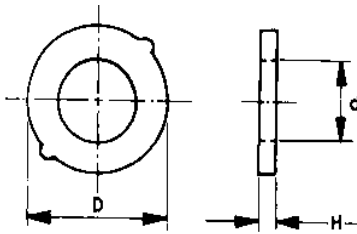


**Table 5: 'UNILOK' High Strength Structural Washers - Dimensions**



Bolt Size		M16	M20	M22	M24	M27	M30	M36
d	Min.	18.00	22.00	24.00	26.00	30.00	33.00	39.00
	Max.	18.43	22.52	24.52	26.52	30.52	33.62	39.62
D	Max.	34.00	42.00	44.00	50.00	56.00	60.00	72.00
	Min.	32.40	40.40	42.40	48.40	54.10	58.10	70.10
H	Max.	4.60	4.60	4.60	4.60	4.60	4.60	4.60
	Min.	3.10	3.10	3.40	3.40	3.40	3.40	3.40
Weight Kg/1000pcs		20.3	31.3	33.2	44.7	54.8	61.4	89.7

**Table 6: Mechanical Properties of H.S.S. Bolts**

Thread Size	Stress Area mm <sup>2</sup>	Property Class 8.8			Property Class 10.9		
		Ultimate Load (Min)	Proof Load (Min)	Hardness	Ultimate Load (Min)	Proof Load (Min)	Hardness
		Newtons	Newtons	HRC	Newtons	Newtons	HRC
M16	157	125600	91060	22-32	163280	130310	32-39
M20	245	203350	147000	23-34	254800	203350	
(M22)	303	251490	181800		315120	251490	
M24	353	292990	211800		367120	292990	
(M27)	459	380970	275400		477360	380970	
M30	561	465630	336600		583440	465630	
M36	817	678110	490200		849680	678110	

**Table 7: Mechanical Properties of H.S.S. Nuts**

Thread Size	Property Class 8		Property Class 10	
	Proof Load	Hardness	Proof Load	Hardness
	Newtons		Newtons	
M16	168900	HRB89 To HRC 38	195500	HRC 26 to HRC 38
M20	263400		305000	
(M22)	325700		377200	
M24	379500		439500	
(M27)	493400		571500	
M30	603100		698400	
M36	878300		1017200	

**ASSEMBLY**

**Calculation of Bolt length :**

The length of bolt required to be used in the assembly will depend on the Grip Length (Clamping Length). Table 4 gives range of Grip Lengths for individual Bolt Lengths. In deciding the ranges, allowances have been made for the thickness of nut, one flat round washer and sufficient thread protrusion beyond nut. Adequate allowances should be made for additional washers or taper washers, if used.

**Holes in Members:**

All holes should preferably be drilled, burrs should be removed. Nominal hole diameters are given in Table 8.

**Operation:**

All contact surfaces should be free of oil, dirt, loose scales, rust, burrs,

paint or any other foreign material or any defect. A clean, as rolled surface with light mill scale is acceptable. All bolts, nuts and washers should be identified as being the correct type H.S.S. Fasteners while drawing from stores. The holes will be lined up with sufficient drift pins to maintain the dimensions and plumbness of the structure until bolts in the remaining holes have been fully tightened - well aligned holes will permit bolts to be freely

placed in position. Driving of bolts should not be permitted as it will damage the threads. Each bolt and nut should be assembled with flat washer under the nut or bolt head, whichever is to be rotated during tightening, preferably tightening will be done by nut rotation. Taper washers are used under nuts or bolt heads where angular seatings are necessary.

Table 8: Hole Dimensions for H.S.S. Bolts

Number of plies in the joint	Hole Diameter For Bolt Diameter (D)	
	M16 to M24	M27 to M36
< 3	D + 2 mm	D + 3 mm
>= 3	D + 2 mm	D + 3 mm
a. Two outer plies b. Inner Plies	D + 3 mm	D + 3 mm