

Estimating Stem Soundness (EREN PFPP Appendix VII)

Soundness: Rank stem soundness from 1 to 3 to indicate the degree to which the lower 5 meters of the stem is solid wood or is occupied by a hollow cavity. The three categories are (1) 95 to 100% solid wood, (2) 50 to 94% solid wood, and (3) < 50% solid wood. Make your judgment based upon the width, height, and depth of the hollow cavity relative to the entire 5 m section of the tree. (Ignore cavities above that height.)

1) The stem appears 95 to 100% solid in the lower 5 m of the stem. Rank the tree a **1** if there is no obvious cavity into the lower 5 m section of the stem, or if there is a small crack or wedge shaped opening into the side of an otherwise solid tree. The width of the opening should generally be less than 5% of the circumference of the tree (Figure 1). Stems with small decayed sections that do not run the length of the 5 meter stem section can also fit this category.

2) The stem appears 50 to 94% solid in the lower 5 m of the stem. This stem will generally have an opening that is > 5% of its circumference, and/ or a hollow core that comprises between 5 and 50 % of the stem volume for most of the 5 meter stem section.

3) The stem appears < 50% solid in the lower 5 m of the stem. This stem will have an opening that is > 5% of its circumference, and/ or a hollow core that comprises over 50 % of the stem volume for most of the 5 meter stem section.

The thickness of the shell of wood, and the size of the opening relative to the circumference of the stem can be compared to Tables 2 and 3 to estimate % stem soundness.

Step 1: If there are not any visible openings in the lower 5 meters of the stem other than cracks or other small openings < 5% of the stem's circumference, rank the stem (**1**). (See Figure 1, left image)

Step 2: If there is an opening into the stem > than 5% of the stem's circumference, or it has a significant internal cavity, measure the width of the opening relative to the overall circumference of the tree to determine the % circumference represented by the opening (Figure 1, Table 1).

Step 3: Measure the thickness of the shell of wood surrounding the cavity.

Step 4: Compare the thickness of the shell to the minimum thickness needed for a stem to be at least 50% sound wood (Table 2). Rank the stem a (2) if it has at least 50% sound wood.

Step 5: If the shell thickness is less than the listed values for dbh for a given stem opening size class, record the stem as a (3).

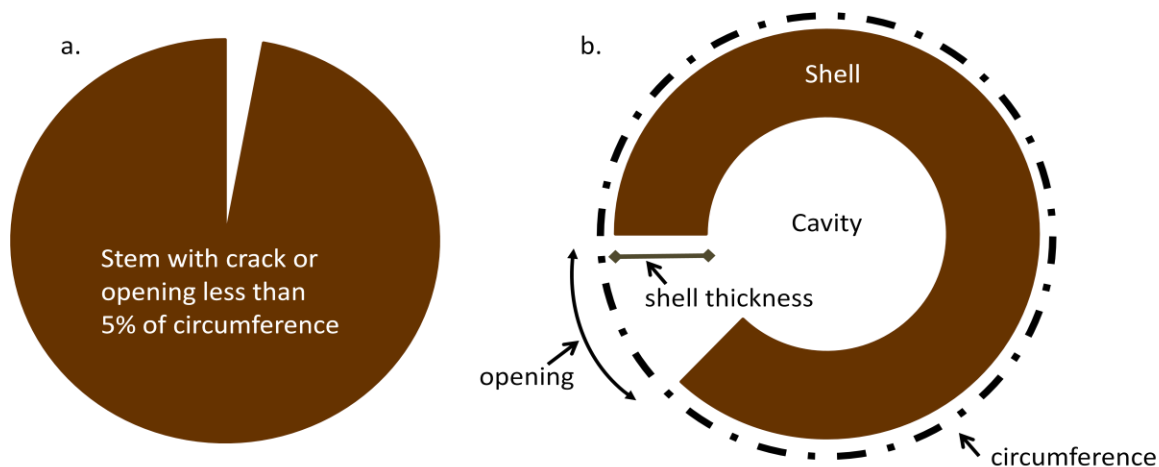


Figure 1. Terminology and images for determining the percentage of sound wood in a stem. (a) Stem with small crack. (b) Stem with an opening into a hollow cavity. Measure the length of the opening relative to the total circumference to determine the opening % size class and measure the thickness of the shell relative to the stem diameter.

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Note: This is an estimate. The values in the tables are not absolutes, but should provide a guide for making the best field estimate for the three categories.

Table 1. DBH, total circumference, and 5, 10, 25, and 33% of circumference for trees ranging in size from 5 to 100 cm in diameter.

Tree dbh (cm)	Tree Circumference (cm)	Length of Stem Circumference Representing Different Percentages of the Total Circumference (cm)			
		5%	10%	25%	33%
5	15.7	0.8	1.6	3.9	5.2
10	31.4	1.6	3.1	7.9	10.4
15	47.1	2.4	4.7	11.8	15.6
20	62.8	3.1	6.3	15.7	20.7
25	78.5	3.9	7.9	19.6	25.9
30	94.2	4.7	9.4	23.6	31.1
35	110.0	5.5	11.0	27.5	36.3
40	125.7	6.3	12.6	31.4	41.5
45	141.4	7.1	14.1	35.3	46.7
50	157.1	7.9	15.7	39.3	51.8
75	235.6	11.8	23.6	58.9	77.8
100	314.2	15.7	31.4	78.5	103.7

Table 2. Thickness of wood shell needed for a tree with 5, 10, 25, or 33% opening to contain at least 50% soundwood in the main stem.

Tree dbh (cm)	Thickness (cm) of stemwood shell needed for stem to be 50% soundwood			
	Opening < 5% circumference	Opening = 10% circumference	Opening = 25% circumference	Opening = 33% circumference
5	0.7	0.8	1.0	1.1
10	1.5	1.6	1.9	2.1
15	2.2	2.5	2.9	3.2
20	2.9	3.3	3.9	4.2
25	3.7	4.1	4.8	5.3
30	4.4	4.9	5.8	6.3
35	5.1	5.8	6.8	7.4
40	5.9	6.6	7.8	8.4
45	6.6	7.4	8.7	9.5
50	7.3	8.2	9.7	10.5
75	11.0	12.3	14.5	15.8
100	14.6	16.5	19.4	21.1

Note: The thickness of the shell can be calculated as follows:
 Opening 5% (or less) = dbh * 0.146; 10% = dbh * 0.165; 25% = dbh * 0.194; 33% = dbh * 0.211