

# BOLT LOAD (METRIC) SOCKET HEAD CAP SCREWS (MATERIAL GR 4.6)

## 40% - 99% YIELD



<b>Southwest Texas</b>	<b>West Texas</b>	<b>Main Office</b>	<b>Southeast Texas</b>	<b>Central &amp; East Texas</b>
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 ISO R898 GRADE 4.6												
MINIMUM YIELD (Mpa)			240									
BOLT LOAD BASED ON			40 PERCENT YIELD									
<b>BOLT LOADS</b>												
REQUIRED TORQUE (N-m)												
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) <sup>2</sup>	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	23.50	51	47	59	66	71	74	94	207	51
M22x2.5	32	303	29.13	70	64	80	90	96	101	128	282	70
M24x3	36	353	33.84	89	81	102	114	122	128	162	357	89
M27x3	41	459	44.11	130	119	149	167	179	187	238	524	130
M30x3.5	46	561	53.82	176	161	202	226	242	253	323	710	176
M33x3.5	50	694	66.58	240	220	275	308	330	345	439	967	240
M36x4	55	817	78.41	308	282	353	395	423	443	565	1,242	308
M39x4	60	976	93.68	398	365	457	511	548	574	731	1,607	398
M42x4.5	65	1121	107.61	493	452	565	633	678	710	904	1,989	493
M45x4.5	70	1306	125.38	615	564	705	790	846	886	1,128	2,483	615
M48x5	75	1473	141.43	740	679	849	950	1,018	1,066	1,358	2,987	740
M52x5	80	1758	168.76	957	878	1,097	1,229	1,316	1,378	1,755	3,861	957
M56x5.5	85	2030	194.89	1,190	1,091	1,364	1,528	1,637	1,713	2,183	4,802	1,190
M60x5.5	90	2362	226.76	1,483	1,361	1,701	1,905	2,041	2,136	2,721	5,987	1,483
M64x6	95	2676	256.90	1,792	1,644	2,055	2,302	2,466	2,581	3,288	7,234	1,792
M68x6	100	3055	293.32	2,174	1,995	2,493	2,792	2,992	3,131	3,989	8,776	2,174
M72x6	105	3460	332.15	2,607	2,391	2,989	3,348	3,587	3,755	4,783	10,522	2,607
M76x6	110	3889	373.39	3,093	2,838	3,547	3,973	4,257	4,455	5,676	12,486	3,093
M80x6	115	4344	417.04	3,637	3,336	4,170	4,671	5,005	5,238	6,673	14,680	3,637
M90x6	130	5591	536.73	5,265	4,831	6,038	6,763	7,246	7,584	9,661	21,255	5,265
M100x6	145	6995	671.50	7,319	6,715	8,394	9,401	10,073	10,543	13,430	29,546	7,319
M110x6	155	8556	821.35	9,848	9,035	11,294	12,649	13,552	14,185	18,070	39,754	9,848
M125x6	180	11192	1,074.40	14,639	13,430	16,788	18,802	20,145	21,085	26,860	59,092	14,639

TORQUE GUIDE FOR ISO R898 GRADE 4.6												
MINIMUM YIELD (Mpa)			240									
BOLT LOAD BASED ON			50 PERCENT YIELD									
<b>BOLT LOADS</b>												
REQUIRED TORQUE (N-m)												
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) <sup>2</sup>	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	29.38	64	59	73	82	88	92	118	259	64
M22x2.5	32	303	36.41	87	80	100	112	120	126	160	352	87
M24x3	36	353	42.30	111	102	127	142	152	159	203	447	111
M27x3	41	459	55.13	162	149	186	208	223	234	298	655	162
M30x3.5	46	561	67.27	220	202	252	283	303	317	404	888	220
M33x3.5	50	694	83.23	299	275	343	385	412	431	549	1,209	299
M36x4	55	817	98.01	385	353	441	494	529	554	706	1,553	385
M39x4	60	976	117.10	498	457	571	639	685	717	913	2,009	498
M42x4.5	65	1121	134.52	616	565	706	791	847	887	1,130	2,486	616
M45x4.5	70	1306	156.73	769	705	882	987	1,058	1,107	1,411	3,103	769
M48x5	75	1473	176.79	925	849	1,061	1,188	1,273	1,332	1,697	3,734	925
M52x5	80	1758	210.95	1,196	1,097	1,371	1,536	1,645	1,722	2,194	4,827	1,196
M56x5.5	85	2030	243.61	1,487	1,364	1,705	1,910	2,046	2,142	2,728	6,003	1,487
M60x5.5	90	2362	283.45	1,854	1,701	2,126	2,381	2,551	2,670	3,401	7,483	1,854
M64x6	95	2676	321.13	2,240	2,055	2,569	2,877	3,083	3,227	4,110	9,043	2,240
M68x6	100	3055	366.65	2,718	2,493	3,117	3,491	3,740	3,914	4,986	10,970	2,718
M72x6	105	3460	415.19	3,258	2,989	3,737	4,185	4,484	4,693	5,979	13,153	3,258
M76x6	110	3889	466.74	3,866	3,547	4,434	4,966	5,321	5,569	7,094	15,608	3,866
M80x6	115	4344	521.30	4,546	4,170	5,213	5,839	6,256	6,548	8,341	18,350	4,546
M90x6	130	5591	670.92	6,582	6,038	7,548	8,454	9,057	9,480	12,077	26,568	6,582
M100x6	145	6995	839.38	9,149	8,394	10,492	11,751	12,591	13,178	16,788	36,933	9,149
M110x6	155	8556	1,026.69	12,310	11,294	14,117	15,811	16,940	17,731	22,587	49,692	12,310
M125x6	180	11192	1,343.00	18,298	16,788	20,984	23,503	25,181	26,356	33,575	73,865	18,298

TORQUE GUIDE FOR ISO R898 GRADE 4.6												
MINIMUM YIELD (Mpa)			240									
BOLT LOAD BASED ON			60 PERCENT YIELD									
<b>BOLT LOADS</b>												
REQUIRED TORQUE (N-m)												
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) <sup>2</sup>	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	35.25	77	71	88	99	106	111	141	310	77
M22x2.5	32	303	43.69	105	96	120	135	144	151	192	423	105
M24x3	36	353	50.76	133	122	152	171	183	191	244	536	133
M27x3	41	459	66.16	195	179	223	250	268	280	357	786	195
M30x3.5	46	561	80.73	264	242	303	339	363	380	484	1,066	264
M33x3.5	50	694	99.88	359	330	412	461	494	517	659	1,450	359
M36x4	55	817	117.61	462	423	529	593	635	665	847	1,863	462
M39x4	60	976	140.51	597	548	685	767	822	860	1,096	2,411	597
M42x4.5	65	1121	161.42	739	678	847	949	1,017	1,064	1,356	2,983	739
M45x4.5	70	1306	188.07	922	846	1,058	1,185	1,269	1,329	1,693	3,724	922
M48x5	75	1473	212.14	1,110	1,018	1,273	1,426	1,527	1,599	2,037	4,480	1,110
M52x5	80	1758	253.14	1,435	1,316	1,645	1,843	1,974	2,067	2,633	5,792	1,435
M56x5.5	85	2030	292.34	1,784	1,637	2,046	2,292	2,456	2,570	3,274	7,203	1,784
M60x5.5	90	2362	340.15	2,225	2,041	2,551	2,857	3,061	3,204	4,082	8,980	2,225
M64x6	95	2676	385.36	2,688	2,466	3,083	3,453	3,699	3,872	4,933	10,852	2,688
M68x6	100	3055	439.98	3,261	2,992	3,740	4,189	4,488	4,697	5,984	13,164	3,261
M72x6	105	3460	498.22	3,910	3,587	4,484	5,022	5,381	5,632	7,174	15,784	3,910
M76x6	110	3889	560.08	4,640	4,257	5,321	5,959	6,385	6,683	8,513	18,729	4,640
M80x6	115	4344	625.56	5,455	5,005	6,256	7,006	7,507	7,857	10,009	22,020	5,455
M90x6	130	5591	805.10	7,898	7,246	9,057	10,144	10,869	11,376	14,492	31,882	7,898
M100x6	145	6995	1,007.26	10,979	10,073	12,591	14,102	15,109	15,814	20,145	44,319	10,979
M110x6	155	8556	1,232.03	14,772	13,552	16,940	18,973	20,329	21,277	27,105	59,630	14,772
M125x6	180	11192	1,611.60	21,958	20,145	25,181	28,203	30,218	31,628	40,290	88,638	21,958

TORQUE GUIDE FOR ISO R898 GRADE 4.6												
MINIMUM YIELD (Mpa)			240									
BOLT LOAD BASED ON			70 PERCENT YIELD									
<b>BOLT LOADS</b>												
REQUIRED TORQUE (N-m)												
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) <sup>2</sup>	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 ISO R898 GRADE 4.6				<b>BOLT LOADS</b>								
MINIMUM YIELD (Mpa)			240									
BOLT LOAD BASED ON			80	PERCENT YIELD								
				<b>REQUIRED TORQUE (N-m)</b>								
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) <sup>2</sup>	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	47.00	102	94	118	132	141	148	188	414	102
M22x2.5	32	303	58.26	140	128	160	179	192	201	256	564	140
M24x3	36	353	67.68	177	162	203	227	244	255	325	715	177
M27x3	41	459	88.21	260	238	298	333	357	374	476	1,048	260
M30x3.5	46	561	107.64	352	323	404	452	484	507	646	1,421	352
M33x3.5	50	694	133.17	479	439	549	615	659	690	879	1,934	479
M36x4	55	817	156.82	615	565	706	790	847	886	1,129	2,484	615
M39x4	60	976	187.35	796	731	913	1,023	1,096	1,147	1,461	3,215	796
M42x4.5	65	1121	215.23	985	904	1,130	1,266	1,356	1,419	1,808	3,977	985
M45x4.5	70	1306	250.76	1,230	1,128	1,411	1,580	1,693	1,772	2,257	4,965	1,230
M48x5	75	1473	282.86	1,480	1,358	1,697	1,901	2,037	2,132	2,715	5,974	1,480
M52x5	80	1758	337.52	1,913	1,755	2,194	2,457	2,633	2,756	3,510	7,722	1,913
M56x5.5	85	2030	389.78	2,379	2,183	2,728	3,056	3,274	3,427	4,366	9,604	2,379
M60x5.5	90	2362	453.53	2,966	2,721	3,401	3,810	4,082	4,272	5,442	11,973	2,966
M64x6	95	2676	513.81	3,584	3,288	4,110	4,604	4,933	5,163	6,577	14,469	3,584
M68x6	100	3055	586.64	4,348	3,989	4,986	5,585	5,984	6,263	7,978	17,552	4,348
M72x6	105	3460	664.30	5,213	4,783	5,979	6,696	7,174	7,509	9,566	21,045	5,213
M76x6	110	3889	746.78	6,186	5,676	7,094	7,946	8,513	8,911	11,351	24,972	6,186
M80x6	115	4344	834.09	7,273	6,673	8,341	9,342	10,009	10,476	13,345	29,360	7,273
M90x6	130	5591	1,073.47	10,531	9,661	12,077	13,526	14,492	15,168	19,322	42,509	10,531
M100x6	145	6995	1,343.01	14,639	13,430	16,788	18,802	20,145	21,085	26,860	59,092	14,639
M110x6	155	8556	1,642.71	19,696	18,070	22,587	25,298	27,105	28,370	36,140	79,507	19,696
M125x6	180	11192	2,148.81	29,277	26,860	33,575	37,604	40,290	42,170	53,720	118,184	29,277

TORQUE GUIDE FOR ISO R898 GRADE 4.6				<b>BOLT LOADS</b>								
MINIMUM YIELD (Mpa)			240									
BOLT LOAD BASED ON			90	PERCENT YIELD								
				<b>REQUIRED TORQUE (N-m)</b>								
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) <sup>2</sup>	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	52.88	115	106	132	148	159	166	212	465	115
M22x2.5	32	303	65.54	157	144	180	202	216	226	288	634	157
M24x3	36	353	76.15	199	183	228	256	274	287	365	804	199
M27x3	41	459	99.24	292	268	335	375	402	421	536	1,179	292
M30x3.5	46	561	121.09	396	363	454	509	545	570	727	1,598	396
M33x3.5	50	694	149.81	539	494	618	692	742	776	989	2,175	539
M36x4	55	817	176.42	692	635	794	889	953	997	1,270	2,795	692
M39x4	60	976	210.77	896	822	1,028	1,151	1,233	1,291	1,644	3,617	896
M42x4.5	65	1121	242.13	1,108	1,017	1,271	1,424	1,525	1,597	2,034	4,475	1,108
M45x4.5	70	1306	282.11	1,384	1,269	1,587	1,777	1,904	1,993	2,539	5,586	1,384
M48x5	75	1473	318.22	1,665	1,527	1,909	2,138	2,291	2,398	3,055	6,721	1,665
M52x5	80	1758	379.71	2,152	1,974	2,468	2,764	2,962	3,100	3,949	8,688	2,152
M56x5.5	85	2030	438.50	2,677	2,456	3,070	3,438	3,683	3,855	4,911	10,805	2,677
M60x5.5	90	2362	510.22	3,337	3,061	3,827	4,286	4,592	4,806	6,123	13,470	3,337
M64x6	95	2676	578.03	4,032	3,699	4,624	5,179	5,549	5,808	7,399	16,277	4,032
M68x6	100	3055	659.97	4,892	4,488	5,610	6,283	6,732	7,046	8,976	19,746	4,892
M72x6	105	3460	747.33	5,865	5,381	6,726	7,533	8,071	8,448	10,762	23,676	5,865
M76x6	110	3889	840.13	6,960	6,385	7,981	8,939	9,577	10,024	12,770	28,094	6,960
M80x6	115	4344	938.35	8,182	7,507	9,383	10,509	11,260	11,786	15,014	33,030	8,182
M90x6	130	5591	1,207.65	11,847	10,869	13,586	15,216	16,303	17,064	21,738	47,823	11,847
M100x6	145	6995	1,510.88	16,469	15,109	18,886	21,152	22,663	23,721	30,218	66,479	16,469
M110x6	155	8556	1,848.05	22,158	20,329	25,411	28,460	30,493	31,916	40,657	89,445	22,158
M125x6	180	11192	2,417.41	32,937	30,218	37,772	42,305	45,326	47,442	60,435	132,957	32,937

TORQUE GUIDE FOR ISO R898 GRADE 4.6				<b>BOLT LOADS</b>								
MINIMUM YIELD (Mpa)		240										
BOLT LOAD BASED ON		99		PERCENT YIELD								
				<b>REQUIRED TORQUE (N-m)</b>								
BOLT SIZE DIA. x P	HEX NUT ACROSS FLAT (mm)	STRESS AREA (mm) <sup>2</sup>	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	58.17	127	116	145	163	174	183	233	512	127
M22x2.5	32	303	72.09	173	159	198	222	238	249	317	698	173
M24x3	36	353	83.76	219	201	251	281	302	316	402	885	219
M27x3	41	459	109.16	321	295	368	413	442	463	589	1,297	321
M30x3.5	46	561	133.20	436	400	500	559	599	627	799	1,758	436
M33x3.5	50	694	164.80	593	544	680	761	816	854	1,088	2,393	593
M36x4	55	817	194.06	762	699	873	978	1,048	1,097	1,397	3,074	762
M39x4	60	976	231.85	986	904	1,130	1,266	1,356	1,420	1,808	3,979	986
M42x4.5	65	1121	266.34	1,219	1,119	1,398	1,566	1,678	1,756	2,237	4,922	1,219
M45x4.5	70	1306	310.32	1,522	1,396	1,746	1,955	2,095	2,192	2,793	6,144	1,522
M48x5	75	1473	350.04	1,831	1,680	2,100	2,352	2,520	2,638	3,360	7,393	1,831
M52x5	80	1758	417.68	2,367	2,172	2,715	3,041	3,258	3,410	4,344	9,557	2,367
M56x5.5	85	2030	482.35	2,944	2,701	3,376	3,782	4,052	4,241	5,402	11,885	2,944
M60x5.5	90	2362	561.24	3,671	3,367	4,209	4,714	5,051	5,287	6,735	14,817	3,671
M64x6	95	2676	635.84	4,436	4,069	5,087	5,697	6,104	6,389	8,139	17,905	4,436
M68x6	100	3055	725.97	5,381	4,937	6,171	6,911	7,405	7,750	9,873	21,721	5,381
M72x6	105	3460	822.07	6,452	5,919	7,399	8,286	8,878	9,293	11,838	26,043	6,452
M76x6	110	3889	924.14	7,656	7,023	8,779	9,833	10,535	11,027	14,047	30,903	7,656
M80x6	115	4344	1,032.18	9,001	8,257	10,322	11,560	12,386	12,964	16,515	36,333	9,001
M90x6	130	5591	1,328.42	13,032	11,956	14,945	16,738	17,934	18,771	23,911	52,605	13,032
M100x6	145	6995	1,661.97	18,115	16,620	20,775	23,268	24,930	26,093	33,239	73,127	18,115
M110x6	155	8556	2,032.85	24,374	22,361	27,952	31,306	33,542	35,107	44,723	98,390	24,374
M125x6	180	11192	2,659.15	36,231	33,239	41,549	46,535	49,859	52,186	66,479	146,253	36,231