



TM

FASTENER
TRAINING
INSTITUTE

BASIC FASTENER HANDBOOK



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Fastener Training Institute

The Fastener Training Institute provides beginning and advanced training on fastener products, standards and specifications.

Product Training Program

- This three-course program was designed to teach your employees about the products they buy, sell and warehouse.
- While it is intended for people new to the industry, it will be beneficial for anyone who wants to expand their knowledge.
- Classes do not need to be taken in sequence. If a class is missed, it can be made up the following year.
- Upon completion of the program, students receive an engraved plaque.
- Classes are taught by recognized industry specialists and include every-day hands-on case studies and lots of real-life information.

Advanced Technical Training

- The Certified Fastener Specialist™ advanced technical training program was created in 1998.
- To receive the CFS™ designation, students must complete seven full-day training programs offered throughout the year and pass a take-home exam at the end of the training.
- Upon completion of the program, students receive an engraved plaque designating their certification as a fastener specialist, according to the requirements established by the Fastener Training Institute™.
- More than 600 students have participated in the program since its inception. We now have more than 200 graduates.
- Classes do not need to be taken in sequence. If a class is missed, it can be made up the following year.
- Classes are taught by recognized industry specialists and include every-day hands-on case studies and lots of real-life information. Not generalities: just the facts, the technical facts.

Proprietary Seminars

- The Fastener Training Institute can deliver customized on-site training for your employees or customers. Let us know what you need, and we can develop a curriculum for you.

Our core purpose is to enhance fastener use, reliability and safety.

All information presented in this handbook is based on data which Fastener Training Institute™ believes to be reliable. Such information is intended for use by persons at their own discretion and risk. Information in this handbook is based on recommended usage per industry standards. The Fastener Training Institute™ assumes no responsibility for information presented.

Core Purpose

To enhance fastener use,
reliability and safety.



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Table of Contents

Drives.....	2
Screw Heads.....	2
Screw Points.....	3
Thread Styles.....	3
How Length is Measured.....	4
Socket Products.....	4
Large Threaded Fasteners.....	5
Nuts.....	6
Washers.....	7
Rivets.....	8
Sems.....	9
Pins.....	9
Anchors.....	10
Appearance and Plating Chart	11
Grade Markings for Steel Bolts and Screws.....	12
Thread Sizes and Threads Per Inch.....	13
ISO Metric Diameter/Pitch Combinations.....	14
Suggested Standard Abbreviations.....	15
How To Call Out Parts.....	16
Fastener Glossary.....	17-24

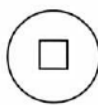
Drives



Spanner



Hexagon Head



Square



Phillips



Hexagon Socket



Hexagon Washer Head



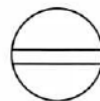
Slotted Hex Washer Head



Tamper Resistant



Combination Phillips/Slot



Slotted Head

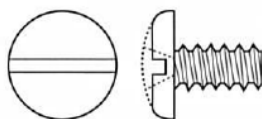


Pozidrive

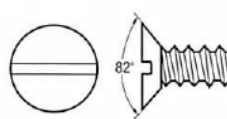


Six Lobe

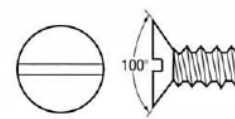
Screw Heads



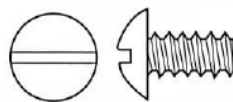
Pan Head*



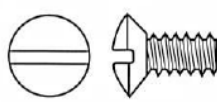
82 Degree Flat Head Screw*



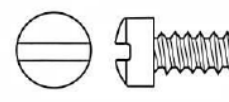
100 Degree Flat Head Screw*



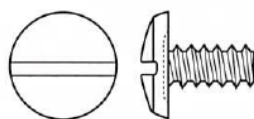
Round Head*



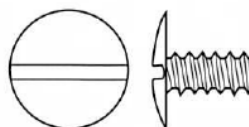
Oval Head*



Fillister Head*



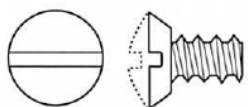
Binding Head



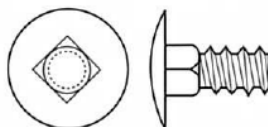
Truss Head



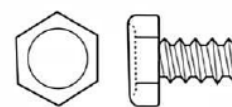
Round Washer Head/
Modified Truss



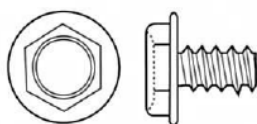
Flat and Oval Heads*
(Undercut)



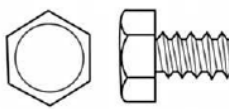
Square Shoulder Screws
(Carriage, Elevator & Step Bolts)



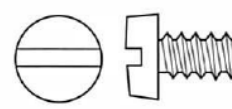
Indented Hexagon



Indented Hexagon Washer Head



Hexagon Head
(Trimmed)



Cheese Head Screw

*Most head styles also available as Phillips recessed.

Screw Points



Flat Point



Cone Point



Oval Point



Full Dog Point



Half Dog Point



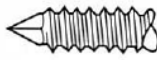
Cup Point



Self-Drilling Tek®



Sharp Point/
Self Piercing



Nail Point
(Pinched)



Machine Screw
Point



Drive Screw
Point

Thread Styles



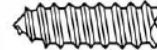
Machine Screw
Thread



Wood Screw
Thread



Type A Self
Tapping



Type AB Self
Tapping



Type B Self
Tapping



Hi-Lo Self
Tapping



Type 25 or
BT Thread Cutter



Type 23 or
T Thread Cutter



Type 1
Thread Cutter



Type F or
G Thread Cutter



Plastite® Thread
Rolling



Taptite® Thread
Rolling



Type BSD Self
Drilling



Type CSD Self
Drilling



Deck/Particle Board
Screw Thread



Type U Drive
Screw



Dry Wall Screw
Thread Sharp Point



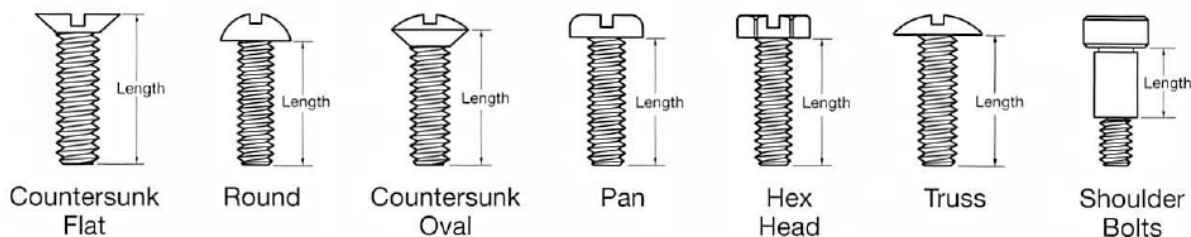
Dry Wall Screw
Thread Drill Point



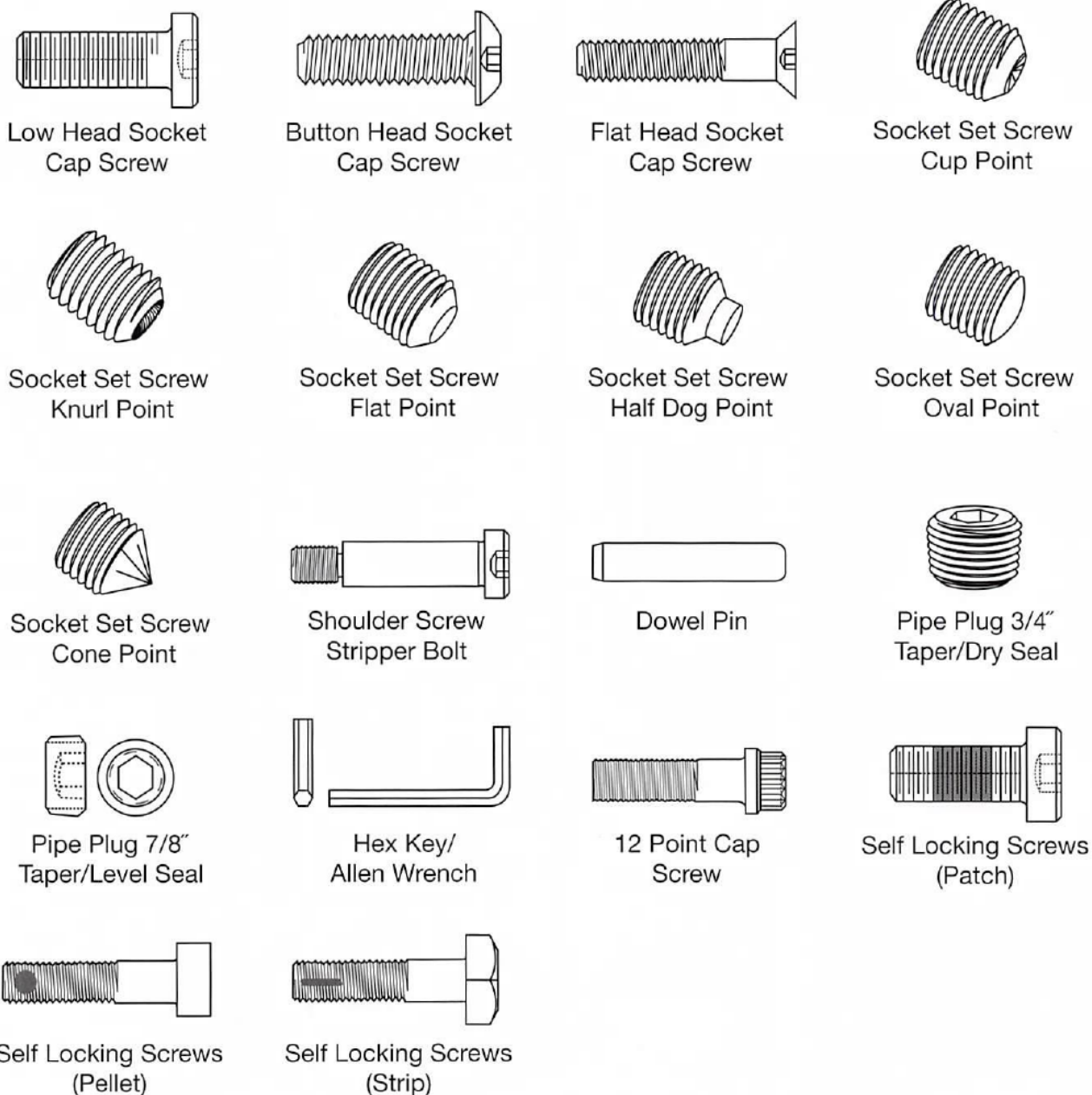
Self Piercing
Thread Former



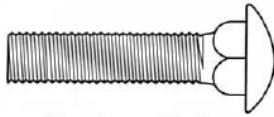
How Length is Measured



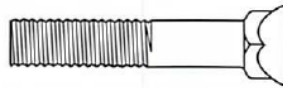
Socket Products



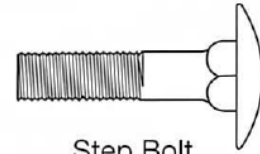
Large Threaded Fasteners



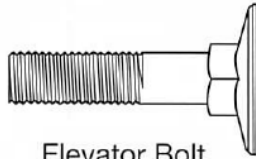
Carriage Bolt



Plow Bolt



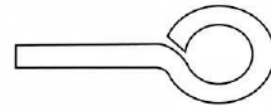
Step Bolt



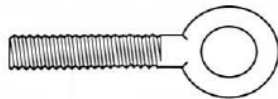
Elevator Bolt



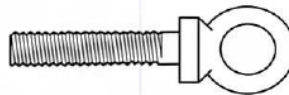
Hanger Bolt



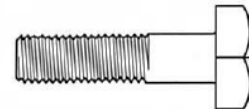
Bent Wire Eye Bolt



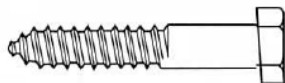
Forged Eye Bolt
Plain Pattern



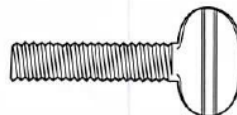
Forged Eye Bolt
Shoulder Pattern



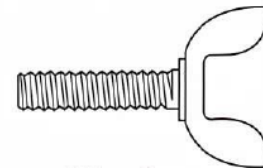
Square Head Bolt



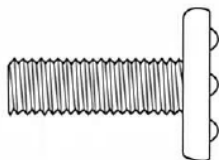
Lag Screw



Thumb Screw



Wing Screw



Weld Screw



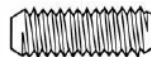
Anchor Bolt



U-Bolt



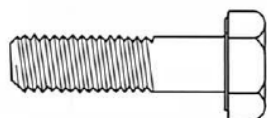
J-Bolt



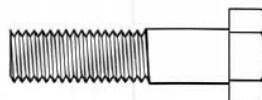
Full Thread Stud



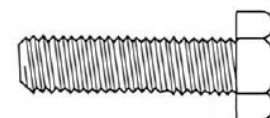
Double End Stud



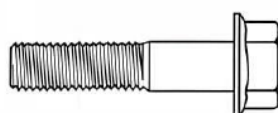
Cap Screw



Machine Bolt



Tap Bolt

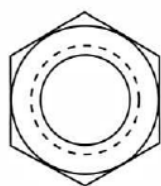


Hex Flange Bolt
(Also comes with
serrations under head)

Nuts



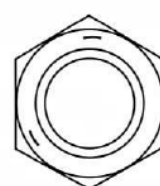
Finished Hex Nut
Gr. 2



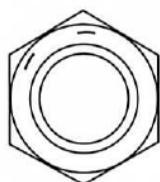
Hex Machine Screw
Nut



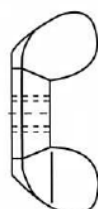
Hex Jam Nut



Finished Hex Nut
Gr. 5



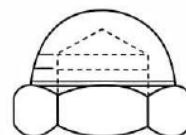
Finished Hex Nut
Gr. 8



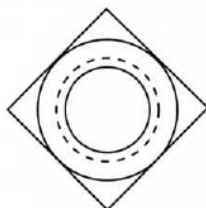
Wing Nut Forged



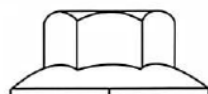
Wing Nut Stamped



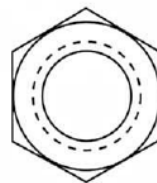
Acorn Nut



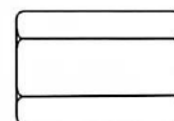
Square Nut



Hex Flange Nut



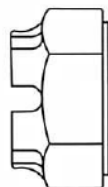
Heavy Hex Nut



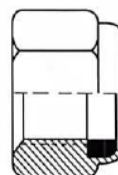
Hex Coupling Nut



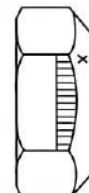
Slotted Hex Nut



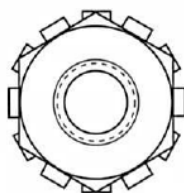
Hex Castle Nut



Nylon Insert Locknut



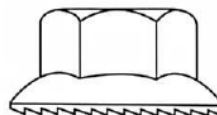
All Metal Locknut
Gr. C



Keps Nut/K-Lock



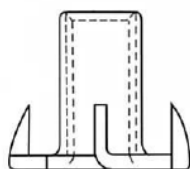
Two Way Locknut
(Reversible)



Serrated Flange Nut



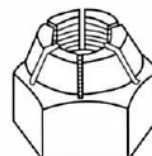
Panel Nut



T Nut or Wood
Prong T Nut

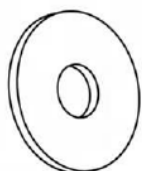


Cage Nut

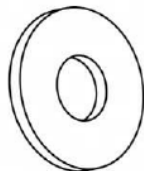


Flexlock®

Washers



Fender Washer



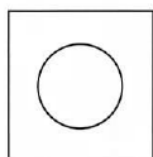
USS Flatwasher



SAE Flatwasher



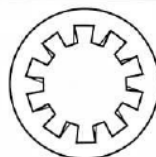
Countersunk Finishing Washer



Square Washer



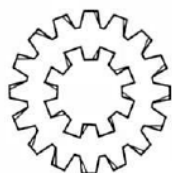
External Tooth Lockwasher



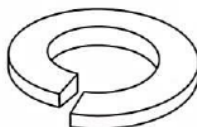
Internal Tooth Lockwasher



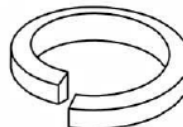
Countersunk External Washer



Internal/External Tooth Lockwasher



Split Lockwasher



Hi Collar Lockwasher

Standard Washer Sizes

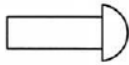
SAE Pattern Flat Washers

Bolt Size	Outside Diameter			Inside Diameter			Thickness			Approx. Number Per 50 Pounds
	Nominal	Max	Min	Nominal	Max	Min	American Standard (Gauge)	Max	Min	
6	3/8	0.406	0.344	5/32	0.187	0.156	18 (3/64)	0.065	0.036	39,500
8	7/16	0.469	0.407	3/16	0.219	0.188	18 (3/64)	0.065	0.036	29,500
3/16	1/2	0.531	0.469	7/32	0.250	0.219	18 (3/64)	0.065	0.036	22,750
12	9/16	0.583	0.531	1/4	0.281	0.250	16 (1/16)	0.080	0.051	14,700
1/4	5/8	0.656	0.594	9/32	0.312	0.281	15 (1/16)	0.080	0.051	11,100
5/16	11/16	0.719	0.657	11/32	0.375	0.344	16 (1/16)	0.080	0.051	9,750
3/8	13/16	0.843	0.781	13/32	0.437	0.406	16 (1/16)	0.080	0.051	7,000
7/16	59/64	0.953	0.891	15/32	0.500	0.469	16 (1/16)	0.080	0.051	5,500
1/2	1-1/16	1.093	1.031	17/32	0.562	0.531	13 (3/32)	0.121	0.074	2,800
9/16	1-3/16	1.219	1.157	19/32	0.625	0.594	13 (3/32)	0.121	0.074	2,250
5/8	1-5/16	1.343	1.281	21/32	0.687	0.656	13 (3/32)	0.121	0.074	1,850
3/4	1-1/2	1.531	1.469	13/16	0.843	0.812	10 (9/64)	0.160	0.108	1,050
7/8	1-3/4	1.781	1.719	15/16	0.969	0.938	10 (9/64)	0.160	0.108	775
1	2	2.031	1.969	1-1/16	1.094	1.062	10 (9/64)	0.160	0.108	585
1-1/8	2-1/4	2.313	2.187	1-3/16	1.251	1.188	10 (9/64)	0.160	0.108	460
1-1/4	2-1/2	2.563	2.437	1-5/16	1.375	1.312	9 (5/32)	0.192	0.136	335
1-3/8	2-3/4	2.813	2.687	1-7/16	1.501	1.438	9 (5/32)	0.213	0.136	275
1-1/2	3	3.063	2.937	1-9/16	1.625	1.562	9 (5/32)	0.213	0.153	230

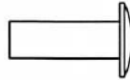
USS Pattern Flat Washers

Bolt Size	Outside Diameter			Inside Diameter			Thickness			Approx. Number Per 50 Pounds
	Nominal	Max	Min	Nominal	Max	Min	American Standard (Gauge)	Max	Min	
3/16	9/16	0.593	0.531	1/4	0.281	0.250	18 (3/64)	0.650	0.360	18,050
1/4	3/4	0.781	0.719	5/16	0.343	0.312	16 (1/16)	0.080	0.510	7,450
5/16	7/8	0.906	0.844	3/8	0.406	0.375	14 (5/64)	0.104	0.640	4,350
3/8	1	1.031	0.969	7/16	0.469	0.438	14 (5/64)	0.104	0.064	3,350
7/16	1-1/4	1.281	1.219	1/2	0.531	0.500	14 (5/64)	0.104	0.640	2,050
1/2	1-3/8	1.406	1.344	9/16	0.593	0.562	12 (7/64)	0.132	0.860	1,300
9/16	1-1/2	1.531	1.469	5/8	0.656	0.625	21 (7/64)	0.132	0.860	1,100
5/8	1-3/4	1.781	1.719	11/16	0.719	0.688	10 (9/64)	0.160	0.108	650
3/4	2	2.031	1.969	13/16	0.843	0.812	9 (5/32)	0.177	0.122	455
7/8	2-1/4	2.281	2.219	15/16	0.969	0.938	8 (11/64)	0.192	0.136	325
1	2-1/2	2.531	2.469	1-1/16	1.094	1.063	8 (11/64)	0.192	0.136	265
1-1/8	2-3/4	2.781	2.719	1-1/4	1.281	1.250	8 (11/64)	0.192	0.136	225
1-1/4	3	3.031	2.969	1-3/8	1.406	1.375	8 (11/64)	0.192	0.136	190
1-3/8	3-1/4	3.281	3.219	1-1/2	1.531	1.500	7 (3/16)	0.213	0.153	150
1-1/2	3-1/2	3.631	3.469	1-5/8	1.656	1.625	7 (3/16)	0.213	0.153	130
1-5/8	3-3/4	3.813	3.687	1-3/4	1.813	1.750	7 (3/16)	0.213	0.153	115
1-3/4	4	4.063	3.937	1-7/8	1.938	1.875	7 (3/16)	0.213	0.153	100
1-7/8	4-1/4	4.313	4.187	2	2.063	2.000	7 (3/16)	0.213	0.153	90
2	4-1/2	4.563	4.437	2-1/8	2.188	2.125	7 (3/16)	0.213	0.153	79
2-1/4	4-3/4	4.813	4.687	2-3/8	2.438	2.375	5 (7/32)	0.248	0.193	60
2-1/2	5	5.063	4.937	2-5/8	2.688	2.625	4 (15/64)	0.280	0.210	52
2-3/4	5-1/4	5.313	5.187	2-7/8	2.938	2.875	3 (1/4)	0.310	0.228	45
3	5-1/2	5.563	5.437	3-1/8	3.188	3.125	2 (5/32)	0.327	0.249	43

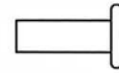
Rivets



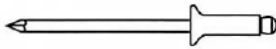
Solid Rivet Universal Head



Solid Rivet Brasier Head



Solid Rivet Flat Head



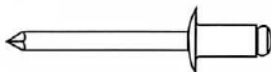
Countersunk Blind Rivet



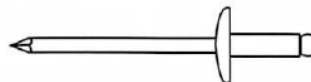
Oval Head Semi Tubular Rivet



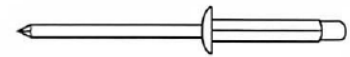
Truss Head Semi Tubular Rivet



Button Head Blind Rivet



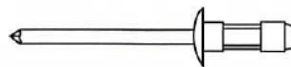
Large Flange Blind Rivet



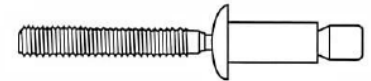
Tri-Bulb Blind Rivet



Closed End Blind Rivet

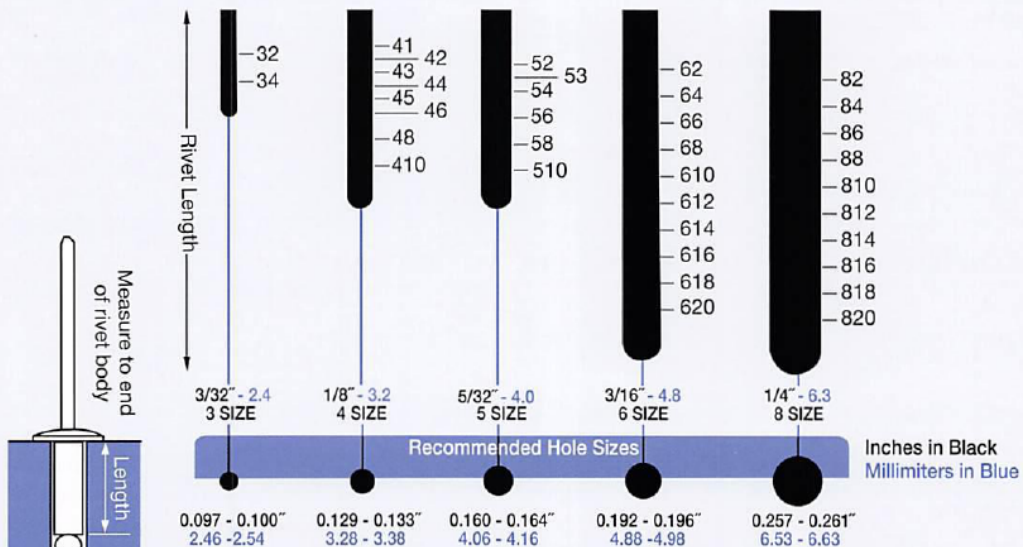


Multi-Grip Blind Rivet



Structural Lock Bolt Rivet

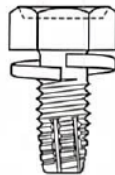
Identifying Rivet Size



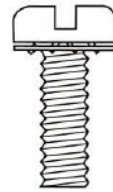
Sems



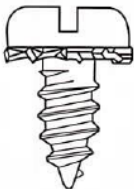
Conical



Split Lockwasher

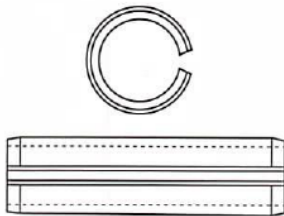


Internal Tooth
Lockwasher

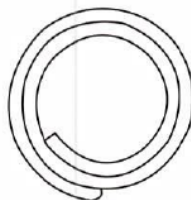


External Tooth
Lockwasher

Pins



Spring Pin/Roll Pin



Coiled Pin/Spirol Pin



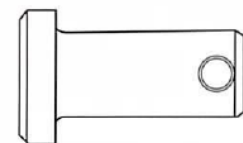
Dowel Pin



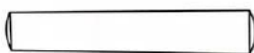
Cotter Pin Extended
Prong



Cotter Pin
Hammerlock



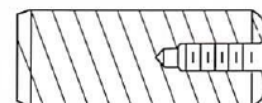
Clevis Pin



Taper Pin

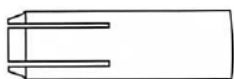


Groove Pin

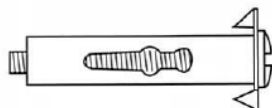


Pull Dowel Pin

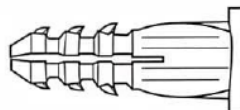
Anchors



Drop-In
Anchor



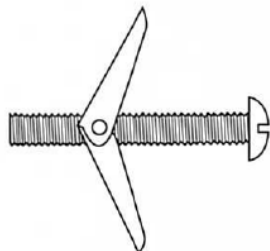
Steel Hollow Wall
Anchor



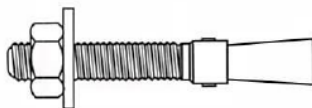
Plastic Hollow Wall
Anchor



Lag Screw
Shield



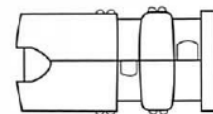
Toggle Bolt/
Toggle Wing



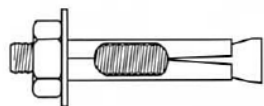
Wedge
Anchor



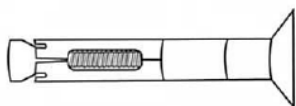
Double Expansion
Anchor



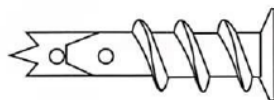
Single Expansion
Anchor



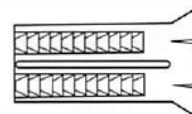
Sleeve Anchor/Hex Nut
& Washer Style



Sleeve Anchor/
Flat Head



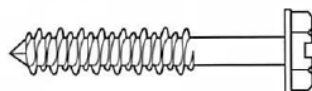
EZ Screw-In
Anchor



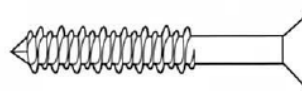
Lead Screw
Anchor



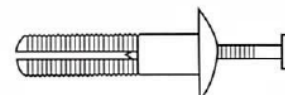
Lead Machine Screw
Anchor



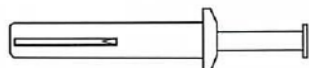
Concrete Screw
Hex Washer Head



Concrete Screw
Flat Head



Nail-In Nylon
Anchor



Hammer Drive
Anchor

Appearance and Plating Chart

Color/Appearance	Finish	Notes
Silver/Grey	Zinc with Clear Sealer	Most common finish on Grade 5 and below.
	Cadmium with Clear Sealer	Probably NOT RoHS compliant. Check with vendor.
	Hard Chrome	Seldom used on fasteners.
	Passivation (Stainless Steel Only)	A form of acid cleaning; not really a coating.
	Tin	
Silver/Grey: Bright, Semi-Bright; matte	Decorative Chrome	Barrel processing not available.
	Nickel	Slight yellow tone when compared to chrome.
	Silver	
Gold or Yellow Iridescent	Zinc with Yellow Sealer	Most common finish on Grade 8.
	Cadmium with Yellow Sealer	Probably NOT RoHS compliant. Check with vendor.
	Brass	Will tarnish without sealer/laquer.
Black	Black Oxide (Used with Oil or Wax)	Available for steel, stainless, brass and copper.
	Black Zinc Phosphate	Typically used with oil. Can be dry to touch.
	Zinc with Black Sealer	Check with vendor on RoHS compliance.
	Cadmium with Black Sealer	Probably NOT RoHS compliant. Check with vendor.
Grey/ Dark Grey (Black) Oiled; (Possibly Dry to Touch)	Zinc Phosphate with Oil. Can be dry to touch.	Common on drywall screws.
	Manganese Phosphate with Oil	Typically used with oil. Can be dry to touch.
	Iron Phosphate with Oil	Very light coating; typically used as a paint primer
Grey/ Dark Grey (Black) Dry	Zinc Phosphate	
	Manganese Phosphate	Seldom used on fasteners
	Solid Film Lubricant (potentially over Zinc)	
	Zinc plate with Phosphate over the Zinc	
	Cadmium with Phosphate over the Cad	Probably NOT RoHS compliant. Check with vendor.
Dull Olive	Zinc with Olive Drab Sealer	Check with vendor on RoHS compliance.
	Cadmium with Olive Drab Sealer	Probably NOT RoHS compliant. Check with vendor.
Greenish Grey, Light Grey Maybe Dyed: Red, Black, Blue, Green...	Anodize (on Aluminum or Titanium)	
Bluish/ White	Zinc with Blue Sealer	Check with vendor on RoHS compliance.
Copper-Matte	Copper	Will tarnish without sealer/laquer.
Other Options	Proprietary Coatings	Many options available. Be sure of what you ask for.

NOTE: Sealers used on zinc should be non-hexavalent chrome to ensure ROHS compliance. Check with vendor.

NOTE: Most of the plated finishes can be applied with varying thicknesses. May change dimensions.

Grade Markings for Steel Bolts and Screws

Grade Designation	Nominal Size of Product in.	Material and Treatment	Mechanical Requirements						Grade Identification Marking
			Proof Load Stress ksi	Yield Strength ksi Min	Tensile Strength ksi Min	Product, Hardness, Rockwell			
						Surface Max	Min	Max	
ASTM A307 Gr. A	1/4 to 4	low or medium carbon steel	—	—	60	—	B69	B100	307A
ASTM A307 Gr. B	1/4 to 4		— —	— —	60 min 100 max	—	B69	B95	307B
SAE Gr. 1	1/4 to 1-1/2		33	36	60	—	B70	B100	None Specified
SAE Gr. 2	1/4 to 3/4	low or medium carbon steel, cold worked	55	57	74	—	B80	B100	None Specified
SAE Gr. 5	1/4 to 1 1-1/8 to 1-1/2	medium carbon steel; the product is quenched and tempered	85 74	92 81	120 105	30N54 30N50	C25 C19	C34 C30	
ASTM A449 Type 1	1/4 to 1 1-1/8 to 1-1/2 1-3/4 to 3		85 74 55	92 81 58	120 105 90	— — —	C25 C19 B91	C34 C30 B100	
ASTM A325 Type 1	1/2 to 1 1-1/8 to 1-1/2		85 74	92 81	120 105	— —	C24 C19	C35 C31	A325
SAE Gr. 5.2	1/4 to 1	low carbon boron steel; the product is quenched and tempered	85	92	120	30N56	C26	C36	
ASTM A449 Type 2	1/4 to 1		85	92	120	—	C25	C34	
ASTM A325 Type 3	1/2 to 1	atmospheric corrosion resistant steel; the product is quenched and tempered	85	92	120	—	C24	C35	<u>A325</u>
	1-1/8 to 1-1/2		74	81	105	—	C19	C31	
SAE Gr. 8	1/4 to 1-1/2	medium carbon alloy steel; the product is quenched and tempered	120	130	150	30N58.6	C33	C39	
ASTM A354 Gr. BD	1/4 to 2-1/2		120	130	150	—	C33	C39	
	2-3/4 to 4		105	115	140	—	C31	C38	BD
ASTM A490 Type 1	1/2 to 1-1/2			120	130	150 min 170 max	— —	C33	C38
SAE Gr. 8.2	1/4 to 1	low carbon boron steel; the product is quenched and tempered	120	130	150	30N58.6	C33	C39	
ASTM A490 Type 3	1/2 to 1-1/2	atmospheric corrosion resistant steel; the product is quenched and tempered	120	130	150 min 170 max	—	C33	C38	<u>A490</u>
ASTM A574	0.060 to 1/2	fine grain alloy steel product is quenched and tempered	140	—	180	—	C39	C45	None Specified
	Over 1/2		135	—	170	—	C37	C45	

NOTES:

1: In general, identification markings shall be located on the top of the product head and preferably shall be raised.

2: Six radial lines as for SAE Grade 8 are optional in addition to the mandatory BD mark for ASTM A354.

Thread Sizes and Threads Per Inch

Nominal Size	UNC Threads Per Inch	UNF Threads Per Inch
1	64	72
2	56	64
3	48	56
4	40	48
5	40	44
6	32	40
8	32	36
10	24	32
12	24	28
1/4"	20	28
5/16"	18	24
3/8"	16	24
7/16"	14	20
1/2"	13	20
9/16"	12	18
5/8"	11	18
3/4"	10	16
7/8"	9	14
1"	8	14
1 1/8"	7	12
1 1/4"*	7	12
1 3/8"	6	—
1 1/2"	6	—

UNC = Unified National Coarse Thread UNF = Unified National Fine Thread

*Commonly known as UNF because this size typically is available and used

ISO Metric Diameter/Pitch Combinations

A screw thread in conformity with this International Standard is designated by the letter M followed by the values of the nominal diameter and of the pitch expressed in millimeters; separated by the sign "x". EXAMPLE: M6 x 0.75 (Fine pitch 0.75)

The absence of the indication of pitch means that the coarse pitch is specified. EXAMPLE: M6 (Coarse pitch 1)

The words "coarse" and "fine" are given in order to conform to usage. No concept of quality, however, is associated with these words. Coarse pitches are the largest metric pitches used.

For the diameters below, choose one of the pitches shown on the corresponding line.

Dimensions in millimeters

Nominal Diameters			Pitches	
1 st Choice	2 nd Choice	3 rd Choice	Coarse	Fine
M1			0.25	0.2
	M1.1		0.25	0.2
M1.2			0.25	0.2
	M1.4		0.3	0.2
M1.6			0.35	0.2
	M1.8		0.35	0.2
M2			0.4	0.25
	M2.2		0.45	0.25
M2.5			0.45	0.35
M3			0.5	0.35
	M3.5		0.6	0.35
M4			0.7	0.5
	M4.5		0.75	0.5
M5			0.8	0.5
		M5.5		0.5
M6			1	0.75
		M7	1	0.75
M8			1.25	1, 0.75
		M9	1.25	1, 0.75
M10			1.5	1.25, 1, 0.75
		M11	1.5	1, 0.75
M12			1.75	1.5, 1.25, 1
	M14		2	1.5, 1.25, 1
		M15		1.5, 1
M16			2	1.5, 1
		M17		1.5, 1
	M18		2.5	2, 1.5, 1
M20			2.5	2, 1.5, 1
	M22		2.5	2, 1.5, 1
M24			3	2, 1.5, 1
		M25		2, 1.5, 1
		M26		1.5
	M27		3	2, 1.5, 1
		M28		2, 1.5, 1
M30			3.5	3, 2, 1.5, 1
		M32		2, 1.5
	M33		3.5	3, 2, 1.5
		M35		1.5
M36			4	3, 2, 1.5
		M38		1.5
	M39		4	3, 2, 1.5
		M40		3, 2, 1.5
M42			4.5	4, 3, 2, 1.5
	M45		4.5	4, 3, 2, 1.5
M48			5	4, 3, 2, 1.5
		M50		3, 2, 1.5
	M52		5	4, 3, 2, 1.5
		M55		4, 3, 2, 1.5
M56			5.5	4, 3, 2, 1.5
		M58		4, 3, 2, 1.5
	M60		5.5	4, 3, 2, 1.5
		M62		4, 3, 2, 1.5
M64			6	4, 3, 2, 1.5

Nominal Diameters			Pitches	
1 st Choice	2 nd Choice	3 rd Choice	Coarse	Fine
		M65	6	4, 3, 2, 1.5
	M68		6	4, 3, 2, 1.5
		M70	6	6, 4, 3, 2, 1.5
M72				6, 4, 3, 2, 1.5
		M75		4, 3, 2, 1.5
	M76			6, 4, 3, 2, 1.5
		M78		2
M80				6, 4, 3, 2, 1.5
		M82		2
	M85			6, 4, 3, 2
M90				6, 4, 3, 2
	M95			6, 4, 3, 2
M100				6, 4, 3, 2
	M105			6, 4, 3, 2
M110				6, 4, 3, 2
	M115			6, 4, 3, 2
	M120			6, 4, 3, 2
M125				6, 4, 3, 2
	M130			6, 4, 3, 2
		M135		6, 4, 3, 2
M140				6, 4, 3, 2
		M145		6, 4, 3, 2
	M150			6, 4, 3, 2
		M155		6, 4, 3
M160				6, 4, 3
		M165		6, 4, 3
	M170			6, 4, 3
		M175		6, 4, 3
M180				6, 4, 3
		M185		6, 4, 3
	M190			6, 4, 3
		M195		6, 4, 3
M200				6, 4, 3
		M205		6, 4, 3
	M210			6, 4, 3
		M215		6, 4, 3
M220				6, 4, 3
		M225		6, 4, 3
		M230		6, 4, 3
		M235		6, 4, 3
	M240			6, 4, 3
		M245		6, 4, 3
M250				6, 4, 3
		M255		6, 4
	M260			6, 4
		M265		6, 4
		M270		6, 4
		M275		6, 4
M280				6, 4
		M285		6, 4
		M290		6, 4
		M295		6, 4
	M300			6, 4

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Suggested Standard Abbreviations

These are just suggestions. Every company will have its own protocol for abbreviations.

Recess Types

Phillips	PHIL
Pozidriv	POZI
Square	SQ
Slotted	SLT

Head Styles

Flat	FL
Round	RD
Oval	OVAL
Pan	PAN
Truss	TR
Indented Hex	IND HEX
Hex Washer HD	HWH
Undercut Flat	U/C FL
Round Washer	RD WASHER
Fillister	FIL
Binder	BIND
Indented Hex Washer Head	IHWH

Screw Types

Type AB	AB
Type A	A
Type B	B
Type C	C
Type F	F
Type BF	BF
Type U	U
Sems	SEMS
Type 1/D	1 D
Type 23 T	23 T
Type 17	17
Type 25 BT	25 BT

Bolt & Screw Designations

Tapping Screws	SMS
Thumb Screws	THUMB SCR
Machine Screws	M/S or MACH SCR
Cap Screw	C/S
Carriage Bolt	C/B
Wood Screw	W/S

Washers

External Toothed Washer	EXT W L/W
Internal Tooted Washer	INT W L/W
Internal External Tooth washer	INT EXT W L/W
Flat washer	FLW or F/W or FLAT CUT
Split Lock Washer	L/W
Countersunk	CTSK
Bevel	BEV
Malleable	MALL
Finished Washer	FIN WASH

Materials

Stainless Steel	410 SS, 430 SS, 305 SS, 302 SS
Brass	BRASS
Bronze	BRNZ
Aluminum	ALUM
Stainless Steel	SS
18-8 Stainless	18-8 SS
Silicon Bronze	SIL BRNZ
Steel	STL

Plating

Zinc Yellow	ZY
Plain Steel	PLAIN
Cadmium Plated	CAD
Zinc Plated	ZN
Zinc Yellow	ZY
Copper Plated	COPPER
Brass Plated	BRASS
Phosphate	PARK
Nicker Plated	NICKEL
Chromium	CHROME
Black Oxide	BL OX
Black Pentrate	BLK PEN
Di-Chromate	DICH
(Add after Type of finish)	
Bright	WAX
(Add before Type of finish)	
Wax Dip	WAX
Lacquer	LACK
Statuary Bronze	STAT BRNZ
Antique Brass	ANT BRASS
Antique Bronze	ANT BRNZ



How to Call Out Parts

These are just suggestions. Each company will have its own protocol.

Screw Example

1/4-20 x 1 3/4 Phillips Pan Machine Screw Steel Zinc Plated

1/4	20	1 3/4	PH	PAN	M/S	STL	ZNC/PLT
Diameter	Thread Pitch	Length	Drive	Head Style	Screw Type	Material	Coating Type

Nut Example

1/2-13 Finished Hex Nut Grade 8 Yellow Zinc

1/2	13	HX	FIN	NUT	GR 8	YELLOW ZINC
Diameter	Thread Pitch	Nut Shape	Nut Type		Material	Coating Type

Bolt Example

3/8-16 x 2 1/4 Carriage Bolt Grade 5 Steel Zinc

3/8	16	2 1/4	CARR	BOLT	GR.5	STL	ZNC
Diameter	Thread Pitch	Length	Bolt Type		Material Grade	Material	Coating Type

Washer Example

5/16 x 1 1/4 Fender Washer Brass Nickel Plated

5/16	1 1/4	FENDER	WASH	BRASS	NIC/PLT
Bolt Size	Outside Diameter	Washer Type		Material	Coating Type



Fastener Glossary

A

allowance An allowance is an intentional difference between the maximum material limits of mating parts. It is the minimum clearance (positive allowance) or maximum interference (negative allowance) between such parts.

alloy steel An alloy steel is a steel containing elements, other than carbon, which have been added to obtain definite mechanical or physical properties, such as higher strength at elevated temperatures, toughness, etc.

annealed A fastener is considered in the annealed state when it has been heated and cooled to make it soft— that is, free of hardness caused by working or previous heat treatment.

anodizing Anodizing is the formation of an oxide film on the surface by means of an anodic treatment. This is commonly used on aluminum.

B

basic size The basic size is that size from which the limits of size are derived by the application of allowances and tolerances.

bearing surface The bearing surface is the supporting or locating surface of a fastener with respect to the part which it fastens (mates). The loading of a fastener is usually through the bearing surface.

blank A blank is a fastener in some intermediate stage of manufacture.

blind rivet A rivet designed for use where only one side of the work is accessible.

blunt start The removal of the partial thread at the entering end of thread.

body The body of a threaded fastener is the unthreaded portion of the shank.

bolt A bolt is an externally threaded fastener.

bolt blank A headed rod or bar intended for a subsequent threading operation.

bolt end A bolt end is a headless rod threaded at one end and assembled with a square nut; it is designed to be welded or otherwise fastened to a part or structure.

broaching Broaching is the process of removing metal by pushing or pulling a cutting tool, called a broach, along the surface.

burnishing Burnishing is the process of producing a smooth surface by rubbing or rolling a tool against the surface.

burr A burr is a small amount of material extended out from the edge of a hole, shoulder, etc. as the result of a machining operation.

C

carbon steel Carbon steel is a steel which does not contain any substantial amounts of alloying materials other than carbon.

case hardened A case hardened fastener is a fastener of ferrous material having a surface which has been harder than the core.

chamfer (v) To bevel a sharp external edge. (n) A beveled edge.

chamfer angle The chamfer angle is the angle of the chamfer measured from the normal to the axis of the fastener and is generally specified in conjunction with either a length or a diameter.

chamfer point A chamfer point is a truncated cone point, the end of which is approximately flat and perpendicular to the fastener axis. Three points on threaded fasteners generally have point included angles of 45 to 90 degrees and a point diameter equal to or slightly less than the minor diameter of the thread. This point is intended to facilitate entry of fasteners into holes at assembly.

chasing threads Cutting screw threads by moving a tool along the axis of the work to be threaded.

chip A chip is a small fragment of metal removed from a surface by cutting with a tool.

class of thread Classes of threads are distinguished from each other by the amount of tolerance or tolerance and allowance specified. Classes 1A, 2A, and 3A apply to external threads, and Classes 1B, 2B, and 3B apply to internal threads. Classes 2 and 3 apply to both external and internal threads.

cold heading Forcing metal to flow cold into dies to form thicker sections and more or less intricate shapes. The operation is performed in specialized machines where the metal, in the form of a wire or bar stock, may be upset or headed in certain sections to a larger size and, if desired, may be extruded in other sections to a smaller diameter than the stock wire.

cold heading stock Cold heading stock is material produced under closely controlled manufacturing and inspection methods so as to be suitable for heading and to be free from those defects causing fractures during heading.

commercial fastener A commercial fastener is a fastener manufactured to published standards and stocked by manufacturers or distributors. The material, dimensions and finish of commercial fasteners conform to the quality level generally recognized by manufacturers and users as commercial quality.

comparator A device for inspecting screw threads and outlines by comparing them with a greatly enlarged standard chart.

complete thread The length of complete thread is the length of that cross section of a threaded length having full form at both crest and root. Where there is a chamfer at the start of the thread not exceeding two pitches in length, it is included within the length of the complete thread. The thread length on the drawing shall be the gaging length or the length of threads having full form, i.e., the partial threads shall be outside or beyond the length, specified. When designing threaded products, it is necessary to take cognizance of: (1) Such permissible length of chamfer and (2) The first two threads which by virtue of HI-LO gaging practice may exceed the product limits and which may be included within the length of complete thread. However, where the application is such as to require a minimum or maximum number, or length, of complete threads the specification shall so state. Similar specification is required for definite length of engagement.

compression fastener A compression fastener is a fastener the primary function of which is to resist forces which tend to compress it.



Fastener Glossary

concentric, concentricity Two surfaces of a fastener are concentric when they have a common center or axis. Concentricity is the term used to describe this condition.

cone point A cone point is a sharp conical point designed to perform perforating or aligning functions at assembly.

copper steel When any minimum copper content is specified, the steel is classed as copper steel. The copper is added to enhance corrosion resistance of the steel.

corrosion Gradual chemical or electrochemical attack on a metal by atmosphere, moisture or other agents.

counterbore (v) To enlarge a hole to a given depth. (n) 1. The cylindrical enlargement of the end of a drilled or bored hole. 2. A cutting tool for counterboring, having a piloted end of the size of the drilled hole.

counterboring Counterboring is the process of enlarging for part of its depth a hole previously formed and to provide a shoulder at the bottom of the enlarged hole. Special tools called counterbores are generally used for this operation.

countersink A countersink is an internal chamfer.

countersinking Countersinking is the process of beveling or flaring the end of a hole. Holes in which countersunk head type fasteners are to be used must be countersunk to provide a mating bearing surface.

countersunk head A head, the underside of which is beveled to fit a flaring hole. The bearing surface of other types of heads is generally perpendicular to the body axis.

crest That surface of the thread which joins the flanks of the thread and is farthest from the cylinder or cone from which the thread projects.

crest clearance As in a thread assembly, the distance, measured perpendicular to the axis, between the crest of a thread and the root of its mating thread.

crest truncation The crest truncation of a thread is the distance, measured perpendicular to the axis, between the sharp crest (or crest apex) and the cylinder or cone that bounds the crest.

cross drilled A cross drilled fastener is a fastener having one or more holes in the head or shank at right angles to, and normally intersecting, the axis of the fastener.

cup point A point in the form of a cone, commonly having an included angle of 90°, with a conical depression in the end commonly having an included angle of 118°. The contact area is a circular ridge which has considerable holding power with slight penetration; applied to set screws generally.

cut thread A cut thread is a thread produced by removing material from the surface with a form cutting tool.

D

decarburized A fastener has a decarburized surface when the carbon content of the surface is lower than the carbon content of the core.

design size The design size is that size from which the limits of size are derived by the application of tolerances. When there is no allowance the design size is the same as the basic size.

diameter The length of a line passing through the center of any object from one side to the other.

die 1. One of a pair of hardened metal blocks for forming, impressing, or cutting out a desired shape. 2. (thread). A tool for cutting external threads. Opposite of tap.

die chaser The separate cutting tools used in die heads, which actually cut the screw threads.

dog point A cylindrical extension, or pilot, of diameter smaller than the minor diameter of the thread, commonly equal to about D/2 in length, with a conical section between it and the thread; usually used as a pilot in assembling or as the end of a set screw projecting into a fairly deep hole or clot.

driver head A head, on a bolt or screw, designed for driving the fastener by means of a tool other than a wrench, such as a screwdriver.

drill (v) To sink a hole with a drill, usually a twist drill. (n) A pointed cutting tool rotated under pressure.

drilling Drilling is the process of forming holes by means of specialized cutting tools called drills.

drive The means for tightening a fastener.

E

eccentric, eccentricity Two surfaces of a fastener are eccentric when they do not have the same center or axis. The amount by which the centers or axes are displaced from each other is called eccentricity. This is not to be confused with Total Indicator Reading (TIR). (See Runout).

effective thread The effective (or useful) thread includes the complete thread and that portion of the incomplete thread having crests not fully formed.

electro-galvanizing Electro-galvanizing is the process of coating metal with zinc by electroplating.

embossing Embossing is the process of raising a boss or protuberance on the surface.

endurance limit The endurance limit is the maximum stress that a fastener can withstand without failure for a specified number of stress cycles (also called fatigue limit).

extruding Extruding is the process of reducing the size of some feature or diameter by forcing it through a die.

eyelet An eyelet is a flanged tubular fastener designed for securing by curling or splaying the tubular end.

F

facing Facing is a machining operation on the end, flat face or shoulder of a fastener.

fastener A fastener is a mechanical device for holding two or more bodies in definite positions with respect to each other.

fatigue strength The stress to which a metal can be subjected for a specified number of cyclic changes of stress.

fillet A fillet is the concave junction at two intersecting surfaces of a fastener.

fillet radius The measure of the curvature (radius) imparted to the junction (fillet) of two intersecting surfaces of a fastener.



Fastener Glossary

fillister head Rounded top surface, cylindrical sides, and a flat bearing surface.

fin A fin is a form of key under the head of a fastener which serves to keep the fastener from turning during assembly and use.

fin neck A fin neck is a style of neck consisting of two or more fins under and integral with the head.

finish The term finish is commonly applied to the condition of the surface of a fastener as a result of chemical or organic treatment subsequent to fabrication. The term finish is also applied to some types of fasteners to indicate the condition of the surface as a result of mechanical operations and the degree of precision. See: Finished, Semi-Finished, and Unfinished Fasteners.

finished fastener A finished fastener is a fastener made to close tolerances and having surfaces other than the threads and bearing surface finished to provide a general high grade appearance. (See: Semi-Finished Fastener, Unfinished Fastener).

fit Fit is the general term used to signify the range of tightness which may result from the application of a specific combination of allowances and tolerances in the design of mating parts.

flange The projecting annular rim around a cylinder used for fastening, strengthening or positioning.

flash Flash is the thin fin of metal along the sides or around the edges of a forged or upset section. It is caused when metal flows out between the edges of the forging dies.

flash plating Flash plating is a very thin deposit of metal, usually on the order of 0.00005 to 0.00015 in. in thickness.

flat head Flat top surface and a conical bearing surface.

flush/countersunk A head, the underside of which is beveled to fit a flaring hole. The bearing surface of other types of heads is generally perpendicular to the body axis.

following flank The flank of a thread opposite to the leading flank.

forging Forging is the process of forming a product by hammering or pressing. When the material is forged below the recrystallization temperature it is said to be cold forged. When worked above the recrystallization temperature it is said to be hot forged.

form of thread The profile of a thread in an axial plane for a length of one pitch.

full annealing Annealing a ferrous alloy by austenitizing and then cooling slowly through the transformation range.

full or nominal diameter body A full or nominal diameter body is a body the diameter of which is generally within the dimensional limits of the major diameter of the thread. Sometimes referred to as "full size body."

G

galvanize To treat with a bath of lead and zinc to prevent rusting.

galvanizing Galvanizing is the process of coating metal with zinc by hot dipping.

gimlet point A gimlet point is a threaded cone point usually having a point angle of 45 to 50 degrees. It is used on thread forming screws such as Type A tapping screws, wood screws, lag bolts, etc.

grains Grains are the individual crystals of the material.

grinding Grinding is the process of removing material from the surface by the cutting action of a bonded abrasive wheel.

grip In general, the grip of a fastener is the thickness of material or parts which the fastener is designed to secure when assembled.

grommet A grommet is a large eyelet type fastener designed for securing by curling the tubular end over a formed washer to provide strength in holes through resilient materials.

ground thread A ground thread finished on the flanks by a grinding operation.

H

half dog point The same as a dog point but half as long; used on short screws for the same purposes as the dog point, but in shallower hole or slot.

hardenability In a ferrous alloy, the property that determines the depth and distribution of hardness induced by quenching.

hardening A method of heat treating metals by heating to a temperature within, or above, the critical range, holding at that temperature for a given time, and then cooling rapidly, usually by quenching in oil or water.

hardness Resistance to plastic deformation by indentation, penetration, scratching or bending.

head The head of a fastener is the enlarged shape preformed on one end of a headed fastener to provide a bearing surface of the head.

head angle The head angle is the included angle of the bearing surface of the head.

head diameter The head diameter is the diameter at the largest periphery of the head.

head eccentricity Head eccentricity is the amount that the head of a fastener is eccentric with the fastener body or shank.

head height For a flat bearing surface head, the head height is the overall distance, measured parallel to the fastener axis, from the extreme top to the bearing surface. For a conical bearing surface head the head height is the overall distance, measured in a line parallel to the fastener axis from the extreme top to the intersection of the bearing surface with the extended thread major diameter cylinder on a threaded fastener or with the shank on an unthreaded fastener. For flat and oval undercut heads, it is this distance measured to the intersection of the bearing surface with the undercut. For oval heads and undercut oval heads, the overall distance is referred to as total head height.

head length For rectangular or irregular shaped heads, the head length is the distance along the longest axis of the head, measured in a plane perpendicular to the axis of the fastener.

head taper Head taper is the angle formed by the side or sides of the head and the axis of the fastener. This is not applicable to conventional countersunk heads and should not be confused with the head angle.

head mark Used in bolt manufacturing to identify the fastener. It frequently includes such details as: manufacturer's symbol, basic part number of the fastener, its grip length and diameter, as well as a letter code for material and self-locking device, as appropriate.



Fastener Glossary

head width The head width is the distance across opposite flats of hexagon, square or twelve-point heads measured in a plane perpendicular to the fastener axis. For rectangular or irregular shaped heads the head width is the distance along the narrowest axis of the head measured in a like manner.

headed fastener A headed fastener is a fastener having one end enlarged or preformed.

headed and threaded rod A headed and threaded rod is a fastener similar to a machine screw except that it has a very much greater length. It has a round truss, or flat head and an end threaded for a nut.

header A header is a specialized for of horizontal press.

header point A header point is a chamfered point normally produced during the heading operation. The screw blank is chamfered before threads are rolled. It is applied to machine screws in certain sizes and lengths.

heading Heading is a manufacturing process involving the use of a header. This process may or may not involve upsetting or extruding. A part made from wire below the recrystallization temperature is said to be cold headed whereas parts made from wire above the recrystallization temperature are said to be hot headed.

headless A headless threaded fastener is a fastener normally having a slot, recess, or socket in one end.

headless fastener A headless fastener is a fastener, either threaded or unthreaded which does not have either end enlarged.

heat treating An operation involving the heating and cooling of a metal to obtain desirable conditions or properties.

height of thread The distance, measured perpendicular to the axis, between the major and minor cylinders or cones, respectively.

hexagon head Flat top surface with hexagonal sides and with a flat bearing surface.

hex socket A hexagonal recess in the head of a cap or a set screw in which the sides of the recess are parallel to the body axis, into which a wrench fits.

high strength fastener A high strength fastener is a fastener having high tensile and shear strengths attained through combinations of materials, work-hardening, and heat treatment.

hot forming Working operations such as bending and drawing sheet and plate, forging, pressing, and heading, performed on metal heated to temperatures above room temperature.

I

immunize To remove small particles of iron or grit from the surface of stainless steel by pickling in an acid solution.

impact test A test to determine the energy absorbed in fracturing a test bar at high velocity. The test may be in tension or in bending, or it may properly be a notch test if a notch is present, creating multiaxial stresses.

incomplete thread This is also known as the vanish or washout thread. On straight threads, the incomplete thread is that portion at

the end having roots not fully formed by the lead or chamfer on threading tools. On the taper threads, the crest at the end may also be not fully formed due to the intersection of the major cone of an external thread or the minor cone of an internal thread with the cylindrical surface of the work.

included angle of thread The angle between the flanks of the thread measured in an axial plane.

inclusions Inclusions are particles of non-metallic impurities contained in material.

interference fit A thread fit having limits of size so prescribed that an interference always results when mating parts are assembled.

internal thread A thread on the internal surface of a hollow cylinder or cone.

J

jam nut (1) A second nut forced or jammed against the main nut to prevent loosening. (2) A thin nut.

K

knurling Knurling is the process of producing a roughened surface by means of a specialized forming tool called a knurl.

L

laps Laps are surface defects caused by folding over fins or sharp corners into the surface of the material.

left-hand thread A thread is a left-handed thread, if, when viewed axially, it winds in a counterclockwise and receding direction. All left-hand threads are designated LH.

length The length of a headed fastener is the distance from the intersection of the largest diameter of the head with the bearing surface to the extreme point, measured in a line parallel to the axis of the fastener. Exceptions: The length of a shoulder screw and a socket head shoulder screw is the length of the shoulder. The length of a flat top countersunk head tubular rivet (with chamfered top) is measured from the intersection of the bearing surface with the shank diameter to the extreme point. The length of a headless fastener is the distance from one extreme point to the other, measured in a line parallel to the axis of the fastener.

length of thread engagement The length of thread engagement of two mating threads is the distance between the extreme points of contact on the pitch cylinders or cones, measured parallel to the axis.

lock nut There are two basically different types of lock nuts; (1) a prevailing torque type which resists relative bolt-nut movement with or without an axially applied load to the bolt-nut combination, and (2) a free-running type which exhibits a locking ability when there is an axial load applied to the base of the nut. The "locking" or stopping action of the nut is accomplished by thread deformation, or clamping, or by the addition of non-metallic inserts. The free-running type usually has a design feature which adds to the elastic elongation of the bolt-nut combination.



Fastener Glossary

low carbon steel Generally considered to be steels with .08% - .30% carbon content and no other significant alloying elements. Not through hardenable. Used for low strength machine screws, bolts, nuts, washers. Designated by the number 10 for plain carbon steel, followed by two digits indicating the carbon content in 100ths of a percent. Example: 1018 (.18% carbon).

M

machining Machining is the process of forming the surface by cutting away material.

major diameter On a straight thread, the diameter of the coaxial cylinder which would pass through the crests of an external thread or the roots of an internal thread.

maximum material condition The maximum material condition of a feature of a fastener means the maximum amount of material permitted by the tolerance shown for that feature (abbreviated MMC).

maximum material limit The maximum limit of size of an external dimension or the minimum limit of size of an internal dimension.

mechanical properties Mechanical properties are those properties which involve a relationship between strain and stress.

milled from the bar Milled from the bar fastener machined from bar stock on a lathe, screw machine, etc.

miniature screw A miniature screw is a screw less than 0.06 in. in diameter, having a slotted head, and threaded for assembly with a preformed internal thread.

minor diameter On a straight thread, the minor diameter is the diameter of the coaxial cylinder which would pass through the roots of an external thread.

N

nail point A nail point is a sharp pyramidal point generally having a point angle of 30 to 45 degrees, and is produced by a pinching operation. It is designed for piercing wood or other resilient materials.

neck Neck is used to define: (1) a specialized form of a portion of the body of fasteners near the head to perform a definite function, such as preventing rotation, etc.; and (2) a reduced diameter of a portion of the shank of a fastener which is required for design or manufacturing reasons.

needle point A needle point is a cone point of long length intended to perform a piercing function.

nitriding A surface hardening process used on ferrous metals by heating the metal in contact with ammonia gas or other nitrogenous material.

nominal diameter The designation used for the purpose of general identification.

nominal size The nominal size is the designation used for the purpose of general identification.

non-ferrous metal Metals or alloys without an appreciable amount of iron. Examples are aluminum, brass, copper, etc.

nonstandard fastener A nonstandard fastener is a fastener which differs in size, length, material, or finish from established and published standards.

normalize To remove internal stresses by heating a metal piece to its critical temperature and allowing it to cool very slowly.

nut A nut is block or sleeve having an internal thread designed to assemble with the external thread on a bolt, screw, or other threaded part. It may serve as a fastening means, an adjusting means, a means for transmitting motion, or a means for transmitting power with a large mechanical advantage and non-reversible motion.

nut thickness Nut thickness is the overall distance from the top of the nut to the bearing surface, measured parallel to the axis of the nut.

O

oiled Oiled is the term denoting the application of a suitable corrosion retarding oil to a fastener.

P

pan head Flat top surface rounded into cylindrical sides, and a flat bearing surface. The recessed pan head has a rounded top surface blending into cylindrical sides and flat bearing surface.

passivating Passivating is the process of dissolving ferrous particles and surface impurities from stainless steel by chemical means (normally a nitric acid dip) and to produce a passive film on the surface. The purpose is to improve the corrosion resistance of the surface.

physical properties Physical properties are the properties defining the basic characteristics of the material or fastener.

pickling Pickling is the process of removing surface oxides or impurities by chemical or electrochemical means.

pilot point A pilot point is a cylindrical point having a diameter. It is designed to facilitate the alignment and starting of such fasteners as drive screws and groove pins into holes at assembly.

pin A pin is a straight cylindrical or tapered fastener, with or without a head, designed to perform a semi-permanent attaching or locating function.

pinch point A pinch point is a short sharp cone point, usually having a point angle of 45 degrees, formed by a pinching operation. This point is normally limited to diameters of 1/4 inch or smaller and is applied to metal drive screws, and Type BP tapping screws.

pipe screw thread American Standard pipe threads are tapered 1 inch in 16, or 3/4 inch per foot. They are 60 degree threads, of National form with flat or rounded top and bottom.

pitch The distance; measured parallel to fastener axis, between corresponding points on adjacent thread forms in the same axial plane and on the same side of the axis.

pitch diameter On a straight thread, the diameter of the coaxial cylinder, the surface of which would pass through the thread profiles at such points as to make the width of the groove equal to one-half of the basic pitch. On a perfect thread this occurs at the point where the widths of the thread and groove are equal.



Fastener Glossary

pitch line A generator of the cylinder or cone of a screw thread specified in the definition of pitch diameter.

pits Pits are sharp depressions on the surface of a raw material or fastener.

plain Plain as applied to finish of fasteners is used to indicate that the fastener has had no supplementary surface treatment, such as plating, coating, etc., other than being oiled.

plain point The term plain point is applied to the end of a fastener cut approximately flat and perpendicular to the fastener axis. These points on threaded fasteners may be slightly concave especially when threads are rolled.

plain sheared point The end of a fastener cut approximately flat and square to the axis, without chamfer.

plating Plating is the application of a metallic deposit on the surface of the fastener by electrolysis, impact or other suitable means.

plating build up Plating build up is the term used to describe the disposition of more plating on edges or corners than on the other surfaces of the fastener.

point The point of a fastener is the configuration of the end of the shank of a headed fastener or of each end of a headless fastener.

point angle The point angle is the included angle of the point.

point diameter The point diameter is the diameter of the point measured at the extreme end of the fastener. It may sometimes be designated as "Chamfer Diameter" or "Pilot Diameter" on respective point types.

point length The point length is the length of the pointed portion of the fastener, measured parallel to the axis of the fastener from the extreme end. It may sometimes be designated as "Chamfer Length" or "Pilot Length" on respective point types.

point radius The point radius is the spherical radius on an oval or spherical point.

pointing Pointing is a secondary machine operation consisting of cutting points on fastener blanks which were not pointed during the heading operation.

polishing Polishing is the process of producing a smooth surface by rubbing with fine abrasive wheels, belts or compounds.

punching Punching is the process of trimming or removing material with dies in a press.

Q

quality Quality denotes the suitability of a fastener for the purpose for which it is intended. Quality should not be confused with precision or workmanship as it is possible that precision parts of good workmanship and finish can be of poor quality if they fail to perform the function for which they are intended. Also for countless applications good quality parts do not require precision or fine finish to serve satisfactorily.

quench hardening Hardening a ferrous alloy by austenitizing and then cooling rapidly enough so that some or all of the austenite transforms to martensite.

quenching Rapid cooling. when applicable, the following more specific terms should be used; direct quenching, fog quenching,

hot quenching, interrupted quenching, selective quenching, spray quenching, and time quenching.

R

radius An arc at the junction of two intersecting plane surfaces. May be internal, as in head-to-shank fillet radius, or external, as at the head surface of a brazier-head fastener.

ream To finish a drilled or punched hole very accurately with a rotating fluted tool of the required diameter.

reamer Tool used for enlarging holes previously formed by drilling or boring.

recess A manufactured groove, slot, depression or other geometric form, usually in the heads of countersunk screws, through which torque is applied by the use of a mating driver.

recess depth The recess depth is the distance measured parallel to the fastener axis from the intersection of the head surface with the maximum diameter of the recess to the bottom of the recess.

recess diameter The recess diameter is the diameter measured in a plane perpendicular to the axis of the fastener over the intersection of the outermost extremities of the recess with the head surface.

recess eccentricity Recess eccentricity is the amount that a recess in a recessed head is eccentric with the shank of the fastener.

recess width The recess width is the distance measured in a plane perpendicular to the axis of the fastener across the intersection of the sides or wings of the recess with the head surface.

recessed head A recessed head is a head having a specially formed indentation or recess centered on its top surface. Two common forms of recess heads are the "Cross Recess" and "Clutch Recess."

reduced diameter body A reduced diameter body is a body the diameter of which may range from the minimum pitch diameter to the minimum major diameter of the thread and is common on screws having rolled heads. Sometimes referred to as "undersize body," which term is not recommended.

reference dimension A reference dimension on a fastener is a dimension without tolerance used for information purposes only.

relief The amount one plane surface of a piece is set below or above another plane, usually for clearance or for economy in machining.

ribbed neck A ribbed neck is a style of neck consisting of longitudinal ribs around the shank adjacent of the underside of the head.

ribs Ribs are small ridges of material usually formed longitudinally around the shank.

right-hand thread A thread is a right-hand thread if, when viewed axially, it winds in a clockwise and receding direction. All threads are right-hand threads unless otherwise designated.

rivet A rivet is a headed metal fastener of malleable material used to join parts of structures and machines by inserting the shank through the aligned holes in each piece and forming a head on the headless end by upsetting.



Fastener Glossary

riveting burr A riveting burr is a small plain washer which is assembled with a small rivet before peening the end to provide a large area of contact on the part.

rockwell hardness test A measure of hardness by determining the depth of penetration of a penetrator into the specimen under certain fixed conditions of test. The penetrator may be either a steel ball or a diamond sphero-conical penetrator. The hardness number is related to the depth of indentation and the higher the number the harder the material.

roll threading Applying a thread to a bolt or screw by rolling the piece between two grooved die plates, one of which is in motion, or between rotating grooved circular rolls.

rolled point The point frequently produced by the cupping of the last 1 to 1 1/2 threads by the thread rolling pressure. This type of point is not produced intentionally but is considered as an alternative form of the plain sheared point.

rolled thread A rolled thread is a thread produced by the action of a form tool which when pressed into the surface of a blank displaces material radially.

root That surface of the thread which joins the flanks of adjacent thread forms and is identical with or immediately adjacent to the cylinder or cone from which the thread projects.

root truncation The root truncation of a thread is the distance, measured perpendicular to the axis, between the sharp root (or root apex) and the cylinder or cone that bounds the root.

round head Semi-elliptical top surface and flat bearing surface.

runout Runout is a term frequently used interchangeable with eccentricity but which normally refers to the amount which the outside surface of one component of a fastener runs out with respect to the outside surface of another component. As such it includes eccentricity, angularity and bow. The amount of runout is usually expressed in terms of Total Indicator Reading (TIR).

S

SAE specifications Standards developed by the Society of Automotive Engineers, Inc.

SAE standard screw threads The SAE Screw Thread Standard, as revised in 1954, conforms with the Unified and American Standard (ASA B1.1-1949).

scale Scale is an oxide of iron sometimes formed on the surfaces of hot headed or forged fasteners.

screw stock Screw stock is metal in the form of wire or rod which is used for making screw machine parts. Usually it is of a free machining type of material.

screw thread chasers Cutting tools having teeth spaced to match the pitch of the threads to be cut.

screws A screw is an externally threaded fastener.

semi-finished fastener A semi-finished fastener is a fastener made to the same basic dimensions as a finished fastener but having greater tolerances on most dimensions and only the bearing surface and threads finished. (See Finished Fastener, Unfinished Fastener).

sems This is a preassembled screw and washer unit in which

the washer is retained free to rotate under the screw head by the rolled thread. These units expedite assembly operations and assure the presence of a washer in each assembly. They are generally available in various combinations of head styles and washer types.

serrations Ridges underneath the head of a fastener that help as a locking element.

shank The shank is that portion of a headed fastener which lies between the head and the extreme point.

shaving Shaving is a cutting operation in which thin layers of material are removed from the outer surfaces of the product.

shear fastener A shear fastener is a fastener whose primary function is to resist forces which tend to shear it.

shear strength The stress required to produce fracture when impressed vertically upon the cross-section of a material. Expressed in psi.

shoulder A shoulder is an enlarged portion of the body of a threaded fastener or shank of an unthreaded fastener.

single thread A single-start thread having lead equal to the pitch.

sliver A sliver is an irregular shaped piece of metal clinging loosely to the finished fastener.

slot depth The slot depth on a headed fastener is the distance measured parallel to the axis of the fastener from the highest part of the head to the intersection of the bottom of the slot with the head or bearing surface. The slot depth on a nut or headless fastener is the distance measured parallel to the fastener axis from the top surface to the extreme bottom of the slot.

slot eccentricity Slot eccentricity is the amount that a slot in a slotted head is eccentric with the body of the fastener.

slot width The slot width is the distance measured in a plane perpendicular to the axis of the fastener over the intersection of the sides of the slot with the head surface of a headed fastener or top surface of a nut.

slotted head A slotted head is a head having a slot centered across its top surface.

slotted nut A hexagon nut having opposed slots at the end opposite to the bearing face which are perpendicular to the axis, designed for insertion of a cotter to secure the nut in place when used with a drilled fastener.

slotting Slotting is the process of forming or cutting the slot on the head of a fastener during either the primary or secondary operation.

T

taper The angle between one side and the axis of the fastener. May refer to head, shank or some other feature of a fastener.

temper The state of a metal or alloy involving its structure and mechanical properties. Temper varies from the annealed temper (soft) to spring temper.

tensile strength In tensile testing, the ratio of maximum load of a material coupon or component at failure to its original cross-sectional area.



Fastener Glossary

tension fastener A fastener whose primary function is to resist forces that tend to elongate it.

thread A ridge of uniform section in the form of a helix on the external or internal surface of cylinder. This is known as a straight or parallel thread, to distinguish it from a taper thread that is formed on a cone.

threaded fastener A fastener a portion of which has some form of screw thread.

tolerance The total permissible variation of a size. The tolerance is the difference between the limits of size.

torsion Twisting force applied to a fastener during tightening.

total thread Includes the complete or effective thread and the incomplete thread.

toughness The ability of a material to absorb considerable energy without fracturing.

trimming The process of shaping or sizing by forcing a part through a die of desired size and shape.

truncate To cut off at the apex.

truncation The axial or centerline length by which the apex is cut off.

tumbling The process of cleaning or abrading parts in a rotating container, either with or without cleaning or abrasive materials.

U

undercut head For short lengths of flat and oval head machine screws, the heads are undercut to 70 percent of normal side height to afford greater length of thread on the screws.

underhead fillet An underhead fillet is the fillet at the junction of the head and shank of a headed fastener.

under-size body The reduced body of a bolt or screw, the diameter of which may range from below the pitch diameter to the minimum major diameter of the thread. Such a body diameter is found on some bolts or screws having roller threads.

unfinished fastener An unfinished fastener is a fastener made to the same basic dimensions as a finished fastener but having relatively wider tolerances than a finished fastener and having all surfaces in their formed condition. (See Finished Fastener, Semi-Finished Fastener).

upsetting Upsetting is the process of increasing the cross sectional area by displacement of material longitudinally and radially

V

voids Voids are internal fissures in ferrous materials. They are sometimes called "chrome checks," "fish eyes," "shatter cracks" and "snow flakes."

W

washer A washer is a part usually thin, having a centrally located hole or partial slot. The washer performs various functions when assembled between the bearing surface of a fastener and the part being attached. Insulation, lubrication, spanning of large clearance

holes, and improved stress distribution are a few design uses.

washer face A washer face is a circular boss on the bearing surface of a bolt or nut.

width across the corner The width across corners of a hex, square or rectangular shaped fastener is the distance measured perpendicular to the axis of the fastener from the intersection at two sides of the intersection of the two opposite sides.

width across the flat The width across flats of hex or square heads of fasteners is the distance measured perpendicular to the fastener axis across opposite sides of the fastener.

work hardness Hardness developed in metal as a result of cold working.

wrenching The transmission of torque to a fastener by means of a tool.

Y

yield point The stress necessary to produce an elongation under load of 0.50 percent of the specimen's original length. Expressed as psi.

yield strength The stress at which a material exhibits a specified limiting set, commonly taken by the offset method as 0.20 percent of the specimen's original length. Expressed as psi.



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