

# 3. Static Clamp Load

To determine the clamp load characteristics of each variation of High Torque Fastener Systems formed helix and mating fastener.

## Test Procedure

Each sample was assembled with a 40mm square plate clamped horizontally and an Interface Force Measurements LW1525 load washer inserted between the plate and the screw head. The screw was tightened to a value of 90% of the minimum failure torque and observations were taken over a period of 24 hours at approximately 22°C ambient temperature. Three values were recorded (initial clamp load, load after 30 minutes and load after 24 hours) for the test.



Figure 1 – Clamp load setup.



12 samples were tested for each size; the purpose of this test is to look at any relaxation in the assembly that may occur and not the maximum amount of clamp load that can be achieved.

## Results

Thickness	Diameter	Newton's			Lbs Force			% Decrease	
		Initial Load	30 Min Load	24 Hour Load	Initial Load	30 Min Load	24 Hour Load	After 30 Mins	After 24 Hours
0.7 / 0.8	4	561	552	544	126.1	124.1	122.4	1.6	3.0
	6	839	828	822	188.6	186.2	184.7	1.3	2.1
0.9 / 1.0	4	685	672	659	153.9	151.1	148	1.8	3.8
	5	822	808	799	184.8	181.7	179.7	1.7	2.8
	6	1388	1366	1343	312.1	307.1	302	1.6	3.2
1.1 / 1.2	6	850	829	808	191.0	186.5	181.7	2.4	4.9
1.5 / 1.6	6	1767	1729	1708	397.2	388.7	383.9	2.1	3.3
	8	3256	3216	3176	731.9	723	713.9	1.2	2.5
1.9 / 2.0	8	5368	5291	5295	1206.7	1189.5	1190.4	1.4	1.4

Table 1 Clamp load results

Table 1 summarises all the clamp load results. The clamp load showed a small initial decrease, and then settled down over the 24-hour period. Beyond this the decrease is minimal due to the locking effect in the fastener which arises from a relatively small deflection in the helical form.

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## Conclusion

High Torque Fastener Systems design, once assembled and tightened to the required torque, utilises the minor deflection of the helix into the thread core to achieve lock up and maintain joint integrity. This minor deflection in the helix acts as a spring, allowing the system to minimise the amount of relaxation in the assembly over a given period of time, as shown in table 1.

The results obtained during these tests on the various panel sizes, goes some way in highlighting the integral characteristics within the High Torque Fastener Systems design to maintain clamp load after being assembled.