

# MERCALLI XII

## Structural Components and Systems

XT Allowable Load Capacity - Paired Installations (lbs)										
XT Device	Bolts (A307)	Rod Size	C <sub>D</sub> LDF	Length of Bolt in Wood Member (in)						
				2.500	3.000	3.125	3.500	5.125	5.500	
XT46-6	4 - 3/4	3/4	1.00	10313	12375	12580	12580	12580	12580	
			1.60	16500	19800	20128	20128	20128	20128	
XT46-8	4 - 3/4	1	1.00	10313	12375	12580	12580	12580	12580	
			1.60	16500	19800	20128	20128	20128	20128	
XT66-8	6 - 3/4	1	1.00	15469	18563	18870	18870	18870	18870	
			1.60	24750	29700	30192	30192	30192	30192	
XT66-9	6 - 3/4	1-1/8	1.00	15469	18563	18870	18870	18870	18870	
			1.60	24750	29700	30192	30192	30192	30192	
XT86-9	8 - 3/4	1-1/8	1.00	20625	24750	25160	25160	25160	25160	
			1.60	33000	39600	40256	40256	40256	40256	
				<b>l/d</b>	3.33	4.00	4.17	4.67	6.83	7.33

Allthread Rod Tensile Capacity Paired Rods (lbs)		
CMF	A36	B7
1.00	19218	41418
0.71	13645	29407
1.00	34164	72372
0.71	24256	51384
1.00	34164	72372
0.71	24256	51384
1.00	43240	93190
0.71	30700	66165
1.00	43240	93190
0.71	30700	66165

1. All allowable load capacities are in lbs, all bolt and rod sizes, as well as bolt lengths are in inches.
2. Allowable load capacities are based upon the 2005 NDS, Section 11.
3. Bolts: A307, Bolt Yield  $F_{yb} = 45,000$  psi (assumed). Wood Member: Douglas Fir - Larch, Specific Gravity  $g = 0.49$ , Dowel Bearing Strength  $f_{em} = 5,500$  psi. XT Base Plate: A36, Dowel Bearing Strength  $f_{es} = 58,000$  psi, Allowable bolt load capacities are for XT installations with a bolt group action factor of  $C_g = 1.00$ , and for bolts loaded parallel to grain, angle  $\theta = 0$  degrees. The Design Engineer shall be responsible for applying the appropriate capacity reductions for XT installations where the group action factor  $C_g$  is less than 1.00, and bolt loading is not parallel to grain. For non-parallel to grain XT installations, see XT Capacity Reduction Factors  $R_g$ .
4. For allowable XT rod compression capacities, see XT Rod Compression Capacity Tables.
5. The Design Engineer shall be responsible for verifying the adequacy of the timber element for the additional loads imposed upon the timber element by the XT's for either single sided or paired installations.
6. LDF = Load Duration Factor  $C_D$ .  $C_D = 1.6$  for wind or earthquake loading.
7. CMF = Capacity Modification Factor =  $1/LF$ .  $LF = 1.4$  per ASCE 7-05 Section 12.11.2.2.2 for the design of steel elements associated with structural wall anchorage systems.
8. Allowable steel strength capacity of the XT's exceeds the above noted allowable load capacities by a factor of 1.4.
9. Allthread rod tensile capacities noted are for a pair of rods (2 rods), and are based on the AISC Manual of Steel Construction, ASD, Thirteenth Edition. Rod Tensile Capacity =  $0.75 \times F_U \times A_N / \Omega$ .  $A_N$  = Rod Nominal Area.  $\Omega$  = Safety Factor = 2.00. A36 refers to ASTM A1554, Grade 36,  $F_U = 58,000$  psi. B7 refers to ASTM A193-B7,  $F_U = 125,000$  psi.
10. The Design Engineer shall be responsible for applying the appropriate Load Factors, Load Duration Factors, and Allowable Stress Increases to the various components associated with an XT installation.
11. To provide for a ductile bolt failure mode it is recommended that  $l/d \geq 4.5$ .
12. Nomenclature - XTnb-r: n = number of bolts, b = bolt size in 1/8 inches, r = rod size in 1/8 inches.