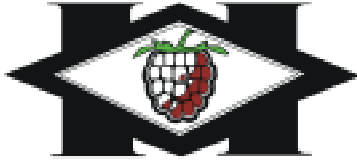


# FASTENERS

## CITY OF HOPKINS INSPECTIONS DIVISION



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*Notice: This handout is intended only as a guide to the subject matter covered herein and is based in part on the 2003 Minnesota State Building Code. While every attempt has been made to insure the correctness of this handout, no guarantees are made to its accuracy or completeness. Responsibility for compliance with applicable codes and ordinances falls on the owner or contractor. For specific questions regarding code requirements, refer to the Minnesota Building Code or contact your local Building Department.*

### PENNY-INCH NAIL EQUIVALENTS

Penny	Inch	Penny	Inch
2d	= 1"	12d	= 3 1/4"
3d	= 1 1/4"	16d	= 3 1/2"
4d	= 1 1/2"	20d	= 4"
5d	= 1 3/4"	30d	= 4 1/2"
6d	= 2"	40d	= 5"
7d	= 2 1/4"	50d	= 5 1/2"
8d	= 2 1/2"	60d	= 6"
9d	= 2 3/4"	70d	= 7"
10d	= 3"	80d	= 8"

### FASTENER SCHEDULE FOR GYPSUM BOARD

Table R702.3.5

Thickness of Gypsum Board	Size of Fasteners to Wood Framing
3/8"	Nails: 13 gage, 1 1/4" long, 19/64" head; 0.098 diameter, 1 1/4" long, annular-ringed; or 4d cooler nail, 0.080" diameter, 1 3/8" long, 7/32" head. Screws: Screws shall be Type S or W and penetrate into wood framing a minimum of 5/8 inch.
1/2 "	Nails: 13 gage, 1 3/8" long, 19/64" head; 0.098 diameter, 1 1/4" long, annular-ringed; 5d cooler nail, 0.086" diameter, 1 5/8" long, 15/64" head; or gypsum board nail, 0.086" diameter, 1 5/8" long, 9/32" head. Screws: Screws shall be Type S or W and penetrate into wood framing a minimum of 5/8 inch.
5/8"	Nails: 13 gage, 1 5/8" long, 19/64" head; 0.098 diameter, 1 3/8" long, annular-ringed; 6d cooler nail, 0.092" diameter, 1 7/8" long, 1/4" head; or gypsum board nail, 0.0915" diameter, 1 7/8" long, 19/64" head. Screws: Screws shall be Type S or W and penetrate into wood framing a minimum of 5/8 inch.

## ROOF TRUSSES TO TOP PLATES

Because toenails often split truss heels, it is recommended that trusses be attached with commercially available truss connectors installed in accordance with the manufacturers recommendations. For this region, the lightest of the truss connectors available are acceptable. This will become a requirement in the 2003 International Residential Code.

## FASTENER SCHEDULE FOR ROOFING

Asphalt Shingles	Mineral-surfaced Roll Roofing	Wood Shingles	Wood Shakes
Fasteners for asphalt shingles must be galvanized steel, stainless steel, aluminum, or copper roofing nails, minimum 12 gauge shank with a minimum 3/8" diameter head and of a length to penetrate through the roofing materials and a minimum of 3/4" inch into roof sheathing or when roof sheathing is less than 3/4" thick, the fastener shall penetrate through the sheathing.	Roll roofing must be installed in accordance with the manufacturer's installation instructions.	Fasteners for wood shingles must be corrosion-resistant with a minimum penetration of 1/2" into the sheathing. For sheathing less than 1/2" in thickness, the fastener shall extend through the sheathing. A minimum of two fasteners per shingle are required.	Fasteners for wood shakes must be corrosion-resistant with a minimum penetration of 1/2" into the sheathing. For sheathing less than 1/2" in thickness, the fastener shall extend through the sheathing. A minimum of two fasteners per shake are required.

# FASTENER SCHEDULE FOR EXTERIOR FINISHES FROM THE INTERNATIONAL RESIDENTIAL CODE <sup>a, b, c, d, e</sup>

## Table R703.4

SIDING MATERIAL		TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS				
		Wood or wood structural panel sheathing	Fiberboard sheathing into stud	Gypsum sheathing into stud	Direct to studs	Number or spacing of fasteners
Horizontal Aluminum (must use aluminum fasteners)	Without Insulation	0.120" nail 1 ½" long	0.120" nail 2" long	0.120" nail 2" long	Not allowed	Same as stud spacing
	With Insulation	0.120" nail 1 ½" long	0.120" nail 2 ½" long	0.120" nail 2 ½" long	Not allowed	
Hardboard panel siding-vertical		0.092" nail, min. head diam. 0.225, nail must accommodate sheathing and penetrate framing 1.5 inches	0.092" nail, min. head diam. 0.225, nail must accommodate sheathing and penetrate framing 1.5 inches	0.092" nail, min. head diam. 0.225, nail must accommodate sheathing and penetrate framing 1.5 inches	0.092" nail, min. head diam. 0.225, nail must accommodate sheathing and penetrate framing 1.5 inches	6" panel edges, 12" intermediate supports
Hardboard lap-siding-horizontal		Minimum shank diameter of 0.099", min. head diameter of 0.240", and nail length must accommodate sheathing and penetrate framing 1 ½"	Minimum shank diameter of 0.099", min. head diameter of 0.240", and nail length must accommodate sheathing and penetrate framing 1 ½"	Minimum shank diameter of 0.099", min. head diameter of 0.240", and nail length must accommodate sheathing and penetrate framing 1 ½"	Minimum shank diameter of 0.099", min. head diameter of 0.240", and nail length must accommodate sheathing and penetrate framing 1 ½"	Same as stud spacing, 2 per stud
Steel siding		0.113 nail – 1 ¾" long, Staple – 1 ¾" long	0.113 nail – 2 ¾" long, Staple – 2 ½" long	0.113 nail – 2 ½" long, Staple – 2 ¼" long	Not allowed	Same as stud spacing
Plywood panel (exterior grade)		0.099 nail – 2" long	0.113 nail – 2 ½" long	0.099 nail – 2" long	0.099 nail – 2" long	6" on edges
Vinyl siding		0.120" nail 1 ½" long, Staple 1 ¾" long	0.120" nail 2" long, Staple 2 ½" long	0.120" nail 2" long, Staple 2 ½" long	Not allowed	Same as stud spacing
Wood rustic drop siding		Fastener penetration into stud – 1"			0.113 nail – 2 ½" long, Staple – 2" long	Face nailing up to 6" widths – 1 per bearing; 8" widths and over, 2 nails per bearing
Wood shiplap siding						
Wood bevel siding						
Wood butt tip siding						

- a. All applications are based on a stud spacing of 16" o.c. Where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.
- b. Nail is a general description and shall be T-headed, modified round head, or round head with smooth or deformed shanks.
- c. Staples must have a minimum crown width of  $\frac{7}{16}$ " outside diameter and be manufactured of minimum No. 16 gauge wire.
- d. Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs for fiberboard or gypsum backing.
- e. Aluminum nails must be used to attach aluminum siding.

# FASTENER SCHEDULE FOR STRUCTURAL MEMBERS <sup>A, B, C</sup>

Table 602.3(1)

Description of Building Elements	Number and Type of Fasteners	Spacing of Fasteners
Joist to sill or girder	3-8d	---
1" x 6" subfloor or less to each joist, face nail	2-8d, 2 staples 1 3/4"	---
2" sub floor to joist or girder, blind and face nail	2-16d	---
Sole plate to joist or blocking, face nail	16d	16" o.c.
Top or sole plate to stud, end nail	2-16d	---
Stud to sole plate, toe nail	3-8d or 2-16d	---
Double studs, face nail	10d	24" o.c.
Double top plates, face nail	10d	24" o.c.
Sole plate to joist or blocking at braced wall panels	3-16d	16" o.c.
Double top plates, minimum 24 inch offset of end joints, face nail in lapped area	8-16d	---
Blocking between joists or rafters to top plate, toe nail	3-8d	---
Rim joist to top plate, toe nail	8d	6" o.c.
Top plates, laps at corners and intersections, face nail	2-10d	---
Built-up header, two pieces with 1/2" spacer	16d	16" o.c. along each edge
Continued header, two pieces	16d	16" o.c. along each edge
Ceiling joists to plate, toe nail	3-8d	---
Continuous header to stud, toe nail	4-8d	---
Ceiling joist, laps over partitions, face nail	3-10d	---
Ceiling joist to parallel rafters, face nail	3-10d	---
Rafter to plate, toe nail	2-16	---
1" brace to each stud and plate, face nail	2-8d 2 staples, 1 3/4"	---
1" x 6" sheathing to each bearing, face nail	2-8d 2 staples, 1 3/4"	---
1" x 8" sheathing to each bearing, face nail	2-8d 3 staples, 1 3/4"	---
Wider than 1" x 8" sheathing to each bearing, face nail	3-8d 4 staples, 1 3/4"	---
Built-up corner studs	10d	24" o.c.
Built-up girders and beams, 2-inch lumber layers	10d	Nail each layer as follows: 32" o.c. at top and bottom and staggered. Two nails at ends and at each splice.
2" planks	2-16d	At each bearing
Roof rafters to ridge, valley or hip rafters:		
Toe nail	4-16d	---
Face nail	3-16d	---
Rafter ties to rafters, face nail	3-8d	---

- a. All nails are smooth-common, box or deformed shanks except where otherwise stated.
- b. Staples are 16-gauge wire and have a minimum 7/16-inch on diameter crown width.
- c. Nails shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater.

# WOOD STRUCTURAL PANELS, SUBFLOOR, ROOF AND WALL SHEATHING, AND PARTICLEBOARD WALL SHEATHING TO FRAMING <sup>A, B, C, D</sup>

Table R602.3(1)

Sheathing Thickness	Type of Fasteners	Spacing of Fasteners	
		Edges (Inches) <sup>f</sup>	Intermediate Supports (Inches)
$\frac{5}{16} - \frac{1}{2}$	6d common nail (subfloor, wall) 8d common nail, (roof) <sup>e</sup>	6	12
$\frac{19}{32} - 1$	8d common nail	6	12
$1 \frac{1}{8} - 1 \frac{1}{4}$	10d common nail or 8d deformed nail	6	12

- a. All nails are smooth-common, box or deformed shanks except where otherwise stated.  
b. Nails shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater.  
c. Four-foot-by-8-foot or 4-foot-by-9-foot wall panels must be applied vertically.  
d. Wood structural panels include plywood, OSB or composite panels.  
e. Nails for attaching wood structural panel roof sheathing to gable end wall framing must be spaced 6 inches on center.  
f. Spacing of fasteners on floor sheathing panel edges applies to panel edges supported by framing members and at all floor perimeters only. Spacing of fasteners on roof sheathing panel edges applies to panel edges supported by framing members and at all roof plane perimeters. Blocking of roof or floor sheathing panel edges perpendicular to the framing members shall not be required except at intersection of adjacent roof planes. Floor and roof perimeters shall be supported by framing members or solid blocking.

## WALL SHEATHING TO FRAMING <sup>A, B, C</sup>

Table R602.3(1)

Sheathing Type	Type of Fastener	Spacing of Fasteners	
		Edges (Inches)	Intermediate Supports (Inches)
$\frac{1}{2}$ " regular cellulosic fiberboard sheathing	1 $\frac{1}{2}$ " galvanized roofing nails; 6d common nails; staples 16 ga., 1 $\frac{1}{2}$ " long	3	6
$\frac{1}{2}$ " structural cellulosic fiberboard sheathing	1 $\frac{1}{2}$ " galvanized roofing nails; 8d common nails; staples 16 ga., 1 $\frac{1}{2}$ " long	3	6
$\frac{25}{32}$ " structural cellulosic fiberboard sheathing	1 $\frac{3}{4}$ " galvanized roofing nails; 8d common nails; staples 16 ga., 1 $\frac{1}{2}$ " long	3	6
$\frac{1}{2}$ " gypsum sheathing	1 $\frac{1}{2}$ " galvanized roofing nails; 6d common nails; galvanized staples 1 $\frac{1}{2}$ " long; 1 $\frac{1}{4}$ " screws, Type W or S <sup>d</sup>	4	8
$\frac{5}{8}$ " gypsum sheathing	1 $\frac{3}{4}$ " galvanized roofing nails; 8d common nails; galvanized staples 1 $\frac{5}{8}$ " long; 1 $\frac{5}{8}$ " screws, Type W or S <sup>d</sup>	4	8

- a. All nails are smooth-common, box or deformed shanks except where otherwise stated.  
b. Staples are 16-gauge wire and have a minimum  $\frac{7}{16}$ -inch on diameter crown width.  
c. Four-foot-by-8-foot or 4-foot-by-9-foot wall panels must be applied vertically.  
d. Type S screws are for fastening gypsum board to light-gage steel members. Type W screws are for fastening gypsum board to wood members.

## WOOD STRUCTURAL PANELS, COMBINATION SUBFLOOR UNDERLAYMENT TO FRAMING <sup>A, B</sup>

Table R602.3(1)

Sheathing Type	Type of Fastener	Spacing of Fasteners	
		Edges (Inches) <sup>c</sup>	Intermediate Supports (Inches)
$\frac{3}{4}$ " and less	6d deformed nail or 8d common nail	6	12
$\frac{7}{8}$ " - 1"	8d common or 8d deformed nail <sup>d</sup>	6	12
$1 \frac{1}{8}$ " - 1 $\frac{1}{4}$ "	10 d common nail or 8d deformed nail <sup>d</sup>	6	12

- a. All nails are smooth-common, box or deformed shanks except where otherwise stated.  
b. Wood Structural panels include plywood, OSB, or composite panels.  
c. Spacing of fasteners on floor sheathing panel edges applies to panel edges supported by framing members and at all floor perimeters only. Blocking of floor sheathing panel edges perpendicular to the framing members shall not be required except at intersection of adjacent roof planes. Floor perimeters shall be supported by framing members or solid blocking.  
d. Deformed shank nails are nails with ringed, screwed, threaded, clinched, or barbed shanks.

# ALTERNATE ATTACHMENTS FOR WOOD STRUCTURAL PANELS, ROOF AND WALL SHEATHING TO FRAMING AND PARTICLE BOARD WALL SHEATHING TO FRAMING AND FLOOR UNDERLAYMENT

Table R602.3(2)

Nominal Material Thickness (Inches)	Description of Fastener and Length <sup>a</sup> (Inches)	Spacing <sup>b</sup> of Fasteners	
		Edges (Inches)	Intermediate Supports (Inches)
<b>Wood Structural Panels subfloor, roof and wall sheathing to framing and particleboard wall sheathing to framing</b>			
<sup>5</sup> / <sub>16</sub>	0.097 – 0.099 Nail 1 ½" long Staple 15 ga. 1 ⅜" long Staple 16 ga. 1 ¾" long	6	12
<sup>3</sup> / <sub>8</sub>	Staple 15 ga. 1 ⅜" long	6	12
	0.097 – 0.099 Nail 1 ½" long	4	10
	Staple 16 ga. 1 ¾" long	6	12
<sup>15</sup> / <sub>32</sub> and ½	Staple 15 ga. 1 ½" long	6	12
	0.097 – 0.099 Nail 1 ⅝" long	3	6
	Staple 16 ga. 1 ¾" long	6	12
<sup>19</sup> / <sub>32</sub> and <sup>5</sup> / <sub>8</sub>	O.113 Nail 1 ⅞" long Staple 15 and 16 ga. 1 ⅝" long	6	12
	0.097 0 0.099 Nail 1 ¾" long	3	6
<sup>23</sup> / <sub>32</sub> and ¾	Staple 14 ga. 1 ¾" long	6	12
	Staple 15 ga. 1 ¾" long	5	10
	0.097 – 0.099 Nail 1 ⅞" long	3	6
	Staple 16 ga. 2" long	4	8
1	Staple 14 ga. 2" long	5	10
	0.113 Nail 2 ¼" long Staple 15 ga. 2" long	4	8
	0.097 0.099 Nail 2 ⅞" long	3	6
<b>Floor underlayment; plywood-hardboard-particleboard</b>		<b>Edges (Inches)</b>	<b>Body of Panel<sup>c</sup> (Inches)</b>
<b>Plywood</b>			
<sup>1</sup> / <sub>4</sub> and <sup>5</sup> / <sub>16</sub>	1 ¼" ring or screw shank nail – minimum 12 ½ ga. (0.099") shank diameter	3	6
	Staple 18 ga. ⅞, <sup>3</sup> / <sub>16</sub> crown width	2	5
<sup>11</sup> / <sub>32</sub> , <sup>3</sup> / <sub>8</sub> , <sup>15</sup> / <sub>32</sub> , and ½	1 ¼" ring or screw shank nail – minimum 12 ½ ga. (0.099) shank diameter	6	8 <sup>d</sup>
<sup>19</sup> / <sub>32</sub> , <sup>5</sup> / <sub>8</sub> , <sup>23</sup> / <sub>32</sub> , and ¾	1 ½" ring or screw shank nail – minimum 12 ½ ga. (0.099) shank diameter	6	12
	Staple 16 ga. 1 ¼" long	6	8
<b>Hardboard</b>			
0.200	1 ½" long ring-grooved underlayment nail	6	6
	4d cement-coated sinker nail	6	6
	Staple 18 ga. ⅞" long (plastic coated)	3	6
<b>Particleboard</b>			
<sup>1</sup> / <sub>4</sub>	4d ring-grooved underlayment nail	3	6
	Staple 18 ga., ⅞" long, <sup>3</sup> / <sub>16</sub> " crown	3	6
<sup>3</sup> / <sub>8</sub>	6d ring-grooved underlayment nail	6	10
	Staple 16 ga., 1 ⅞" long, <sup>3</sup> / <sub>8</sub> crown	3	6
<sup>1</sup> / <sub>2</sub> , <sup>5</sup> / <sub>8</sub>	6d ring-grooved underlayment nail	6	10
	Staple 16 ga., 1 ⅝" long, <sup>3</sup> / <sub>8</sub> " crown	3	6

a. Staples must have a minimum crown width of <sup>1</sup>/<sub>16</sub>-inch diameter except as noted.

- b. Nails or staples shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater. Nails or staples shall be spaced at not more than 12 inches on center at intermediate supports for floors.
- c. Fasteners shall be placed in a grid pattern throughout the body of the panel.
- d. For 5-ply panels, intermediate nails shall be spaced no more than 12 inches on center each way.

## **Corrosion Resistant Nails**

### **Stainless Steel Nails**

Approved stainless steel nails come as either Type 304 or Type 316. Stainless steel nails provide superior resistance to corrosion and are required for portions of the construction of wood foundation systems. If you are using a wood foundation system, make sure you are using the right fasteners in the right locations.

### **Hot-dipped galvanized (zinc coated) steel nails**

Nails are dipped in molten zinc to give each nail a thick coating of zinc. Hot dipped nails are required in wood foundation applications where stainless steel is not required and may be used in other situations which require corrosion resistant fasteners.

### **Hot-tumbled galvanized (zinc coated) steel nails**

Nails are galvanized by putting zinc chips into a hot, rotating barrel with the nails with the zinc then “washing” off on the nails. These nails may also be used in wood foundations where stainless steel nails are not required and may be used in other situations that require corrosion resistant fasteners.

### **Electro galvanized steel nails**

This method of corrosion protection uses electricity to put a thin shiny coating of zinc on the nails. Electro galvanized nails may not be used in the construction of wood foundations but may be used in others areas of building construction requiring corrosion resistant fasteners.

### **Mechanical galvanized steel nails**

This is a cold process that hammers zinc powder on to nails to give them a galvanized coating. Mechanically galvanized nails may not be used in the construction of wood foundations but may be used in others areas of building construction requiring corrosion resistant fasteners.

# Nail Application Guide

## How many nails will I need? (approximate count)

### Box Nails for Hardboard Siding

12" Horizontal Siding	6d – 16d	1200 nails per 1000 sq. ft
4' x 8' Panel Siding	6d – 16d	3300 nails per 1000 sq. ft

### Nails for Cedar and Redwood Wood Siding

1/2" x 4" Siding	6d – 8d	2280 nails per 1000 board feet
1/2" x 6" Siding	7d – 8d	1520 nails per 1000 board feet
3/4" x 8" Siding	8d – 10d	1140 nails per 1000 board feet
3/4" x 10" Siding	8d – 10d	912 nails per 1000 board feet
3/4" x 12" Siding	10d	760 nails per 1000 board feet

### Fiber Cement Siding Nails

Lap Siding	6d – 16d	9 nails per 12' piece
4' x 8' Panel Siding	6d – 16d	16" o.c. – 80 nails
4' x 8' Panel Siding	6d – 16d	24" o.c. – 64 nails

### Vinyl Siding Nails

1 1/2", 2" and 2 1/2"		115 nails per square
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### Cedar Shake Siding Face Nails

16" Shakes	6d	360 nails per square
18" Shakes	6d	310 nails per square

### Cedar Shingle Nails

16" & 18" – New Roof	3d	860 nails per square
Over old Roof	5d	860 nails per square
24" – New Roof	4d	570 nails per square
Over old Roof	6d	570 nails per square

### Asphalt & Fiberglass Shingle Nails

On a New Roof	1 1/4"	320 nails per square
Over an Old Roof	1 3/4"	320 nails per square

### Decking Nails

5/4" x 6" Decking Joists spaced at 16" o.c.	8d – 10d	330 nails per 100 square feet
2 x 4 Decking Joists spaced at 16" o.c.	10d – 16d	550 nails per 100 square feet
2" x 6" Decking Joists spaced at 16" o.c.	10d – 16d	330 nails per 100 square feet

### Drywall Nails

Single Layer 3/8" & 1/2"	1 1/4"	2000 nails per 1000 per square feet
5/8"	1 5/8"	2000 nails per 1000 per square feet

### Underlayment and Plywood Nails

1/4" Pressed and Plywood Underlayment	1 1/4"	500 nails per 100 square feet
3/8" Pressed and Plywood Underlayment	1 1/2"	500 nails per 100 square feet
1/2", 5/8", & 3/4" Plywood Sheathing	2" & 2 1/2"	150 nails per 100 square feet
1" Plywood Subfloor	3"	150 nails per 100 square feet



# CHARACTERISTICS OF COMMON, BOX, FINISHING, AND CASING NAILS

Nail Type		Common		Box		Finishing	Casing
Size	Length	Gauge	Approx. No. per Pound	Gauge	Approx. No. per Pound	Approx. No. per Pound	Approx. No. per Pound
2d	1"	15	845	15 ½	940	1473	1090
3d	1 ¼"	14	540	14 ½	588	880	654
4d	1 ½"	12 ½	290	14	453	630	489
5d	1 ¾"	12 ½	250	14	389	535	414
6d	2"	11 ½	165	12 ½	225	288	244
7d	2 ¼"	11 ½	150	12 ½	200	254	215
8d	2 ½"	10 ¼	100	11 ½	136	196	147
9d	2 ¾"	10 ¼	90	11 ½	124	178	133
10d	3"	9	65	10 ½	90	124	96
12d	3 ¼"	9	60	10 ½	83	113	88
16d	3 ½"	8	45	10	69	93	74
20d	4"	6	30	9	50	65	53
30d	4 ½"	5	20	9	45	Not usually stocked	47
40d	5"	4	17	8	34	Not usually stocked	35
50d	5 ½"	3	13	Not usually stocked		Not usually stocked	Not usually stocked
60d	6"	2	10	Not usually stocked		Not usually stocked	Not usually stocked

## NAILS PER POUND (APPROX.)

### Roofing Nails

1 ¼"	202 nails per pound
1 ½"	180 nails per pound
1 ¾"	156 nails per pound
2"	136 nails per pound

### Siding Nails

2"	194
2 ¼"	172
2 ½"	123
3"	103

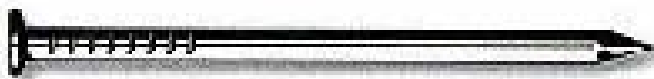
### Shingle Nails

1 ¼"	450
1 ½"	392
1 ¾"	344
2"	232
2 ¼"	185

### Drywall Nails

1 ¼"	352
1 ⅜"	321
1 ½"	302
1 ⅝"	274
1 ¾"	259

## COMMON CONSTRUCTION NAILS



**Common Nails** – Common nails are the most popular nails in use today. They are the basic nail for most construction. They are usually available with flat heads and diamond points, although they are sometimes manufactured with other head and point designs. Most common nails have a cement or vinyl coating that improves their holding power. Suitable for a wide variety of purposes, common nails are used primarily for structural framing, scaffolding and general carpentry.



**Box Nails** – Box nails are used for light construction and rough work in soft woods. Box nails are of the same general design as common nails but are made of a smaller wire gauge. Because of their smaller diameter, they are easily driven and less likely to split wood. Most box nails have a cement or vinyl coating that improves their holding power.



**Finishing Nails** – Finishing nails are slightly smaller in diameter than common nails. Finishing nails are those made for interior trim, finish carpentry, cabinetwork, and furniture building. Their small, cupped head help to position the nail set to countersink the head of the nail below the surface of the wood.



**Casing Nails** - Casing nails, with their deep, wedge-shaped heads, are used for interior trim, finish carpentry, cabinet making and furniture. They are most often used where a nail heavier than a finishing nail is required. Like finishing nails, they also have cupped heads for easier nail setting. In their corrosion resistant form, they are also used for exterior applications.



**Duplex Head Nails** – Duplex head nails are used for scaffolding, forms and other temporary construction. They are easy to pull, save dismantling time, lumber and nails.



**Cut Nails** – Cut nails are made from sheets of specially hardened steel in a wide range of lengths, dimensions and head designs. They are wedge-shaped with squared edges to cut through wood without splitting. Cut nails should be driven with their widest dimension parallel to the grain of the wood. The most widely used cut nail is the furring or concrete nail, for fastening wood or metal to cement, masonry or building block walls.



**Masonry Nails** – In addition to the cut nail, there are several other types of masonry nails. These nails are made of high carbon steel for maximum hardness to insure easiest possible penetration. They are mainly used for fastening lumber to concrete or masonry.



**Roofing Nails** – Roofing nails are designed for the application of asphalt and fiberglass shingles on new construction and reproofing jobs. Roofing nails are corrosion resistant. Their broad heads resist pulling through shingles during high winds. Nails should be long enough to penetrate  $\frac{3}{4}$  inch into the wood deck lumber or completely through plywood decking. Roofing nails also come in ring and spiral shanks for additional holding power in high-wind areas.



**Shingle Nails** - Shingle nails are used for the application of wood roofing products. Because of their smaller head, they should never be used for asphalt roofing applications. Shingle nails should always be corrosion resistant.



**Joist Hanger Nails** – Joist hanger nails are specially made for use with joist hangers. These nails have specific head sizes, thickness, steel and shank designs, and point configurations to insure conformity with the joist hanger manufacturers published values. When using any connector, the manufacturers published literature should be consulted to insure that the proper fastener is being used. Screws should not be substituted unless specified by the manufacturer.



**Drywall Nails** – Drywall nails are used for the application of drywall. Their ring shank design adds additional holding power.



**Siding Nails** – Siding nails are designed for face and blind nailing differing types of manufactured siding products. Only corrosion resistant nails may be used for siding applications.



**Deformed Shank Nails** – Deformed shank nails are nails with ringed, screwed, threaded, clinched or barbed shanks to increase the withdrawal strength of the nail.



**Deck screws** – Deck screws are a popular fastener for fastening decking to framing on exterior decks because of their ease of installation and ability to resist withdrawal. Deck screws come in square drive, star drive, torx drive, and Philips head.



**Wood screws** – Wood screws are used when a fastener stronger than a nail is needed. Wood screws are tapered so as to help draw wood together as the screw is inserted. Screw heads are usually flat, oval, or round depending on the desired final appearance. Screws should penetrate 2/3 of the combined thickness of the materials being joined. Galvanized or corrosion resistant screws should be used where rust could be a problem. Lubricating

screws with soap or beeswax will ease installation. A pilot hole (usually 2 sizes smaller than the shank of the screw) should always be made before driving a screw. This is especially crucial in hardwoods or when driving a screw near the end of a board. When working with screws of a larger diameter, a pilot hole of the same diameter as the shank of the screw should be drilled into the wood to a depth of 1/3 the length of the screw.



**Cabinet screws** – Cabinet screws are used for cabinet assembly and installation. They come in a variety of lengths with both Phillips and #2 square heads.



**Drywall Screws** – Drywall screws are designed for holding power and ease of penetration. While both Type S and Type W drywall screws can be used to attach drywall to wood framing, only Type S screws can be used for application of drywall to steel studs.



**Anchor bolts** – Anchor bolts are set into concrete and masonry slabs and foundations for anchoring sills and plates. Anchor bolts must be a minimum of 1/2" diameter and extend a minimum of 7 inches into masonry or concrete.



**Carriage bolts**



**Stove bolt**



**Hex bolt**



**Lag screws**

**Carriage bolts, stove bolts, hex bolts, and lag screws** – are all used in wood framing when strength beyond what can be provided with nails is required. These fasteners come in a wide variety of sizes, strengths, and finishes.

## Steel Wire Gauge and Decimal Equivalents

Gauge	Decimal Equivalent	Gauge	Decimal Equivalent
20	.0348"	11	.1205"
19	.0410"	10	.1350"
18	.0475"	9	.1483"
17	.0540"	8	.1620"
16 ½	.0580"	7	.1770"
16	.0625"	6	.1920"
15	.0720"	5 ½	.2000"
14 ½	.0760"	5	.2070"
14	.0800"	4	.2253"
13	.0915"	3	.2437"
12 ½	.0990"	2	.2625"
12	.1055"	1	.2830"
11 ½	.1150"		

## Inch-Decimal Conversion

Inch	Decimal Equivalent	Inch	Decimal Equivalent
$\frac{1}{16}$ "	.0625"	$\frac{11}{64}$ "	.1719"
$\frac{5}{64}$ "	.0781"	$\frac{3}{16}$ "	.1875"
$\frac{3}{32}$ "	.0938"	$\frac{13}{64}$ "	.2031"
$\frac{7}{64}$ "	.1094"	$\frac{7}{32}$ "	.2119"
$\frac{1}{8}$ "	.1250"	$\frac{15}{64}$ "	.2344"
$\frac{9}{64}$ "	.1406"	$\frac{1}{4}$ "	.2500"
$\frac{5}{32}$ "	.1563"	$\frac{17}{64}$ "	.2656"

## COUNTERBORE, SHANK & PILOT HOLE DIAMETERS

Screw Size	Counterbore Diameter For Screw Head	Clearance Hole for Screw Shank	Pilot Hole Diameter	
			Hard Wood	Soft Wood
#1	.146 ( $\frac{9}{64}$ )	$\frac{5}{64}$	$\frac{3}{64}$	$\frac{1}{32}$
#2	$\frac{1}{4}$	$\frac{3}{32}$	$\frac{3}{64}$	$\frac{1}{32}$
#3	$\frac{1}{4}$	$\frac{7}{64}$	$\frac{1}{16}$	$\frac{3}{64}$
#4	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{3}{64}$
#5	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{5}{64}$	$\frac{1}{16}$
#6	$\frac{5}{16}$	$\frac{9}{64}$	$\frac{3}{32}$	$\frac{5}{64}$
#7	$\frac{5}{16}$	$\frac{5}{32}$	$\frac{3}{32}$	$\frac{5}{64}$
#8	$\frac{3}{8}$	$\frac{11}{64}$	$\frac{1}{8}$	$\frac{3}{32}$
#9	$\frac{3}{8}$	$\frac{11}{64}$	$\frac{1}{8}$	$\frac{3}{32}$
#10	$\frac{3}{8}$	$\frac{3}{16}$	$\frac{1}{8}$	$\frac{7}{64}$
#11	$\frac{1}{2}$	$\frac{3}{16}$	$\frac{5}{32}$	$\frac{9}{64}$
#12	$\frac{1}{2}$	$\frac{7}{32}$	$\frac{9}{64}$	$\frac{1}{8}$