

**BOLT LOAD (METRIC) SOCKET HEAD CAP SCREWS (MATERIAL 1.4541 Mpa=450)
40% - 99% YIELD**



Southwest Texas	West Texas	Main Office	Southeast Texas	Central & East Texas
4802 Baldwin Blvd.	3508 S County Rd 1290	12420 Texaco Rd	2484 W Cardinal #4	7900 Rodeo Trl. #500
Corpus Christi 78408	Odessa, TX 78765	Houston, TX 77013	Beaumont, TX 77705	Mansfield, TX 76063
361-888-5080	432-561-8481	713-453-6677	409-840-9699	682-334-2679

BOLT LOADS

TORQUE GUIDE FOR MATERIAL STANDARD 1.4541						REQUIRED TORQUE (N-m)						
MINIMUM YIELD (Mpa)			450									
BOLT LOAD BASED ON			40			PERCENT YIELD						
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) ²	BOLT LOAD (kN)	LoaDISC TS 801 MOLY K=.109	MOLY DISULFIDE K=.100	MOLY/LEAD OXIDE/GRAPHITE K=.125	COPPER & GRAPHITE K=.140	NICKEL & GRAPHITE K=.150	API SA2 K=.157	MACHINE OIL K=.200	DRY STEEL K=.300	CUSTOM (INSERT K)
												0.109
M20x2.5	30	245	44.07	96	88	110	123	132	138	176	264	96
M22x2.5	32	303	54.61	131	120	150	168	180	189	240	360	131
M24x3	36	353	63.45	166	152	190	213	228	239	305	457	166
M27x3	41	459	82.70	243	223	279	313	335	351	447	670	243
M30x3.5	46	561	100.91	330	303	378	424	454	475	605	908	330
M33x3.5	50	694	124.85	449	412	515	577	618	647	824	1,236	449
M36x4	55	817	147.02	577	529	662	741	794	831	1,059	1,588	577
M39x4	60	976	175.64	747	685	856	959	1,028	1,075	1,370	2,055	747
M42x4.5	65	1121	201.77	924	847	1,059	1,186	1,271	1,330	1,695	2,542	924
M45x4.5	70	1306	235.09	1,153	1,058	1,322	1,481	1,587	1,661	2,116	3,174	1,153
M48x5	75	1473	265.18	1,387	1,273	1,591	1,782	1,909	1,998	2,546	3,819	1,387
M52x5	80	1758	316.42	1,793	1,645	2,057	2,304	2,468	2,583	3,291	4,936	1,793
M56x5.5	85	2030	365.42	2,231	2,046	2,558	2,865	3,070	3,213	4,093	6,139	2,231
M60x5.5	90	2362	425.18	2,781	2,551	3,189	3,572	3,827	4,005	5,102	7,653	2,781
M64x6	95	2676	481.70	3,360	3,083	3,854	4,316	4,624	4,840	6,166	9,249	3,360
M68x6	100	3055	549.97	4,076	3,740	4,675	5,236	5,610	5,872	7,480	11,219	4,076
M72x6	105	3460	622.78	4,888	4,484	5,605	6,278	6,726	7,040	8,968	13,452	4,888
M76x6	110	3889	700.11	5,800	5,321	6,651	7,449	7,981	8,354	10,642	15,962	5,800
M80x6	115	4344	781.96	6,819	6,256	7,820	8,758	9,383	9,821	12,511	18,767	6,819
M90x6	130	5591	1,006.38	9,873	9,057	11,322	12,680	13,586	14,220	18,115	27,172	9,873
M100x6	145	6995	1,259.07	13,724	12,591	15,738	17,627	18,886	19,767	25,181	37,772	13,724
M110x6	155	8556	1,540.04	18,465	16,940	21,176	23,717	25,411	26,596	33,881	50,821	18,465
M125x6	180	11192	2,014.50	27,448	25,181	31,477	35,254	37,772	39,535	50,363	75,544	27,448

TORQUE GUIDE FOR MATERIAL STANDARD 1.4541						REQUIRED TORQUE (N-m)						
MINIMUM YIELD (Mpa)			450	PERCENT YIELD								
BOLT LOAD BASED ON			50									
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) ²	BOLT LOAD (kN)	LoaDISC TS 801 MOLY K=.109	MOLY DISULFIDE K=.100	MOLY/LEAD OXIDE/GRAPHITE K=.125	COPPER & GRAPHITE K=.140	NICKEL & GRAPHITE K=.150	API SA2 K=.157	MACHINE OIL K=.200	DRY STEEL K=.300	CUSTOM (INSERT K)
												0.109
M20x2.5	30	245	55.08	120	110	138	154	165	173	220	330	120
M22x2.5	32	303	68.27	164	150	188	210	225	236	300	451	164
M24x3	36	353	79.32	207	190	238	267	286	299	381	571	207
M27x3	41	459	103.37	304	279	349	391	419	438	558	837	304
M30x3.5	46	561	126.14	412	378	473	530	568	594	757	1,135	412
M33x3.5	50	694	156.06	561	515	644	721	772	809	1,030	1,545	561
M36x4	55	817	183.77	721	662	827	926	992	1,039	1,323	1,985	721
M39x4	60	976	219.55	933	856	1,070	1,199	1,284	1,344	1,713	2,569	933
M42x4.5	65	1121	252.22	1,155	1,059	1,324	1,483	1,589	1,663	2,119	3,178	1,155
M45x4.5	70	1306	293.86	1,441	1,322	1,653	1,851	1,984	2,076	2,645	3,967	1,441
M48x5	75	1473	331.47	1,734	1,591	1,989	2,228	2,387	2,498	3,182	4,773	1,734
M52x5	80	1758	395.53	2,242	2,057	2,571	2,879	3,085	3,229	4,114	6,170	2,242
M56x5.5	85	2030	456.77	2,788	2,558	3,197	3,581	3,837	4,016	5,116	7,674	2,788
M60x5.5	90	2362	531.48	3,476	3,189	3,986	4,464	4,783	5,007	6,378	9,567	3,476
M64x6	95	2676	602.12	4,200	3,854	4,817	5,395	5,780	6,050	7,707	11,561	4,200
M68x6	100	3055	687.47	5,096	4,675	5,843	6,545	7,012	7,339	9,350	14,024	5,096
M72x6	105	3460	778.47	6,109	5,605	7,006	7,847	8,408	8,800	11,210	16,815	6,109
M76x6	110	3889	875.13	7,250	6,651	8,314	9,311	9,976	10,442	13,302	19,953	7,250
M80x6	115	4344	977.45	8,523	7,820	9,774	10,947	11,729	12,277	15,639	23,459	8,523
M90x6	130	5591	1,257.97	12,341	11,322	14,152	15,850	16,983	17,775	22,643	33,965	12,341
M100x6	145	6995	1,573.84	17,155	15,738	19,673	22,034	23,608	24,709	31,477	47,215	17,155
M110x6	155	8556	1,925.05	23,081	21,176	26,469	29,646	31,763	33,246	42,351	63,527	23,081
M125x6	180	11192	2,518.13	34,310	31,477	39,346	44,067	47,215	49,418	62,953	94,430	34,310

TORQUE GUIDE FOR MATERIAL STANDARD 1.4541						REQUIRED TORQUE (N-m)						
MINIMUM YIELD (Mpa)			450	PERCENT YIELD								
BOLT LOAD BASED ON			60									
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) ²	BOLT LOAD (kN)	LoaDISC TS 801 MOLY K=.109	MOLY DISULFIDE K=.100	MOLY/LEAD OXIDE/GRAPHITE K=.125	COPPER & GRAPHITE K=.140	NICKEL & GRAPHITE K=.150	API SA2 K=.157	MACHINE OIL K=.200	DRY STEEL K=.300	CUSTOM (INSERT K)
												0.109
M20x2.5	30	245	66.10	144	132	165	185	198	208	264	397	144
M22x2.5	32	303	81.92	196	180	225	252	270	283	360	541	196
M24x3	36	353	95.18	249	228	286	320	343	359	457	685	249
M27x3	41	459	124.05	365	335	419	469	502	526	670	1,005	365
M30x3.5	46	561	151.37	495	454	568	636	681	713	908	1,362	495
M33x3.5	50	694	187.27	674	618	772	865	927	970	1,236	1,854	674
M36x4	55	817	220.53	865	794	992	1,111	1,191	1,246	1,588	2,382	865
M39x4	60	976	263.47	1,120	1,028	1,284	1,439	1,541	1,613	2,055	3,083	1,120
M42x4.5	65	1121	302.66	1,386	1,271	1,589	1,780	1,907	1,996	2,542	3,814	1,386
M45x4.5	70	1306	352.64	1,730	1,587	1,984	2,222	2,380	2,491	3,174	4,761	1,730
M48x5	75	1473	397.77	2,081	1,909	2,387	2,673	2,864	2,998	3,819	5,728	2,081
M52x5	80	1758	474.64	2,690	2,468	3,085	3,455	3,702	3,875	4,936	7,404	2,690
M56x5.5	85	2030	548.13	3,346	3,070	3,837	4,297	4,604	4,819	6,139	9,209	3,346
M60x5.5	90	2362	637.77	4,171	3,827	4,783	5,357	5,740	6,008	7,653	11,480	4,171
M64x6	95	2676	722.54	5,040	4,624	5,780	6,474	6,936	7,260	9,249	13,873	5,040
M68x6	100	3055	824.96	6,115	5,610	7,012	7,854	8,415	8,807	11,219	16,829	6,115
M72x6	105	3460	934.17	7,331	6,726	8,408	9,416	10,089	10,560	13,452	20,178	7,331
M76x6	110	3889	1,050.16	8,700	7,981	9,976	11,174	11,972	12,530	15,962	23,944	8,700
M80x6	115	4344	1,172.93	10,228	9,383	11,729	13,137	14,075	14,732	18,767	28,150	10,228
M90x6	130	5591	1,509.56	14,809	13,586	16,983	19,020	20,379	21,330	27,172	40,758	14,809
M100x6	145	6995	1,888.60	20,586	18,886	23,608	26,440	28,329	29,651	37,772	56,658	20,586
M110x6	155	8556	2,310.06	27,698	25,411	31,763	35,575	38,116	39,895	50,821	76,232	27,698
M125x6	180	11192	3,021.76	41,171	37,772	47,215	52,881	56,658	59,302	75,544	113,316	41,171

TORQUE GUIDE FOR MATERIAL STANDARD 1.4541						REQUIRED TORQUE (N-m)						
MINIMUM YIELD (Mpa)			450									
BOLT LOAD BASED ON			70			PERCENT YIELD						
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) ²	BOLT LOAD (kN)	LoaDISC TS 801 MOLY K=.109	MOLY DISULFIDE K=.100	MOLY/LEAD OXIDE/GRAPHITE K=.125	COPPER & GRAPHITE K=.140	NICKEL & GRAPHITE K=.150	API SA2 K=.157	MACHINE OIL K=.200	DRY STEEL K=.300	CUSTOM (INSERT K)
												0.109
M20x2.5	30	245	77.11	168	154	193	216	231	242	308	463	168
M22x2.5	32	303	95.58	229	210	263	294	315	330	421	631	229
M24x3	36	353	111.05	290	267	333	373	400	418	533	800	290
M27x3	41	459	144.72	426	391	488	547	586	613	781	1,172	426
M30x3.5	46	561	176.59	577	530	662	742	795	832	1,060	1,589	577
M33x3.5	50	694	218.48	786	721	901	1,009	1,081	1,132	1,442	2,163	786
M36x4	55	817	257.28	1,010	926	1,158	1,297	1,389	1,454	1,852	2,779	1,010
M39x4	60	976	307.38	1,307	1,199	1,498	1,678	1,798	1,882	2,398	3,596	1,307
M42x4.5	65	1121	353.10	1,617	1,483	1,854	2,076	2,225	2,328	2,966	4,449	1,617
M45x4.5	70	1306	411.41	2,018	1,851	2,314	2,592	2,777	2,907	3,703	5,554	2,018
M48x5	75	1473	464.06	2,428	2,228	2,784	3,119	3,341	3,497	4,455	6,683	2,428
M52x5	80	1758	553.74	3,139	2,879	3,599	4,031	4,319	4,521	5,759	8,638	3,139
M56x5.5	85	2030	639.48	3,903	3,581	4,476	5,014	5,372	5,622	7,162	10,743	3,903
M60x5.5	90	2362	744.07	4,866	4,464	5,581	6,250	6,697	7,009	8,929	13,393	4,866
M64x6	95	2676	842.97	5,881	5,395	6,744	7,553	8,092	8,470	10,790	16,185	5,881
M68x6	100	3055	962.46	7,134	6,545	8,181	9,163	9,817	10,275	13,089	19,634	7,134
M72x6	105	3460	1,089.86	8,553	7,847	9,809	10,986	11,771	12,320	15,694	23,541	8,553
M76x6	110	3889	1,225.18	10,149	9,311	11,639	13,036	13,967	14,619	18,623	27,934	10,149
M80x6	115	4344	1,368.42	11,933	10,947	13,684	15,326	16,421	17,187	21,895	32,842	11,933
M90x6	130	5591	1,761.16	17,277	15,850	19,813	22,191	23,776	24,885	31,701	47,551	17,277
M100x6	145	6995	2,203.37	24,017	22,034	27,542	30,847	33,051	34,593	44,067	66,101	24,017
M110x6	155	8556	2,695.07	32,314	29,646	37,057	41,504	44,469	46,544	59,291	88,937	32,314
M125x6	180	11192	3,525.38	48,033	44,067	55,084	61,694	66,101	69,186	88,135	132,202	48,033

TORQUE GUIDE FOR MATERIAL STANDARD 1.4541						REQUIRED TORQUE (N-m)						
MINIMUM YIELD (Mpa)			450									
BOLT LOAD BASED ON			80			PERCENT YIELD						
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) ²	BOLT LOAD (kN)	LoaDISC TS 801 MOLY K=.109	MOLY DISULFIDE K=.100	MOLY/LEAD OXIDE/GRAPHITE K=.125	COPPER & GRAPHITE K=.140	NICKEL & GRAPHITE K=.150	API SA2 K=.157	MACHINE OIL K=.200	DRY STEEL K=.300	CUSTOM (INSERT K)
												0.109
M20x2.5	30	245	88.13	192	176	220	247	264	277	353	529	192
M22x2.5	32	303	109.23	262	240	300	336	360	377	481	721	262
M24x3	36	353	126.91	332	305	381	426	457	478	609	914	332
M27x3	41	459	165.39	487	447	558	625	670	701	893	1,340	487
M30x3.5	46	561	201.82	660	605	757	848	908	951	1,211	1,816	660
M33x3.5	50	694	249.69	898	824	1,030	1,154	1,236	1,294	1,648	2,472	898
M36x4	55	817	294.03	1,154	1,059	1,323	1,482	1,588	1,662	2,117	3,176	1,154
M39x4	60	976	351.29	1,493	1,370	1,713	1,918	2,055	2,151	2,740	4,110	1,493
M42x4.5	65	1121	403.55	1,847	1,695	2,119	2,373	2,542	2,661	3,390	5,085	1,847
M45x4.5	70	1306	470.18	2,306	2,116	2,645	2,962	3,174	3,322	4,232	6,347	2,306
M48x5	75	1473	530.36	2,775	2,546	3,182	3,564	3,819	3,997	5,091	7,637	2,775
M52x5	80	1758	632.85	3,587	3,291	4,114	4,607	4,936	5,167	6,582	9,872	3,587
M56x5.5	85	2030	730.84	4,461	4,093	5,116	5,730	6,139	6,426	8,185	12,278	4,461
M60x5.5	90	2362	850.36	5,561	5,102	6,378	7,143	7,653	8,010	10,204	15,307	5,561
M64x6	95	2676	963.39	6,721	6,166	7,707	8,632	9,249	9,680	12,331	18,497	6,721
M68x6	100	3055	1,099.95	8,153	7,480	9,350	10,472	11,219	11,743	14,959	22,439	8,153
M72x6	105	3460	1,245.56	9,775	8,968	11,210	12,555	13,452	14,080	17,936	26,904	9,775
M76x6	110	3889	1,400.21	11,599	10,642	13,302	14,898	15,962	16,707	21,283	31,925	11,599
M80x6	115	4344	1,563.91	13,637	12,511	15,639	17,516	18,767	19,643	25,023	37,534	13,637
M90x6	130	5591	2,012.75	19,745	18,115	22,643	25,361	27,172	28,440	36,230	54,344	19,745
M100x6	145	6995	2,518.14	27,448	25,181	31,477	35,254	37,772	39,535	50,363	75,544	27,448
M110x6	155	8556	3,080.08	36,930	33,881	42,351	47,433	50,821	53,193	67,762	101,643	36,930
M125x6	180	11192	4,029.01	54,895	50,363	62,953	70,508	75,544	79,069	100,725	151,088	54,895

TORQUE GUIDE FOR MATERIAL STANDARD 1.4541						REQUIRED TORQUE (N-m)						
MINIMUM YIELD (Mpa)			450									
BOLT LOAD BASED ON			90			PERCENT YIELD						
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) ²	BOLT LOAD (kN)	LoaDISC TS 801 MOLY K=.109	MOLY DISULFIDE K=.100	MOLY/LEAD OXIDE/GRAPHITE K=.125	COPPER & GRAPHITE K=.140	NICKEL & GRAPHITE K=.150	API SA2 K=.157	MACHINE OIL K=.200	DRY STEEL K=.300	CUSTOM (INSERT K)
												0.109
M20x2.5	30	245	99.15	216	198	248	278	297	311	397	595	216
M22x2.5	32	303	122.88	295	270	338	378	406	424	541	811	295
M24x3	36	353	142.77	373	343	428	480	514	538	685	1,028	373
M27x3	41	459	186.07	548	502	628	703	754	789	1,005	1,507	548
M30x3.5	46	561	227.05	742	681	851	954	1,022	1,069	1,362	2,043	742
M33x3.5	50	694	280.90	1,010	927	1,159	1,298	1,390	1,455	1,854	2,781	1,010
M36x4	55	817	330.79	1,298	1,191	1,489	1,667	1,786	1,870	2,382	3,573	1,298
M39x4	60	976	395.20	1,680	1,541	1,927	2,158	2,312	2,420	3,083	4,624	1,680
M42x4.5	65	1121	453.99	2,078	1,907	2,383	2,669	2,860	2,994	3,814	5,720	2,078
M45x4.5	70	1306	528.96	2,595	2,380	2,975	3,332	3,570	3,737	4,761	7,141	2,595
M48x5	75	1473	596.65	3,122	2,864	3,580	4,010	4,296	4,496	5,728	8,592	3,122
M52x5	80	1758	711.95	4,035	3,702	4,628	5,183	5,553	5,812	7,404	11,106	4,035
M56x5.5	85	2030	822.19	5,019	4,604	5,755	6,446	6,906	7,229	9,209	13,813	5,019
M60x5.5	90	2362	956.66	6,257	5,740	7,175	8,036	8,610	9,012	11,480	17,220	6,257
M64x6	95	2676	1,083.81	7,561	6,936	8,671	9,711	10,405	10,890	13,873	20,809	7,561
M68x6	100	3055	1,237.44	9,172	8,415	10,518	11,780	12,622	13,211	16,829	25,244	9,172
M72x6	105	3460	1,401.25	10,997	10,089	12,611	14,125	15,134	15,840	20,178	30,267	10,997
M76x6	110	3889	1,575.24	13,049	11,972	14,965	16,761	17,958	18,796	23,944	35,915	13,049
M80x6	115	4344	1,759.40	15,342	14,075	17,594	19,705	21,113	22,098	28,150	42,226	15,342
M90x6	130	5591	2,264.35	22,213	20,379	25,474	28,531	30,569	31,995	40,758	61,137	22,213
M100x6	145	6995	2,832.91	30,879	28,329	35,411	39,661	42,494	44,477	56,658	84,987	30,879
M110x6	155	8556	3,465.09	41,546	38,116	47,645	53,362	57,174	59,842	76,232	114,348	41,546
M125x6	180	11192	4,532.64	61,757	56,658	70,822	79,321	84,987	88,953	113,316	169,974	61,757

TORQUE GUIDE FOR MATERIAL STANDARD 1.4541						REQUIRED TORQUE (N-m)						
MINIMUM YIELD (Mpa)			450									
BOLT LOAD BASED ON			99			PERCENT YIELD						
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) ²	BOLT LOAD (kN)	LoaDISC TS 801 MOLY K=.109	MOLY DISULFIDE K=.100	MOLY/LEAD OXIDE/GRAPHITE K=.125	COPPER & GRAPHITE K=.140	NICKEL & GRAPHITE K=.150	API SA2 K=.157	MACHINE OIL K=.200	DRY STEEL K=.300	CUSTOM (INSERT K)
												0.109
M20x2.5	30	245	109.06	238	218	273	305	327	342	436	654	238
M22x2.5	32	303	135.17	324	297	372	416	446	467	595	892	324
M24x3	36	353	157.05	411	377	471	528	565	592	754	1,131	411
M27x3	41	459	204.68	602	553	691	774	829	868	1,105	1,658	602
M30x3.5	46	561	249.75	817	749	937	1,049	1,124	1,176	1,499	2,248	817
M33x3.5	50	694	308.99	1,111	1,020	1,275	1,428	1,530	1,601	2,039	3,059	1,111
M36x4	55	817	363.87	1,428	1,310	1,637	1,834	1,965	2,057	2,620	3,930	1,428
M39x4	60	976	434.72	1,848	1,695	2,119	2,374	2,543	2,662	3,391	5,086	1,848
M42x4.5	65	1121	499.39	2,286	2,097	2,622	2,936	3,146	3,293	4,195	6,292	2,286
M45x4.5	70	1306	581.85	2,854	2,618	3,273	3,666	3,927	4,111	5,237	7,855	2,854
M48x5	75	1473	656.32	3,434	3,150	3,938	4,410	4,725	4,946	6,301	9,451	3,434
M52x5	80	1758	783.15	4,439	4,072	5,090	5,701	6,109	6,394	8,145	12,217	4,439
M56x5.5	85	2030	904.41	5,521	5,065	6,331	7,091	7,597	7,952	10,129	15,194	5,521
M60x5.5	90	2362	1,052.32	6,882	6,314	7,892	8,840	9,471	9,913	12,628	18,942	6,882
M64x6	95	2676	1,192.20	8,317	7,630	9,538	10,682	11,445	11,979	15,260	22,890	8,317
M68x6	100	3055	1,361.19	10,089	9,256	11,570	12,959	13,884	14,532	18,512	27,768	10,089
M72x6	105	3460	1,541.38	12,097	11,098	13,872	15,537	16,647	17,424	22,196	33,294	12,097
M76x6	110	3889	1,732.76	14,354	13,169	16,461	18,437	19,753	20,675	26,338	39,507	14,354
M80x6	115	4344	1,935.34	16,876	15,483	19,353	21,676	23,224	24,308	30,965	46,448	16,876
M90x6	130	5591	2,490.78	24,435	22,417	28,021	31,384	33,626	35,195	44,834	67,251	24,435
M100x6	145	6995	3,116.20	33,967	31,162	38,952	43,627	46,743	48,924	62,324	93,486	33,967
M110x6	155	8556	3,811.59	45,701	41,928	52,409	58,699	62,891	65,826	83,855	125,783	45,701
M125x6	180	11192	4,985.90	67,933	62,324	77,905	87,253	93,486	97,848	124,647	186,971	67,933