol) or cubic content specified provided that the length(L) and Girth(G) are met.

Relationship between Veneer Log Grading Rules and Defects

Sr.No.	Class	Special	First	Second	Third	Fourth	
1	2	3	4	5	6	7	8
	LENGTH		15"/24"	8'/24"	8'/24"	8'/24"	8' & UP
	GIRTH		6'-0" 7'-0" 4'-2" 5'-0" 6'-0" 7'-0"	4'-2" 5'-0" 6'-0" 7'-0"	4'-2" 5'-0" 6'-0" 7'-0"	4'-2" 5'-0" 6'-0" 7'-0"	4'-2" 5'-0" 6'-0" 7'-0"
			6'-11" & up	4'-11" 5'-11" 6'-11" & up	4'-11" 5'-11" 6'-11" & up	4'-11" 5'-11" 6'-11" & up	4'-11" 5'-11" 6'-11" & up
1	BEE HOLE	S	..	..	..	..	1 1
2	BUMP	M	..	..	..	3" 3" 4" 4"	2" 4" 6" 8"
3	CURVATURE	S	..	..	..	..	10'-1"
4	ELEPHANT SKIN	M	..	..	..	25%	50%
5	END FLUTE MARKS	M	..	..	..	6" 8" 10" 12"	8" 10" 12" 14"
6	FLUTE	M	..	..	..	4" 6" 8" 10"	6" 8" 10" 12"
7	GREEN BAND	S	..	..	..	..	3"
8	HEART	S	..	..	..	..	3" 4"
	a. DIAGONAL	S	..	..	..	..	3" 4"
	b. DOUBLE	M	..	..	..	..	..
	c. SPONGY	M	..	..	..	DIA: (G-4)	DIA: (G-3) DIA: (G-2)
9	HOLE	M	..	..	..	DIA: (G-4)	DIA: (G-3) DIA: (G-2)
	a. HEART	M	..	..	..	DIA: (G-4)	DIA: (G-3) DIA: (G-2)
	b. END	S	..	..	..	DIA: (G-4)	DIA: (G-3) DIA: (G-2)
	c. DO YO	S	..	..	..	..	..
10	INBARK	S	..	..	..	2' x 3' 2' x 6'	2' x 9' 2' x 9'
11	KNOTS						
	a. SOUND	M	..	1 1/2" 1 1/2" 2" 2"	1 1/2" 1 1/2" 2" 2"	1" 2" 3" 4"	2" 4" 6" 8"
	b. PINK KNOTS PIG EYES	S	..	8' x 3 Nos.	8' x 4 Nos.	8' x 6 Nos.	8' x 8 Nos.
12	PITCHPOCKETS	S	..	..	..	2" 2" 4" 4"	2" 2" 4" 6"
13	SHAPE						
	a. RING	M	..	..	80%	70%	60%
	b. CUP	M	..	..	..	..	1/2 LENGTH
14	SHAPE						
	a. RING	S	..	..	..	(G-3)	(G-3) (G-2)
	b. CUP	M	..	..	..	..	4" 6" 3" 5" 7" 9"
15	SPLIT	M	6"	6"	6"	6" x 2 x 2 6" x 2 x 3	6" x 2 x 2 6" x 1 x 3
	b. CUP	M	..	..	..	..	4" 6" 3" 5" 7" 9"
16	SUN CRACKS (DEPTH)	M	2"	2" 3"	2" 3"	2" 3"	2" 3"
17	TWIST	S	..	..	..	..	20'-1'
18	INTERLOCKED	M	..	..	..	..	25%
	INTERLOCKED GRAIN	S	..	..	..	..	25%
19	BLACK SPOTS	S	..	..	..	..	5%

S = SERIOUS, M = MILD, .. = NOT ALLOWED

## Grading Rules for Teak Veneer Logs

Sr. No.	Class	Saving Quality Grade I	Saving Quality Grade II	Saving Quality Grade III	Saving Quality Grade IV
1	2	3	4	5	6
	LIGHT	8' & up		8' & up	8' & up
	GIRTH	5'-0" 6'-0" 7'-0"	5'-0" 6'-0" 7'-0"	3' 4'-11"	4'-0" 5'-0" 6'-0" 7'-0"
		5'-11" 6'-11" & up	5'-11" 6'-11" & up	3'-11" 4'-11"	4'-11" 5'-11" 6'-11" & up
1	BEE HOLE	S	1	1	1
2	CURVATURE	S	10'--2"	10'--3"	10'--3"
3	END HOLE	S	DIAMETER = 3"	DIAMETER = 4"	DIAMETER = 3"
4	DO YO	S	DIAMETER = 3"	DIAMETER = 4"	DIAMETER = 3"
5	In--BARK 3"	S	5' x 9"	6' x 9"	5' x 6"
6	SUN CRACK	S	DEPTH = 3"	DEPTH = 4"	DEPTH = 3"
7	TWIST	S	10'---6"	10'---7"	10'---6"
8	UNSOUND KNOT	S	DIAMETER = 6"	DIAMETER = 8"	6"
9	FLUTE 3"	S	5'---8"	6'---10"	5'-8"
10	DOUBLE HEART	S	4"	6"	4"
11	SPONG HEART	S	DIAMETER = 3"	DIAMETER = 4"	DIAMETER = 3"
12	HEART HOLE	S	DIAMETER = 3"	DIAMETER = 4"	DIAMETER = 4"
13	SPLIT	S	24"	36"	24"

S = SERIOUS DEFECT, M = MILD DEFECT

The sawing Grade Rules calculate the defect value as in Gallant Rules. But, there is no log scaling. Each Grade allows a fixed defect value. Grading is done according to the defect value considering the category of grade a log will fall into after the length and the girth are taken.

In addition, teak logs originating from different areas have different values. Area consciousness on the part of the buyers is very pronounced in this particular species. Teak logs from areas with heavy rainfall are less favored than logs from that of scanty rainfall. For instance, teak log from Yamethin, Pyinmana, Pyay, Minbu and Yaw are extremely popular. It has also been noticed that teak from Northern Shan State, and Momeik are also favoured. The reason for the partiality is that there are no typical defects in teak logs from these areas and the colour, stripe and conformation of the logs rate from Good to Very Good. Incidence of beeholes is markedly less in logs from the above mentioned area.

For the area-wise characteristics of Myanmar Teak logs please go to "Area of Origin of Teak"



## Teak squares

The next rule for consideration is the grading rules for teak squares. The Forest Department sought and obtained the co-operation of the Forest Research Institute, Dehra Dun, in bringing out the Seaman-Limaye Grading Rules for teak squares. Later the Department rearranged and rewrote the rules on the lines adopted by FAO.

Squares are not dimension stock and are mainly meant for re-conversion into smaller sizes. Undersized squares measure 10" & up x 10" & up x 10' (sometimes 7') & up. Full sized squares have sidings 12" & up x 12" & up. They are therefore judged by the general quality of the wood, and the probable loss chargeable to visible defects under normal sawing methods. These rules define the average quality of the whole parcel, and the poorest square which can be admitted in any grade. Graders, passing any square of the poorest allowable quality must offset it in the average by one or more squares of superior quality.

The condition of the logs available for sawing today produce only a small quantity of Selected First and up. Most squares are Market Quality. First and Second Quality are also available, but in a comparatively smaller quantity.

Grade names covered and value of defects permitted by these rules are shown in the Table 12. The Table shows the defect values (D.V.) each single square can carry and the parcel average as a whole.

**Table 12. Teak squares grade names and defect/square**

Grade	Previous name	D.V. per Parcel	D.V. per Square
Select Special (SA)	Europe 1st Class	0.25/10 cft	0.75/10 cft
Special (SB)	Europe Intermediate	0.5/10 cft	1.25/10 cft
Selected First (SC)	Europe 2nd Class	0.75/10 cft	2/10 cft
First (F)	Indian 1st Class	1.5/10 cft	4/10 cft
Second (II)	Indian 2nd Class	3/10 cft	6/10 cft
Market (M)	Indian 3rd Class	6/10 cft	9/10 cft

Definition of defects include; beeholes, curvature, end holes, equivalent defects not listed (e.g. bird holes rated as decayed knots, etc.), heart defects (crooked heart, diagonal heart cracks, side splits or exposed heart, ring heart cracks, star heart cracks or soft heart, inbarks and flutes, knots, rough grain, sapwood, seasoning checks, sun-cracks, taper and wane. Defect values are calculated as in logs, and each grade has its maximum permissible defects. The table of defects mention knots; beeholes; diagonal heart cracks; star heart cracks or soft heart; ring heart cracks; end holes; badly twisted or crooked heart; sun-cracks; and rough grain.

Five percent of the total quantity will be allowed for the personal judgement of different inspectors. If more than 5% is found to be defective in re-inspection, the balance of the parcel which comes up to specification will be accepted and the portion falling below grade may be disposed of as agreed between buyers and sellers.

## Teak conversions

All sawn teak fall in the category of teak conversions. Before the 2nd World War, millers and shippers used their traditional grades which were known and accepted at home and abroad. The State Timber Board (STB) was formed after the independence to take over extraction, milling and marketing of teak. The STB had to find a common ground among the traditional grades offered and prepared a fresh set of rules by setting out to find grades common to the traditionally offered grades. The rules for teak conversions now in use are being prepared by the Forest Department on FAO lines, based on the practices of the State Timber Board.

These rules divide the specifications into two: viz., the General Market Specifications (GMS), and the Special Market Specifications (SMS). GMS includes planks, boards, flitches, etc., that are intended for reconversion. SMS applies to decks, margin planks, and special sizes of scantlings that are to be used without further cutting.

Defects are mainly the same as in other products; but also includes those found after sawing. Bark pockets; beeholes; black streak or oil streak; blemish; chalk pockets and veins; checks; end splits; wavy, curly, rough, and cross grain; knots; sapwood; shake; spring; sun cracks; and wane comprise the list of defects.

Grades recognized in the rules are - Select Special; Special; Selected First; First; Second; Market. But in actual practice only Special & Better (S&B); Special (S); First (F); and Second (II) are usually sold. Specifications of teak conversions are shown in Table 13.

**Table 13. Specifications of teak conversions**

Specification	Measurement	Grades Available
Posts	6"/9" x 6"/9" x 6' & up	F, II, M
Planks	Avg. (3.5" x 8" x 8')	S&B
Boards	0.5"-2" x Avg. (8" x 8')	S&B
Flitches	3" & up x 7" & up x 6' & up	S&B
Decks	2"-3" x 4", 5" x 10' & up	S&B
Scantlings	0.5"-5" x 1"-6" x 1' & up	S, F, II

The above mentions only the general groupings. Quality names as well as specification names also differs with those of other rules. Some of the terms used in the softwood and hardwood trades like baulks, battens are not used here.

Conversions should be well-manufactured with cross sections rectangular throughout. They must be sawn full with 1/8" overcut full to the normal dimensions at the time of milling. The permissible defects of each grade for teak conversions are briefly explained in Table 14. The width (W), length (L) of the piece is usually considered in calculating permissible defects. In knots the diameter (dia.) of the knot is taken into account.

**Table 14. Teak conversions grades and permissible defect**

Defects	Special	First	Second
Knots (kn)	L<6'-one 3/4" L>6'-two 1/2"	one 1"+ one 1/2"	one 1.25"+ one 1/2" +one 3/4" (If knot unsound dia. is halved)
Beeholes (b.h.)	L<6'-one 3/8" L>6'-two 1/4" distance<30% of L	two 3/8" distance<30% of L	two 1/2" distance<20% of L
Knots + Beeholes	one kn 3/4'+ one b.h. 1/4"	one kn 3/4'+ one b.h. 3/8"	one kn 1.25"+ one b.h. 1/2"
Sap	W>4"- 1/2"x1/4" if 1 kn or 1bh W<4"-1/2"x1/4"	W>4"- 1/2"x1/4" if 1 kn or 1bh W<4"-1/2"x1/4"	<33% of width if free from other defects. if defects present same as FQ
Curly\Wavy Grain	<5% of pcs	<10% of pcs	allowed
Suncracks	not allowed	<1/8" on <30% of length <15% of pcs	<1/8" on <50% of length <15% of pcs
Pitch\Bark\Chalk Pockets	not allowed	three - small <3/8" dia. if oval;  <u>or</u> 1"x1/8" <15% of pcs	four <1/2" dia. if oval; <u>or</u> 1.5"x1/2"
Black\Oil Streaks		permitted	allowed

The Grading Rules for Teak Squares, when read in comparison with the Grading Rules for Teak Conversions, will show that the rules for squares give methods for calculating the defect value, and the permissible defect value is fixed for each grade. In the case of teak conversions, the rules indicate only the size, location and number of defects that are permitted, and the defect value system of defects per 10 cubic feet or per ton of 50 cubic feet is not mentioned.

Scantlings are exported today as Special, First, and Second Quality. Special and Better Quality is the export quality for Teak Boards, Planks, Decks and Fitches. There is no standardisation of quality names with other countries exporting teak. For example, Special Quality is, at present, more popularly traded by Singapore, Hong Kong and Thailand as First European Quality (FEQ), and not Europe Intermediate as was previously called in this country.

It should be mentioned that in the case of small-sized scantlings, it is not practical to examine each piece as the lumber comes out of the mill. It is too time consuming as well as costly. The time for inspection is very limited. The integrity and the experience of the grader is the sole criteria in such cases. The rules can also be deceptive if followed too slavishly. Being a natural product, going by the book may sometimes result in instances where a piece of first quality is graded as special and vice versa.

## **TEAK WOOD INDUSTRY PRODUCTS**

### **Teak veneer**

Only two grades of veneer are recognised, viz., Special and Fair. The grades are determined by the maximum permissible defects they can carry. The defects are: Bark Pockets; Beehole; Mineral Streak; Black Spot; Burr; Chalk Vein; Colour; Curve Natural Markings; Decay; Flame; Flash; Grain (Rough, Wavy); Green Band; Hole (Insect. Pin) Knots; Sapwood; Split; Stain. The rules explain the place and size of the imperfection that would constitute a defect and the extent that is permissible any grade.

### **Teak plywood**

Three grades viz., Special, Superior, and Fair are recognised. In addition to the defects stated in the teak veneer, defects for plywood also include: delamination; gap; and overlap that is to be expected in the overlaying process.

### **Teak mouldings**

There are only two grades: Grades "A", and rejection "B". The defects for mouldings include: Mechanical Defects; Grain (Wavy, Cross); Sound Knots; Inbark; Decay (not allowed in any grade); Stain; Sapwood; Split (not allowed in any grade); Beeholes; Chalk Pocket; Green Band; and Moisture Content. Permissible defects are determined according to the grades and to the length of the moulding.

### **Teak lam parquet**

Three grades viz., Grades "A", "B" and "C" are recognised. Defects are: Mechanical Defects (not allowed in any grade); Wavy Grain (allowed only for Grades "B" and "C"); Crossed Grain (allowed only for Grades "B" and "C"); Sound Knots; Decayed Knots (not allowed in any grade); Stains (allowed only for Grades "B" and "C"); Sapwood on Face (allowed only for Grade "C"); Sapwood on Back (allowed only for Grades "B" and "C"); Splits (not allowed in any grade); Hole on Face (not allowed in any grade); Hole on Back (allowed only for Grades "B" and "C"); and Green Band (allowed only for Grade "C").

## **FINDINGS AND CONCLUSIONS**

1. Grading is a visual process. Graders have differences of opinion. Sometimes the written rules are not adequate to meet the provisions of nature. Then it is for the experienced grader to use his discretion.
2. Whilst the rules for teak logs and lumber in Myanmar have evolved through years of experience, there is still room for further improvement. The rules for other wood industry products are still in the rudimentary stage, and need more polishing. Markets conditions, exchange of information with other producers, and more experience would help establish a more precise set of rules.
3. Defects for quality of the texture is given more emphasis than defects for condition. Discoloration or dark colour or stripes when present in a log or a piece of lumber are not considered a defect in the existing rules.
4. No common set of grading rules has been established for teak from the Region where it is the natural habitat. In order to preserve the good name of teak it is strongly recommended that clear lines be drawn between mature teak and young immature teak.
5. It is important, that sawyers, edgermen, trimmerman and tallymen should have a basic idea of the grading rules for the goods handled by them. Graders are required to be more proficient with the different sets of rules. Systematic training complemented by years of seeing, feeling, and smelling, would make these people pass a piece of timber without having to refer the manual for determining the species and the grade in normal circumstances.
6. Market conditions set prices; and prices influence grading. It would be advisable not to adjust the grading to the fluctuating prices. Graders tend to relax the rules a bit or apply them more strictly under such situations. Let the prices rise or fall as the markets sway, but grading should be constant.
7. It would be endless to comment on grading. But as a means of providing good service, the improvement of the rules should never end.

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