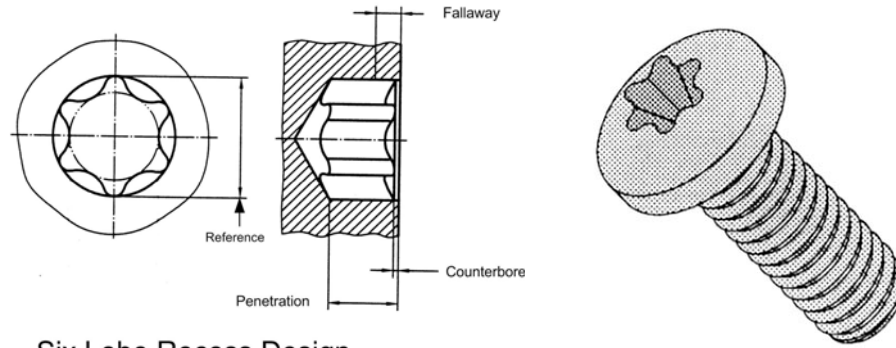


Guidance for Specifying and Inspecting Six Lobe Recess Screws



Six Lobe Recess Design

The six lobe recess has become a very popular drive system because of its excellent screw driving performance when the recess is properly manufactured. The predecessor of the six lobe recess was the TORX® Drive System patented by CAMCAR-Extron in the early 1970's. The screw producers that were licensed by CAMCAR to manufacture the TORX® recess received extensive technical assistance including standards support.

After the TORX® patent expired in the mid 1990's many non-licensed fastener producers started manufacturing the recess which they referred to as the six lobe recesses as it had been referred to by General Motors and FORD Motor Company in their standards. Unfortunately, many of these fastener manufacturers did not have the technical information and expertise necessary to make the six lobe recess properly. The result has been that many six lobe recesses in the screw heads do not mate tightly with the driver bits as they should. These poorly formed recesses ream out very easily and do not provide the excellent driving performance that was a property of the original design.

There have been two significant difficulties associated with properly making six lobe recesses in screws. First, there are no industrial standards covering the six lobe recess from the American Society of Mechanical Engineers (ASME), the Society of Automotive Engineers (SAE), or the Industrial Fastener Institute (IFI) to give producers guidance for the selection of the drive size and recess depths for various screw sizes. The International Standards Organization (ISO) has produced standard ISO10664 that covers the recess dimensions and the gages, but it does not contain any guidance for which recess size should be used.

Fortunately, FORD Motor Company has published some helpful guidance in their Worldwide Standard WB 900, Appendix D. The charts below are excerpts from the FORD Motor and ISO standards regarding which six lobe recess to use with which screw size including specifications for the penetration, counterbore, and fallaway depths.

Metric Six Lobe Recess Data

Screw Size	Pan Head					
	Recess	A ref.	Penetration		Counterbore	Fallaway
			Max	Min.		
M3, ST2.9	T10	2.80	1.27	0.88	0.13	0.51
M3.5, ST3.5	T15	3.35	1.53	1.14	0.13	0.51
M4, ST4.2	T20	3.95	1.66	1.27	0.25	0.64
M5, ST4.8	T25	4.50	1.94	1.52	0.25	0.64
M6, ST6.3	T30	5.60	2.32	1.90	0.25	0.76
M8, ST8	T40	6.75	3.28	2.79	0.25	0.89

Screw Size	Hex and Hex Flange Head					
	Recess	A ref.	Penetration		Counterbore	Fallaway
			Max	Min.		
M3, ST2.9	T10	2.80	1.27	0.88	0.13	0.51
M3.5, ST3.5	T15	3.35	1.66	1.27	0.13	0.51
M4, ST4.2	T20	3.95	1.66	1.27	0.25	0.64
M5, ST4.8	T25	4.50	1.94	1.52	0.25	0.64
M6, ST6.3	T30	5.60	2.32	1.90	0.25	0.76
M8, ST8	T40	6.75	2.77	2.28	0.25	0.89

Screw Size	Socket Head Cap Screw					
	Recess	A ref.	Penetration		Counterbore	Fallaway
			Max	Min.		
M3, ST2.9	T10	2.80	1.54	1.15	0.13	0.51
M3.5, ST3.5	T15	3.35	1.86	1.40	0.13	0.51
M4, ST4.2	T25	4.50	2.70	2.04	0.25	0.64
M5, ST4.8	T27	5.00	3.08	2.42	0.25	0.64
M6, ST6.3	T30	5.60	3.59	2.93	0.25	0.76
M8, ST8	T45	7.93	4.04	3.31	0.25	1.02

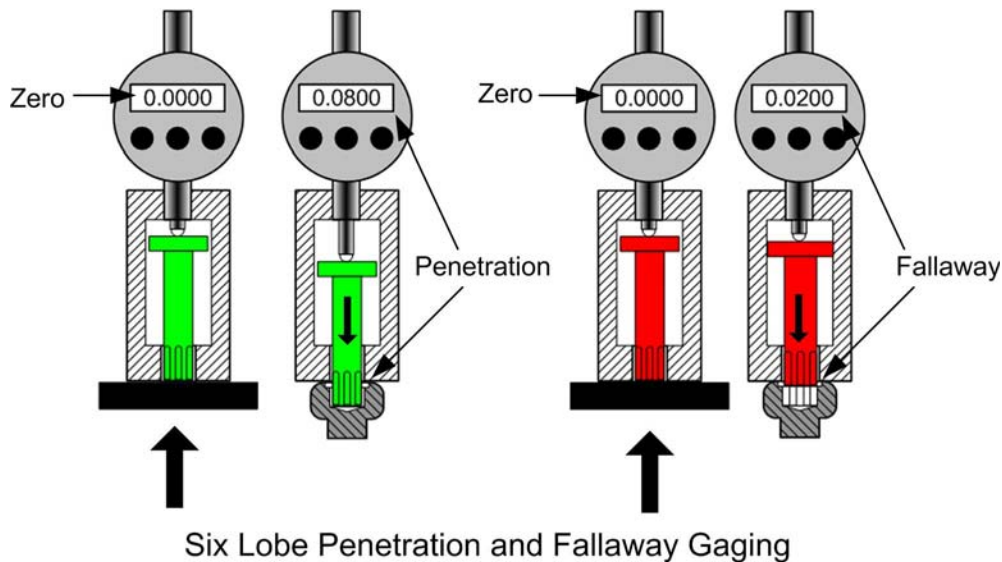
Inch Six Lobe Recess Data

Screw Size	Pan Head					
	Recess	Recess	Penetration		Counterbore	Fallaway
			Max	Min.		
#4	T10	0.110	0.050	0.035	0.005	0.020
#6	T15	0.132	0.060	0.045	0.005	0.020
#8	T20	0.156	0.065	0.050	0.010	0.025
#10	T25	0.177	0.076	0.060	0.010	0.025
1/4	T30	0.220	0.091	0.075	0.010	0.030
5/16	T40	0.266	0.129	0.110	0.010	0.035

Screw Size	Hex and Hex Flange Head					
	Recess	A ref.	Penetration		Counterbore	Fallaway
			Max	Min.		
#4	T10	0.110	0.050	0.035	0.005	0.020
#6	T15	0.132	0.065	0.050	0.005	0.020
#8	T20	0.156	0.065	0.050	0.010	0.025
#10	T25	0.177	0.076	0.060	0.010	0.025

1/4	T30	0.220	0.091	0.075	0.010	0.030
5/16	T40	0.266	0.109	0.090	0.010	0.035
Socket Head Cap Screw						
Screw Size	Recess	A ref.	Penetration		Counterbore	Falloway
			Max	Min.	Max.	Max.
#4	T10	0.110	0.061	0.045	0.005	0.020
#6	T15	0.132	0.073	0.055	0.005	0.020
#8	T25	0.177	0.106	0.080	0.010	0.025
#10	T27	0.197	0.121	0.095	0.010	0.025
1/4	T30	0.220	0.141	0.115	0.010	0.030
5/16	T45	0.312	0.159	0.130	0.010	0.040
Note: The inch dimensions are extrapolated from the FORD Motor metric data.						

The proper way of determining the quality of a six lobe recess is to inspect its penetration and fallaway depths with the proper gage indicating gages. When measuring a six lobe recess with the appropriate six lobe penetration gage the indicator must read between the maximum and minimum dimensions listed in the charts above. When measuring the same six lobe recess with the proper fallaway gage it must indicate a value no greater than that shown in the charts above.



Supplier of screws with a six lobe recesses must adhere to the recess specifications on the customer's drawing if that information is provided. If the customer does not provide the recess specifications on drawings use those in the chart above as a guide in manufacturing and inspection to assure that the recesses will provide the consistent driving performance the end user expects.

For more information about six lobe recess gaging or other fastener quality issues contact the author at greensladeandcompany@sbcglobal.net or 817-870-8888.