Threaded Fasteners

Fasteners are used throughout the electric guitar and in all areas of industry. There are a variety of fasteners on a guitar; being able to identify, size and drill the proper pilot holes is important so as to not break the screw. This activity will have students identifying the various threaded fasteners that are found in this project, and in industry, with respect to the following attributes: application type, head, length, diameter, thread, material.

Learning Objectives:

1. Students will identify machine threads, wood screw threads, and sheet metal threads.
2. Students will identify different heads for threaded fasteners.
3. Students will select drill sizes for through and threaded holes.
4. Students will decode thread notation.
5. Students will state the importance of selecting the proper tool for inserting and removing threaded fasteners.

Standards:

CCSS.MATH.CONTENT.HSG.GMD.B.4 - Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.

Materials Required:

1. Screws: wood, sheet metal, and machine
2. Screwdrivers – variety of Phillips sizes (#00, #0, #1 recommended)
3. Allen “wrenches” or keys
4. Drill Index
5. Drill & screw size chart

Safety:

1. Safety glasses when working in a lab environment
2. Select the proper screwdriver when driving the screw, screwdrivers too large or small will strip out the head of the screw.

References:

Fastener Slideshow

Fastener Reference Chart - www.boltdepot.com/fastener-information/type-chart.aspx

Activity:

When the time comes to assemble your electric guitar, you will be required to use a variety of threaded fasteners in order to get the job done correctly. Being able to identify, size and drill the proper pilot holes is important so as to not break the screw. In this activity, you will be identifying the various threaded fasteners commonly used in industry, and in this project in particular. The following fastener attributes will be identified: application type, head, length, diameter, thread, material. On to the activity…

1. View the accompanying Fastener Slideshow (see References above)
2. Review the following document
3. Inspect the various fasteners that are included in your electric guitar build kit
4. Complete the Threaded Fasteners assessment

Thread types – Screws come in a variety of styles based on the type of fastening required

Wood screws are for directly fastening into wood

Machine Screws must use another fastener (like a nut or a threaded hole) for applying the fastening torque

Sheet metal screws like wood screws fasten directly into the material you are fastening.

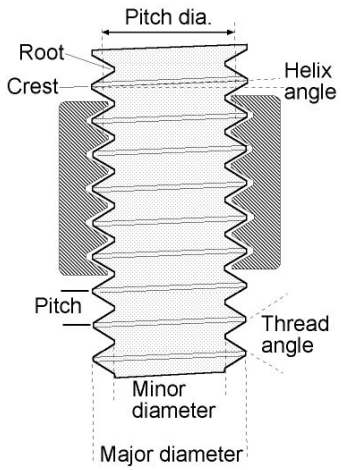
Thread Anatomy

Pitch: distance from crest to crest

Major diameter is the overall size of the thread

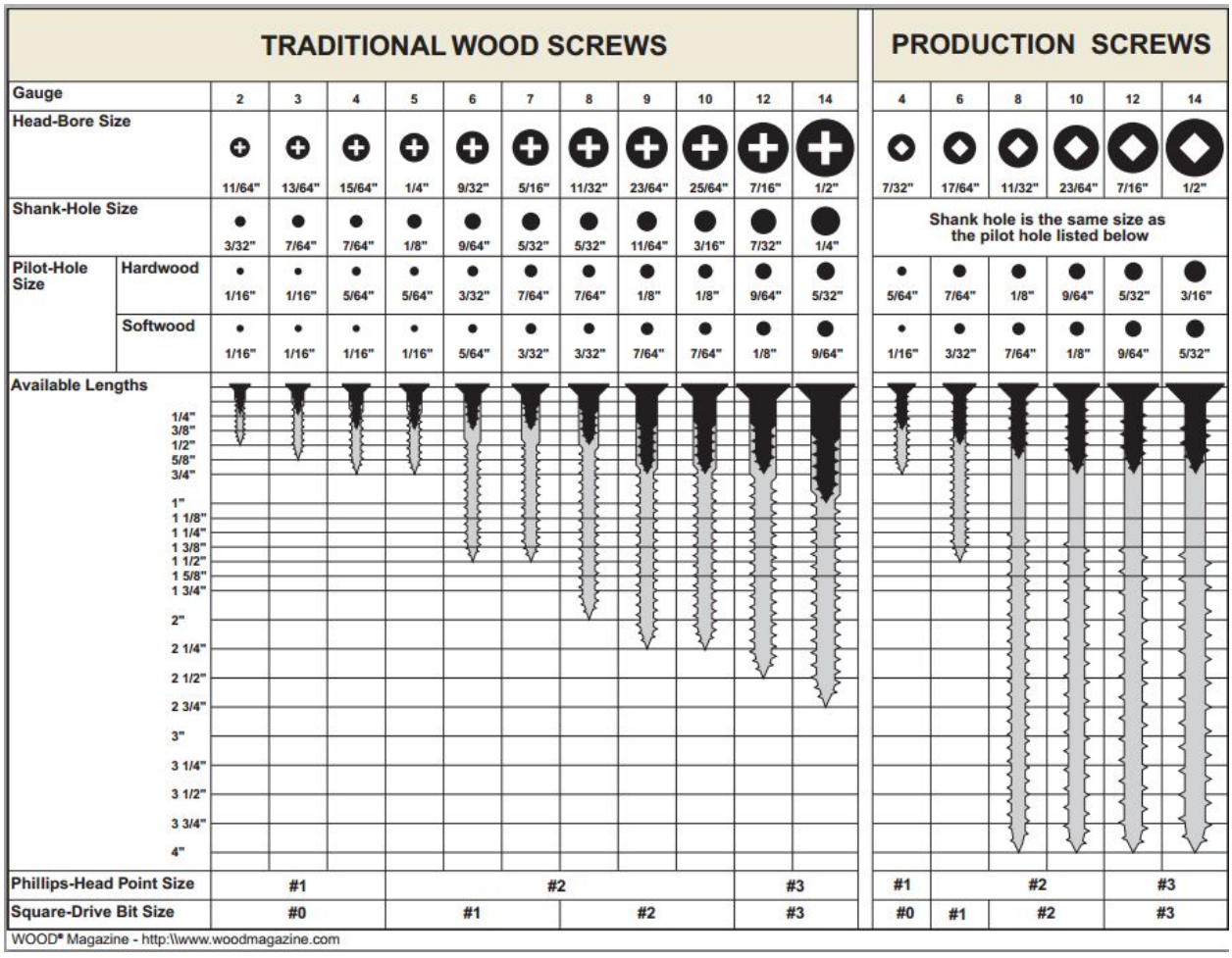
Minor diameter is the smallest diameter of the thread it is measuring.

Thread angle / helix angle: The angle of each thread to perpendicular, each thread is a continuous helix from top to bottom.



Wood Screws Sizing

It is very important to drill a pilot hole before you start using a screw in wood. This prevents the wood from splitting out and the screw from being bound up and then breaking. Shown below is a chart that has the most common wood screw sizes and lengths



Types of Screw heads:

Screw heads can come in different shapes. This package shows a #8 - 2" long wood screw. This screw is used to attach the neck to the body of the guitar. What should be the pilot drill size be if we were drilling into hardwoods?

This hex bolt is a 7/16" in Diameter by 3 ½" long, they are like machine screws in that they require additional hardware to complete the fastening effect. This is typically a nut or a threaded hole.

The 14 is the threads per inch designation. It determines the threading that the nut or tapped (threaded) hole requires to properly and smoothly fasten together. If you ever had a nut and the screw that was the correct diameter but the threads per inch were not matched up to the nut then the nut would not thread more than a ¾ turn. The bolt would then stop turning since the threads do not mate well.

Name _____

Assessment
Threaded Fasteners

1. What is meant by the *¼"* indicated by arrow A?

   A. The length of the screw
   B. The major diameter of the screw
   C. The minor diameter of the screw
   D. The diameter of the screw head

2. What is meant by the *20* by arrow B?

   A. The number of screws in the package
   B. The threads per inch on the screw
   C. The size of the screw head
   D. The length of the screw

3. What is meant by the *2-1/2"* by arrow C?

A. The hole size needed
B. The major diameter of the screw
C. The diameter of the screw head
D. The length of the screw

4. What is meant by the *#6* by arrow A?

A. The size of the pilot hole needed for the screw
B. The diameter of the screw
C. The size of the phillips screwdriver needed
D. The length of the screw

5. What is meant by the ½" by arrow B?

   A. The length of the screw
   B. The hole diameter
   C. The size of the countersink head
   D. The diameter of the screw

6. What is meant by "Phillips flat head?"

   A. The head of the screw is flat with a countersink with a phillips shape needed for driving
   B. The size of the screw requires a phillips head screwdriver with a flat top on it to drive the screw into the wood
   C. The top of the screw is slightly rounded to insure it looks good
   D. The screw cannot lay flat since it has a countersink on it

7. Thread pitch refers to the _____.

   A. depth of the thread.
   B. thread angle.
   C. distance from thread crest to thread crest.
   D. angle of the thread as you look at screw from the side.

8. When drilling a pilot hole, _____.

   A. select a drill bit exactly the same size as the screw minor diameter.
   B. select a drill bit slightly larger than the screw minor diameter.
   C. select a drill bit exactly the same size as the screw major diameter.
   D. select a drill bit slightly larger than the screw major diameter.

9. Identify the following screw head types:

a. 

b. 

c. 

d. 

____ Flange head

____ Flat head

____ Fillister head

____ Hexagon head (hex head)

10. Identify the following screw thread type:

a. 

b. 

c. 

d. 

____ Wood slotted

____ Machine

____ Wood Phillips

____ Sheet Metal

Assessment Key:

1. B - The major diameter of the screw
2. B - The threads per inch on the screw
3. D - The length of the screw
4. B - The diameter of the screw
5. A - The length of the screw
6. A - The head of the screw is flat with a countersink with a phillips shape needed for driving
7. C - distance from thread crest to thread crest.
8. B - select a drill bit slightly larger than the screw minor diameter.
9. d, c, b, a
10. c, b, a, d

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