

Yield Limit Analysis of a Bolt (D >= .25")

2005 NDS

Input Data:	Diameter of Bolt, D	0.25 in
	Reduced Diameter, Dr (lag screws)	0.173 in
Member is a Lag Screw?	Yes	
	Side Member	
Number of side members	1	
	Is the side member steel?	Yes
Thickness of Wood Side Member	0 in	
	Thickness of Steel Side Member	0.375 in
Width	15 in	
	Angle of Load to Grain	0 deg
Specific Gravity of Wood Side Member	0	
	Steel Side Member Fu	87000 psi
Fe.	0 psi	
	Fe.perp	0 psi
Dowel Bearing Strength, Side Mem, Fe.s	87000 psi	
	Es	29000000 psi
Thickness	0.38 in	
	Main Member	
Is the main member concrete?	No	
	Thickness of Main Member	3.5 in
Width	16 in	
	Angle of Load to Grain	90 deg
Specific Gravity of Wood Main Member	0.5	
	Fe.	5600 psi
Fe.perp	5368 psi	
	Dowel Bearing Strength, Main Mem, Fe.m	5368 psi
Dowel Bearing Strength of Concrete	7500 psi	
	Use Dowel Bearing Strength	5368 psi
Em	1900000 psi	
	Fastener Bending Yield Strength, Fyb	70000 psi

Spacing Data:	Number of bolts in a row	4
	Number of Rows	1
	Total number of bolts	4
	L/D	1.5

C-C Spacing in the row	Actual	Required	Min	Cdelta
to grain	12	1	0.75 in	1
+ to grain	4	0.375	0.75 in	1

Row Spacing	Actual	Required
to grain	12	0.375 in
+ to grain	4	0.625 in

End Distance	Actual	Required	Min	Cdelta
to grain, compression	3	1	0.5 in	1
to grain, tension	3	1.75	0.875 in	1
+ to grain	2	1	0.5 in	1

Edge Distance	Actual	Required
to grain	2	0.375 in
+ to grain, loaded edge	2	1 in
+ to grain, unloaded edge	2	0.375 in

Determination of Group Action Factor, Cg (NDS 10.3.6)

EsAs	163.1E+6
EmAm	106.4E+6
Rea	0.652
gamma	33750
u	1.003
m	0.9238

Cg 0.993

Computed Values

D	0.173 in				
Fyb	70000 psi				
Fes	87000 psi				
Fem	5368 psi				
ls	0.38 in		Rd		
lm	3.5 in	Mode 1m	5		lb/bolt
Re	0.0617	Mode ls	5		lb/bolt
Rt	9.333	Mode ll	4.5		lb/bolt
k1	0.255	Mode llIm	4		lb/bolt
k2	0.465	Mode llIs	4		lb/bolt
k3	5.183	Mode IV	4		lb/bolt
Bolt capacity, Z.ss	114.9 lb/bolt				
Bolt capacity, Z.ds	229.9 lb/bolt				

Note that double shear values assume side members are same thickness and species

Modifiers

General Modifiers	
CM	1.00 (Moisture Factor)
Ct	1.00 (Temperature Factor)
Cdelta	1.00 (Geometry Factor)
Cg	0.99 (Group Action Factor)

ASD Modifiers:	
CD	1.00 (Load Duration Factor)

LRFD Modifiers:	
KF*phi.z	2.16
lamda	0.80

Modified bolt capacity, Z'

	Single	Double
ASD:	114.1	228.3 lb/bolt
LRFD:	197.2	394.4 lb/bolt