

BOLT LOAD (METRIC) SOCKET HEAD CAP SCREWS (MATERIAL 1.4541 Mpa=210)

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

TORQUE GUIDE FOR MATERIAL STANDARD 1.4541

MINIMUM YIELD (Mpa) 210
 BOLT LOAD BASED ON 40 PERCENT YIELD

BOLT LOADS

REQUIRED TORQUE (N-m)												
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) ²	BOLT LOAD (kN)	LoaDISC TS 801 MOLY K=.109	MOLYBDENUM 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=.440 K=.300	CUSTOM (INSERT) 0.109
M20x2.5	30	245	20.56	45	41	51	58	62	65	82	181	45
M22x2.5	32	303	25.49	61	56	70	78	84	88	112	247	61
M24x3	36	353	29.61	77	71	89	99	107	112	142	313	77
M27x3	41	459	38.59	114	104	130	146	156	164	208	458	114
M30x3.5	46	561	47.09	154	141	177	198	212	222	283	622	154
M33x3.5	50	694	58.26	210	192	240	269	288	302	385	846	210
M36x4	55	817	68.61	269	247	309	346	370	388	494	1,087	269
M39x4	60	976	81.97	348	320	400	448	480	502	639	1,407	348
M42x4.5	65	1121	94.16	431	395	494	554	593	621	791	1,740	431
M45x4.5	70	1306	109.71	538	494	617	691	741	775	987	2,172	538
M48x5	75	1473	123.75	647	594	743	832	891	933	1,188	2,614	647
M52x5	80	1758	147.66	837	768	960	1,075	1,152	1,206	1,536	3,379	837
M56x5.5	85	2030	170.53	1,041	955	1,194	1,337	1,432	1,499	1,910	4,202	1,041
M60x5.5	90	2362	198.42	1,298	1,191	1,488	1,667	1,786	1,869	2,381	5,238	1,298
M64x6	95	2676	224.79	1,568	1,439	1,798	2,014	2,158	2,259	2,877	6,330	1,568
M68x6	100	3055	256.65	1,902	1,745	2,182	2,443	2,618	2,740	3,491	7,679	1,902
M72x6	105	3460	290.63	2,281	2,093	2,616	2,930	3,139	3,285	4,185	9,207	2,281
M76x6	110	3889	326.72	2,707	2,483	3,104	3,476	3,725	3,898	4,966	10,925	2,707
M80x6	115	4344	364.91	3,182	2,919	3,649	4,087	4,379	4,583	5,839	12,845	3,182
M90x6	130	5591	469.64	4,607	4,227	5,283	5,917	6,340	6,636	8,454	18,598	4,607
M100x6	145	6995	587.57	6,404	5,876	7,345	8,226	8,813	9,225	11,751	25,853	6,404
M110x6	155	8556	718.68	8,617	7,906	9,882	11,068	11,858	12,412	15,811	34,784	8,617
M125x6	180	11192	940.10	12,809	11,751	14,689	16,452	17,627	18,450	23,503	51,706	12,809

TORQUE GUIDE FOR MATERIAL STANDARD 1.4541

MINIMUM YIELD (Mpa) 210
 BOLT LOAD BASED ON 50 PERCENT YIELD

BOLT LOADS

REQUIRED TORQUE (N-m)												
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) ²	BOLT LOAD (kN)	LoaDISC TS 801 MOLY K=.109	MOLYBDENUM 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=.440 K=.300	CUSTOM (INSERT) 0.109
M20x2.5	30	245	25.70	56	51	64	72	77	81	103	226	56
M22x2.5	32	303	31.86	76	70	88	98	105	110	140	308	76
M24x3	36	353	37.02	97	89	111	124	133	139	178	391	97
M27x3	41	459	48.24	142	130	163	182	195	204	260	573	142
M30x3.5	46	561	58.86	192	177	221	247	265	277	353	777	192
M33x3.5	50	694	72.83	262	240	300	336	360	377	481	1,057	262
M36x4	55	817	85.76	337	309	386	432	463	485	617	1,358	337
M39x4	60	976	102.46	436	400	499	559	599	627	799	1,758	436
M42x4.5	65	1121	117.70	539	494	618	692	742	776	989	2,175	539
M45x4.5	70	1306	137.14	673	617	771	864	926	969	1,234	2,715	673
M48x5	75	1473	154.69	809	743	928	1,040	1,114	1,166	1,485	3,267	809
M52x5	80	1758	184.58	1,046	960	1,200	1,344	1,440	1,507	1,920	4,223	1,046
M56x5.5	85	2030	213.16	1,301	1,194	1,492	1,671	1,791	1,874	2,387	5,252	1,301
M60x5.5	90	2362	248.02	1,622	1,488	1,860	2,083	2,232	2,336	2,976	6,548	1,622
M64x6	95	2676	280.99	1,960	1,798	2,248	2,518	2,697	2,823	3,597	7,913	1,960
M68x6	100	3055	320.82	2,378	2,182	2,727	3,054	3,272	3,425	4,363	9,599	2,378
M72x6	105	3460	363.29	2,851	2,616	3,270	3,662	3,924	4,107	5,231	11,509	2,851
M76x6	110	3889	408.39	3,383	3,104	3,880	4,345	4,656	4,873	6,208	13,657	3,383
M80x6	115	4344	456.14	3,978	3,649	4,561	5,109	5,474	5,729	7,298	16,056	3,978
M90x6	130	5591	587.05	5,759	5,283	6,604	7,397	7,925	8,295	10,567	23,247	5,759
M100x6	145	6995	734.46	8,006	7,345	9,181	10,282	11,017	11,531	14,689	32,316	8,006
M110x6	155	8556	898.36	10,771	9,882	12,352	13,835	14,823	15,515	19,764	43,480	10,771
M125x6	180	11192	1,175.13	16,011	14,689	18,361	20,565	22,034	23,062	29,378	64,632	16,011

TORQUE GUIDE FOR MATERIAL STANDARD 1.4541												
MINIMUM YIELD (Mpa)		210		BOLT LOADS								
BOLT LOAD BASED ON		60		PERCENT YIELD								
REQUIRED TORQUE (N-m)												
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) ²	BOLT LOAD (kN)	LoaDISC TS 801 MOLY K=.109	MOLYBDENUM 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=.440 K=.300	CUSTOM (INSERT) 0.109
M20x2.5	30	245	30.85	67	62	77	86	93	97	123	271	67
M22x2.5	32	303	38.23	92	84	105	118	126	132	168	370	92
M24x3	36	353	44.42	116	107	133	149	160	167	213	469	116
M27x3	41	459	57.89	170	156	195	219	234	245	313	688	170
M30x3.5	46	561	70.64	231	212	265	297	318	333	424	932	231
M33x3.5	50	694	87.39	314	288	360	404	433	453	577	1,269	314
M36x4	55	817	102.91	404	370	463	519	556	582	741	1,630	404
M39x4	60	976	122.95	523	480	599	671	719	753	959	2,110	523
M42x4.5	65	1121	141.24	647	593	742	831	890	931	1,186	2,610	647
M45x4.5	70	1306	164.56	807	741	926	1,037	1,111	1,163	1,481	3,258	807
M48x5	75	1473	185.63	971	891	1,114	1,247	1,337	1,399	1,782	3,920	971
M52x5	80	1758	221.50	1,255	1,152	1,440	1,612	1,728	1,808	2,304	5,068	1,255
M56x5.5	85	2030	255.79	1,561	1,432	1,791	2,005	2,149	2,249	2,865	6,303	1,561
M60x5.5	90	2362	297.63	1,946	1,786	2,232	2,500	2,679	2,804	3,572	7,857	1,946
M64x6	95	2676	337.19	2,352	2,158	2,697	3,021	3,237	3,388	4,316	9,495	2,352
M68x6	100	3055	384.98	2,853	2,618	3,272	3,665	3,927	4,110	5,236	11,519	2,853
M72x6	105	3460	435.94	3,421	3,139	3,924	4,394	4,708	4,928	6,278	13,811	3,421
M76x6	110	3889	490.07	4,060	3,725	4,656	5,214	5,587	5,848	7,449	16,388	4,060
M80x6	115	4344	547.37	4,773	4,379	5,474	6,131	6,568	6,875	8,758	19,267	4,773
M90x6	130	5591	704.46	6,911	6,340	7,925	8,876	9,510	9,954	12,680	27,897	6,911
M100x6	145	6995	881.35	9,607	8,813	11,017	12,339	13,220	13,837	17,627	38,779	9,607
M110x6	155	8556	1,078.03	12,926	11,858	14,823	16,602	17,787	18,618	23,717	52,176	12,926
M125x6	180	11192	1,410.15	19,213	17,627	22,034	24,678	26,440	27,674	35,254	77,558	19,213

TORQUE GUIDE FOR MATERIAL STANDARD 1.4541												
MINIMUM YIELD (Mpa)		210		BOLT LOADS								
BOLT LOAD BASED ON		70		PERCENT YIELD								
REQUIRED TORQUE (N-m)												
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) ²	BOLT LOAD (kN)	LoaDISC TS 801 MOLY K=.109	MOLYBDENUM 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=.440 K=.300	CUSTOM (INSERT) 0.109
M20x2.5	30	245	35.99	78	72	90	101	108	113	144	317	78
M22x2.5	32	303	44.60	107	98	123	137	147	154	196	432	107
M24x3	36	353	51.82	136	124	155	174	187	195	249	547	136
M27x3	41	459	67.54	199	182	228	255	274	286	365	802	199
M30x3.5	46	561	82.41	269	247	309	346	371	388	494	1,088	269
M33x3.5	50	694	101.96	367	336	421	471	505	528	673	1,480	367
M36x4	55	817	120.06	471	432	540	605	648	679	864	1,902	471
M39x4	60	976	143.44	610	559	699	783	839	878	1,119	2,461	610
M42x4.5	65	1121	164.78	754	692	865	969	1,038	1,087	1,384	3,045	754
M45x4.5	70	1306	191.99	942	864	1,080	1,210	1,296	1,356	1,728	3,801	942
M48x5	75	1473	216.56	1,133	1,040	1,299	1,455	1,559	1,632	2,079	4,574	1,133
M52x5	80	1758	258.41	1,465	1,344	1,680	1,881	2,016	2,110	2,687	5,912	1,465
M56x5.5	85	2030	298.43	1,822	1,671	2,089	2,340	2,507	2,624	3,342	7,353	1,822
M60x5.5	90	2362	347.23	2,271	2,083	2,604	2,917	3,125	3,271	4,167	9,167	2,271
M64x6	95	2676	393.38	2,744	2,518	3,147	3,525	3,776	3,953	5,035	11,078	2,744
M68x6	100	3055	449.15	3,329	3,054	3,818	4,276	4,581	4,795	6,108	13,438	3,329
M72x6	105	3460	508.60	3,992	3,662	4,577	5,127	5,493	5,749	7,324	16,113	3,992
M76x6	110	3889	571.75	4,736	4,345	5,432	6,083	6,518	6,822	8,691	19,119	4,736
M80x6	115	4344	638.60	5,569	5,109	6,386	7,152	7,663	8,021	10,218	22,479	5,569
M90x6	130	5591	821.87	8,063	7,397	9,246	10,356	11,095	11,613	14,794	32,546	8,063
M100x6	145	6995	1,028.24	11,208	10,282	12,853	14,395	15,424	16,143	20,565	45,243	11,208
M110x6	155	8556	1,257.70	15,080	13,835	17,293	19,369	20,752	21,720	27,669	60,873	15,080
M125x6	180	11192	1,645.18	22,416	20,565	25,706	28,791	30,847	32,287	41,129	90,485	22,416

TORQUE GUIDE FOR MATERIAL STANDARD 1.4541												
MINIMUM YIELD (Mpa)		210		BOLT LOADS								
BOLT LOAD BASED ON		80		PERCENT YIELD								
REQUIRED TORQUE (N-m)												
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) ²	BOLT LOAD (kN)	LoaDISC TS 801 MOLY K=.109	MOLYBDENUM 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=.440 K=.300	CUSTOM (INSERT) 0.109
M20x2.5	30	245	41.13	90	82	103	115	123	129	165	362	90
M22x2.5	32	303	50.97	122	112	140	157	168	176	224	493	122
M24x3	36	353	59.22	155	142	178	199	213	223	284	625	155
M27x3	41	459	77.18	227	208	260	292	313	327	417	917	227
M30x3.5	46	561	94.18	308	283	353	396	424	444	565	1,243	308
M33x3.5	50	694	116.52	419	385	481	538	577	604	769	1,692	419
M36x4	55	817	137.22	538	494	617	692	741	776	988	2,174	538
M39x4	60	976	163.93	697	639	799	895	959	1,004	1,279	2,813	697
M42x4.5	65	1121	188.32	862	791	989	1,107	1,186	1,242	1,582	3,480	862
M45x4.5	70	1306	219.42	1,076	987	1,234	1,382	1,481	1,550	1,975	4,344	1,076
M48x5	75	1473	247.50	1,295	1,188	1,485	1,663	1,782	1,865	2,376	5,227	1,295
M52x5	80	1758	295.33	1,674	1,536	1,920	2,150	2,304	2,411	3,071	6,757	1,674
M56x5.5	85	2030	341.06	2,082	1,910	2,387	2,674	2,865	2,999	3,820	8,404	2,082
M60x5.5	90	2362	396.84	2,595	2,381	2,976	3,333	3,572	3,738	4,762	10,476	2,595
M64x6	95	2676	449.58	3,136	2,877	3,597	4,028	4,316	4,517	5,755	12,660	3,136
M68x6	100	3055	513.31	3,805	3,491	4,363	4,887	5,236	5,480	6,981	15,358	3,805
M72x6	105	3460	581.26	4,562	4,185	5,231	5,859	6,278	6,571	8,370	18,414	4,562
M76x6	110	3889	653.43	5,413	4,966	6,208	6,953	7,449	7,797	9,932	21,851	5,413
M80x6	115	4344	729.83	6,364	5,839	7,298	8,174	8,758	9,167	11,677	25,690	6,364
M90x6	130	5591	939.28	9,214	8,454	10,567	11,835	12,680	13,272	16,907	37,196	9,214
M100x6	145	6995	1,175.13	12,809	11,751	14,689	16,452	17,627	18,450	23,503	51,706	12,809
M110x6	155	8556	1,437.37	17,234	15,811	19,764	22,135	23,717	24,823	31,622	69,569	17,234
M125x6	180	11192	1,880.20	25,618	23,503	29,378	32,904	35,254	36,899	47,005	103,411	25,618

TORQUE GUIDE FOR MATERIAL STANDARD 1.4541												
MINIMUM YIELD (Mpa)		210		BOLT LOADS								
BOLT LOAD BASED ON		90		PERCENT YIELD								
REQUIRED TORQUE (N-m)												
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) ²	BOLT LOAD (kN)	LoaDISC TS 801 MOLY K=.109	MOLYBDENUM 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=.440 K=.300	CUSTOM (INSERT) 0.109
M20x2.5	30	245	46.27	101	93	116	130	139	145	185	407	101
M22x2.5	32	303	57.35	138	126	158	177	189	198	252	555	138
M24x3	36	353	66.63	174	160	200	224	240	251	320	704	174
M27x3	41	459	86.83	256	234	293	328	352	368	469	1,032	256
M30x3.5	46	561	105.96	346	318	397	445	477	499	636	1,399	346
M33x3.5	50	694	131.09	472	433	541	606	649	679	865	1,903	472
M36x4	55	817	154.37	606	556	695	778	834	872	1,111	2,445	606
M39x4	60	976	184.43	784	719	899	1,007	1,079	1,129	1,439	3,165	784
M42x4.5	65	1121	211.86	970	890	1,112	1,246	1,335	1,397	1,780	3,915	970
M45x4.5	70	1306	246.85	1,211	1,111	1,389	1,555	1,666	1,744	2,222	4,888	1,211
M48x5	75	1473	278.44	1,457	1,337	1,671	1,871	2,005	2,098	2,673	5,881	1,457
M52x5	80	1758	332.25	1,883	1,728	2,160	2,419	2,592	2,712	3,455	7,602	1,883
M56x5.5	85	2030	383.69	2,342	2,149	2,686	3,008	3,223	3,373	4,297	9,454	2,342
M60x5.5	90	2362	446.44	2,920	2,679	3,348	3,750	4,018	4,205	5,357	11,786	2,920
M64x6	95	2676	505.78	3,528	3,237	4,046	4,532	4,855	5,082	6,474	14,243	3,528
M68x6	100	3055	577.47	4,280	3,927	4,909	5,498	5,890	6,165	7,854	17,278	4,280
M72x6	105	3460	653.92	5,132	4,708	5,885	6,591	7,062	7,392	9,416	20,716	5,132
M76x6	110	3889	735.11	6,090	5,587	6,984	7,822	8,380	8,771	11,174	24,582	6,090
M80x6	115	4344	821.05	7,160	6,568	8,211	9,196	9,853	10,312	13,137	28,901	7,160
M90x6	130	5591	1,056.69	10,366	9,510	11,888	13,314	14,265	14,931	19,020	41,845	10,366
M100x6	145	6995	1,322.02	14,410	13,220	16,525	18,508	19,830	20,756	26,440	58,169	14,410
M110x6	155	8556	1,617.04	19,388	17,787	22,234	24,902	26,681	27,926	35,575	78,265	19,388
M125x6	180	11192	2,115.23	28,820	26,440	33,050	37,017	39,661	41,511	52,881	116,338	28,820

TORQUE GUIDE FOR MATERIAL STANDARD 1.4541				BOLT LOADS								
MINIMUM YIELD (Mpa)		210										
BOLT LOAD BASED ON		99		PERCENT YIELD								
				REQUIRED TORQUE (N-m)								
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) ²	BOLT LOAD (kN)	LoaDISC TS 801 MOLY K=.109	MOLYBDENUM 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=.440 K=.300	CUSTOM (INSERT) 0.109
M20x2.5	30	245	50.90	111	102	127	143	153	160	204	448	111
M22x2.5	32	303	63.08	151	139	173	194	208	218	278	611	151
M24x3	36	353	73.29	192	176	220	246	264	276	352	774	192
M27x3	41	459	95.52	281	258	322	361	387	405	516	1,135	281
M30x3.5	46	561	116.55	381	350	437	490	524	549	699	1,538	381
M33x3.5	50	694	144.20	519	476	595	666	714	747	952	2,094	519
M36x4	55	817	169.81	666	611	764	856	917	960	1,223	2,690	666
M39x4	60	976	202.87	862	791	989	1,108	1,187	1,242	1,582	3,481	862
M42x4.5	65	1121	233.05	1,067	979	1,224	1,370	1,468	1,537	1,958	4,307	1,067
M45x4.5	70	1306	271.53	1,332	1,222	1,527	1,711	1,833	1,918	2,444	5,376	1,332
M48x5	75	1473	306.28	1,602	1,470	1,838	2,058	2,205	2,308	2,940	6,469	1,602
M52x5	80	1758	365.47	2,071	1,900	2,376	2,661	2,851	2,984	3,801	8,362	2,071
M56x5.5	85	2030	422.06	2,576	2,364	2,954	3,309	3,545	3,711	4,727	10,400	2,576
M60x5.5	90	2362	491.08	3,212	2,947	3,683	4,125	4,420	4,626	5,893	12,965	3,212
M64x6	95	2676	556.36	3,881	3,561	4,451	4,985	5,341	5,590	7,121	15,667	3,881
M68x6	100	3055	635.22	4,708	4,320	5,399	6,047	6,479	6,782	8,639	19,006	4,708
M72x6	105	3460	719.31	5,645	5,179	6,474	7,251	7,769	8,131	10,358	22,788	5,645
M76x6	110	3889	808.62	6,699	6,146	7,682	8,604	9,218	9,648	12,291	27,040	6,699
M80x6	115	4344	903.16	7,876	7,225	9,032	10,115	10,838	11,344	14,451	31,791	7,876
M90x6	130	5591	1,162.36	11,403	10,461	13,077	14,646	15,692	16,424	20,923	46,030	11,403
M100x6	145	6995	1,454.23	15,851	14,542	18,178	20,359	21,813	22,831	29,085	63,986	15,851
M110x6	155	8556	1,778.74	21,327	19,566	24,458	27,393	29,349	30,719	39,132	86,091	21,327
M125x6	180	11192	2,326.75	31,702	29,084	36,356	40,718	43,627	45,663	58,169	127,971	31,702

