



MASTER ONE-STEPPERS®

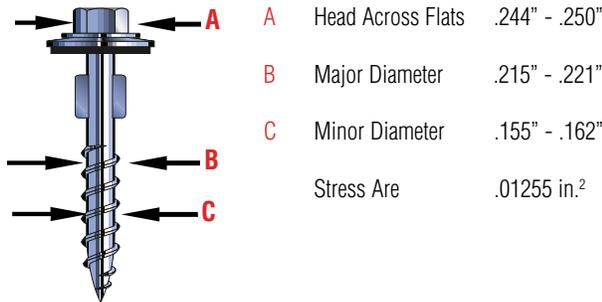
THERMAL EXPANSION FASTENERS

TECHNICAL DATA

CARBON STEEL & 304 HT3 HIGH TENSILE STAINLESS STEEL

12-11 HEX WASHER HEAD ONE STEPPER

DIMENSIONAL PROPERTIES



A	Head Across Flats	.244" - .250"
B	Major Diameter	.215" - .221"
C	Minor Diameter	.155" - .162"
	Stress Area	.01255 in. ²

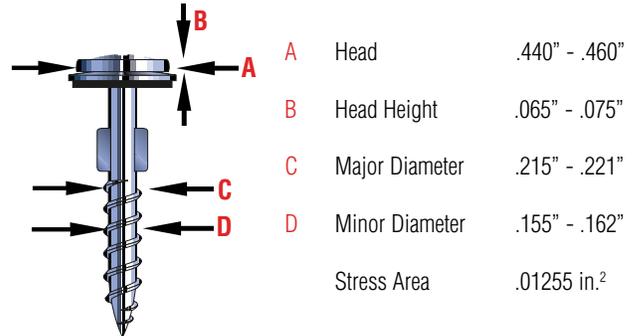
STANDARD MECHANICAL REQUIREMENTS

FOR LELAND AVERAGE VALUES SEE PAGE 23

	Carbon	304 Stainless
Minimum Tensile Strength	3500 lbs.	2290 lbs.
Minimum Torsional Strength	90 in.-lbs.	60 in.-lbs.
Minimum Shear Strength	2100 lbs.	1370 lbs.

12-11 LOW PROFILE PANCAKE ONE STEPPER

DIMENSIONAL PROPERTIES



A	Head	.440" - .460"
B	Head Height	.065" - .075"
C	Major Diameter	.215" - .221"
D	Minor Diameter	.155" - .162"
	Stress Area	.01255 in. ²

STANDARD MECHANICAL REQUIREMENTS

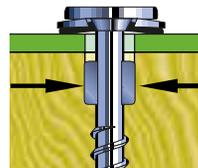
FOR LELAND AVERAGE VALUES SEE PAGE 23

	Carbon	304 Stainless
Minimum Tensile Strength	3500 lbs.	2290 lbs.
Minimum Torsional Strength	90 in.-lbs.	60 in.-lbs.
Minimum Shear Strength	2100 lbs.	1370 lbs.

REFER TO PAGE 8 FOR PULL-OUT STRENGTH TECHNICAL DATA

FASTENER SELECTION GUIDE

DESCRIPTION	THREAD LENGTH	MAXIMUM PANEL THICKNESS
12 x 1-1/4"	3/4"	0.100
12 x 1-1/2"	1"	0.100
12 x 1-3/4"	1"	0.250
12 x 2"	1-1/4"	0.375
12 x 2-1/4"	1-1/4"	0.500
12 x 2-1/2"	1-1/4"	0.750



Master One Steppers drill a .280 expansion hole - allowing for .100 expansion of substrate

SHEAR STRENGTH - SEE INSIDE BACK COVER

DEFINITIONS RELATING TO TEST REPORTS

TENSILE STRENGTH

The maximum load sustained in axial stress expressed in pounds per square inch (p.s.i.).

TORQUE

Force exerted, multiplied by the distance through which the force acts expressed in inch-pounds, foot-pounds or Newton meters.

STRESS

Force per unit area (pounds per square inch, kilograms per square millimeter).

SHEAR

A force acting perpendicular to the bolt axis. Failure due to shear force is similar to a cutting action.

Master Seal is a registered trademark of Aztec Washer Company, Inc.
All test results and suggestions are based on laboratory tests. Specific job site conditions should be taken into consideration when specifying the proper fasteners. Because applications vary, we assume no liability for use of this information.



MASTER ONE-STEPPERS®

THERMAL EXPANSION FASTENERS

TECHNICAL DATA

Pull-Out Strength at 1" Effective Penetration Excluding Point* Effect (add safety factor for structural design)

WOOD				Pull-out force at 1" Effective Penetration (No Predrilled Hole)								
				#10 Master Gripper #10 Nylon MG #10 Pancake MG #10 mini Drill Point MG Carbon & Stainless Steel			#12 Master Gripper #12 Stitch MG #12 Truss Quadrex MDP #12 Diaphragm MG #12 Master One Steppers			#14 Master Gripper		
COMMON NAME	DENSITY APPROX (lbs/cu.ft)	SPECIFIC GRAVITY (kgs/litre)	REMARKS	POINT EFFECT (inch)	MIN. FORCE (lbs)	AVER. FORCE (lbs)	POINT EFFECT (inch)	MIN. FORCE (LBS)	AVER. FORCE (lbs)	POINT EFFECT (inch)	MIN. FORCE (lbs)	AVER. FORCE (lbs)
Douglas Fir	23	0.400	Kiln Dry Construction	0.37	600	670	0.30	650	725	0.33	575	660
Douglas Fir	35	0.560	Air Dry Structural	0.31	825	870	0.27	1060	1150	0.30	875	960
Douglas Fir	32	0.510	Kiln Dry Furniture	0.32	880	960	0.32	975	1080	0.40	1060	1160
Ponderosa Pine	35	0.560	CCA Pressure Treated	0.37	725	830	0.30	1150	1350	0.27	675	800
Spruce Fine Fir	25	0.400	S Dry Construction	0.29	625	660	0.30	900	960	0.29	700	790
Canadian SPF	30	0.480	S Dry Construction	0.29	730	820	0.30	910	990	0.32	820	930
Southern Yellow	33	0.530	CCA Pressure Treated	0.26	770	840	0.24	875	960	0.28	930	1030
Yellow Pine	47/37	0.750/600	Kiln Dry Furniture	0.22	1180	1320	0.28	1140	1270	0.35	1440	1510

Point Effect: is the maximum penetration depth that gives a pull out force equal to zero.

Pull-Out Strength No Point Effect - Points are Cleared (add safety factor for structural design)

PLYWOOD / OSB *					Pull-out force at 1" Effective Penetration (No Predrilled Hole)									
					Master Gripper 10-12 Steel		Master Gripper Mini Drill Point 10-12 Steel		Master Gripper 14-10 Steel		Master One Stepper #12-Steel/Stainless Master Diaphragm 12-11 Steel		Master Gripper Mini Drill Point 12-14 Steel	
COMMON NAME	DENSITY APPROX.	SPECIFIC GRAVITY	USE	THICK-NESS	MIN. FORCE	AVER. FORCE	MIN. FORCE	AVER. FORCE	MIN. FORCE	AVER. FORCE	MIN. FORCE	AVER. FORCE	MIN. FORCE	AVER. FORCE
	(lbs/cu.ft)	(kgs/litre)		(INCH)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)
Canadian Spruce (4 plys)	29.21	0.468	Exterior	1/2	200	230			250	270	200	240		
Canadian Spruce (5 plys)	29.40	0.471	Exterior	5/8	300	340			350	420	350	380		
Canadian Spruce (6 plys)	30.80	0.493	Exterior	3/4	400	480	425	465	450	530	450	460		
Plywood USA (5 plys)	29.09	0.465	Interior	1/2	250	260			300	330	250	320		
Plywood - USA (5 plys)	31.37	0.502	Interior	3/4	400	510	400	340	450	570	500	530		
OSB *	32.77	0.524	Interior	1/4	125	170							100	140
OSB *	36.32	0.581	Interior	7/16	175	200							200	220
OSB *	37.85	0.606	Interior	19/32	225	245							275	310
OSB *	36.67	0.587	Interior	3/4	275	300	325		300	310	300	335	350	380

* OSB - ORIENTED STRAN BOARD

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