

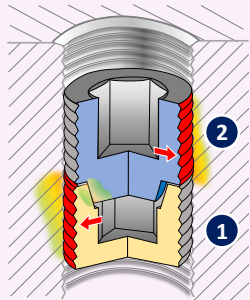


## ADVANTAGES

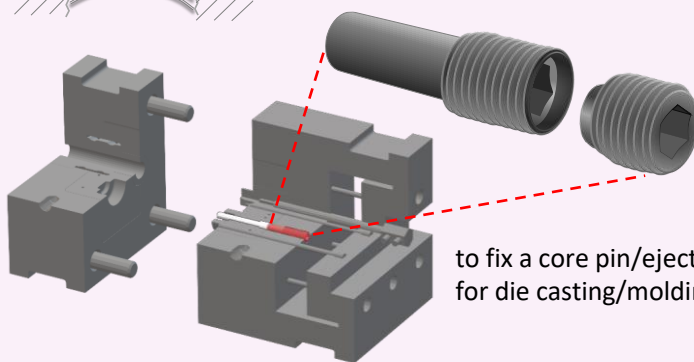
- ◆ The self-locking effect remains even in the most severe environments.
- ◆ All metal with little abrasion enables repeated reuse.
- ◆ Simple and fast installation.
- ◆ Significant cost reduction.



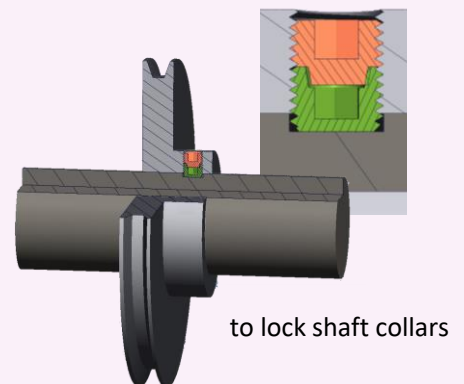
## MAINTENANCE-FREE WITH EXTRAORDINARY LOCKING PERFORMANCE



The HARDLOCK Set Screw (HLS) is a revolutionary self-locking set screw (Hexagon socket head set screw) which applies the “Wedge Principle” and delivers superior self-locking effect like the other HARDLOCK products. By combining the concave set screw ① with its concentric conical recess and the convex set screw ② designed with an eccentric protrusion, due to the wedge principle, they will lock themselves in the direction perpendicular to the axis.



to fix a core pin/ejector pin for die casting/molding dies



to lock shaft collars

## INSTALLATION PROCEDURE

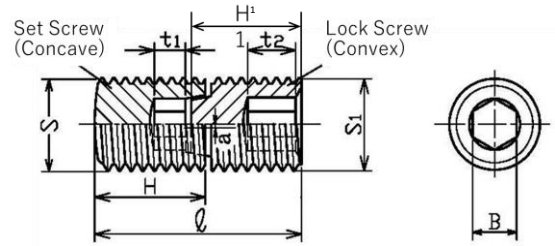


- 1 Tighten the concave set screw first.
- 2 Use a general tightening tool (L-wrench or the like).
- 3 Tighten the convex (lock) screw by the specified torque or by 1 turn (360 degrees) after prevailing torque is generated (When the protrusion and recess come into contact.).
- 4 Installation Complete.

# DIMENSION AND TIGHTENING TORQUE TABLE

## STANDARD - NORMAL TYPE HLS-A (aka HLS or HLS-S)

Size	Materials	Plating
M8 - M20 (Coarse)	Property Class 45H Surface Hardness 45 - 53HRC	Black Oxide
M8 - M20 (Fine) M22 - M36	Property Class 33H Surface Hardness 33 - 44HRC	Black Oxide

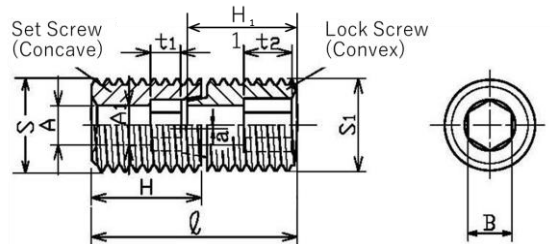


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Nominal size	Pitch		Set screw (1) (Concave)			Lock screw (2) (Convex)			Overall height (Approx.)	Hexagon socket Common to (1) (2)		Unit weight (g)	Reference tightening torque (Nm) *Common to (1) & (2)	Proof torque (Nm)
	Coarse	Fine	H	Tolerance	t1	H1	Tolerance	t2		ℓ	B			
M8	1.25	-	10	±0.29	≥2.5	10	±0.29	≥5	17.5	4	+0.02 / +0.10	4	9~10	16
M10	1.5	-	12	±0.35	≥3	12	±0.35	≥6	21	5	+0.02 / +0.14	8	17~20	30
M12	1.75	1.5	16	±0.35	≥5	16	±0.35	≥8	29	6	+0.02 / +0.14	16	29~34	52
M14	2	1.5	16	±0.35	≥4	16	±0.35	≥8	28	6	+0.02 / +0.14	22	29~34	52
M16	2	1.5	20	±0.42	≥6	20	±0.42	≥10	36	8	+0.03 / +0.18	37	66~78	120
M18	2.5	1.5	20	±0.42	≥6	20	±0.42	≥10	36	8	+0.03 / +0.18	47	66~78	120
M20	2.5	1.5	20	±0.42	≥7	20	±0.42	≥12	35	10	+0.03 / +0.18	52	121~143	220
M22	2.5	1.5	25	±0.42	≥10	25	±0.42	≥15	45	12	+0.03 / +0.18	79	204~241	370
M24	3	1.5	25	±0.42	≥9	25	±0.42	≥15	44	12	+0.05 / +0.23	95	204~241	370
M30	3.5	1.5	30	±0.42	≥9	30	±0.42	≥15	54	17	+0.05 / +0.23	161	539~637	980
M36	4	1.5	35	±0.5	≥8	35	±0.5	≥15	63	17	+0.05 / +0.23	368	539~637	980

## STANDARD - HOLLOW TYPE HLS-B (aka HLS-T or HLS-H)

Size	Materials	Plating
M12 - M36	Property Class 33H Surface Hardness 33 - 44HRC	Black Oxide



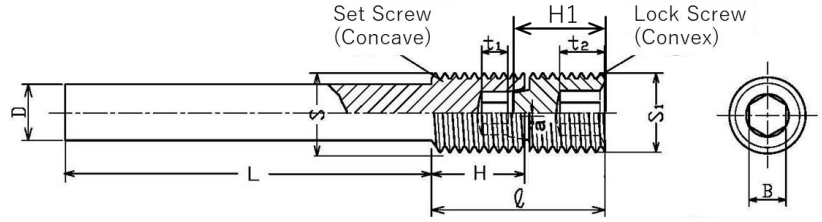
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Nominal size	Pitch		Set screw (1) (Concave)			Lock screw (2) (Convex)			Overall height (Approx.)	Hexagon socket Common to (1) (2)		Hole dia.		Unit weight (g)	Reference tightening torque (Nm) *Common to (1) & (2)	Proof torque (Nm)
	Coarse	Fine	H	Tolerance	t1	H1	Tolerance	t2		ℓ	B	Tolerance	A, A1			
M12	1.75	/	16	±0.35	≥2	16	±0.35	≥5	29	6	+0.02 / +0.14	6	±0.2	13	29~34	52
M14	2	1.5	16	±0.35	≥2	16	±0.35	≥6	28	6	+0.02 / +0.14	6	±0.2	18	29~34	52
M16	2	1.5	20	±0.42	≥4	20	±0.42	≥8	36	8	+0.03 / +0.18	8	±0.2	29	66~78	120
M20	2.5	1.5	20	±0.42	≥5	20	±0.42	≥10	35	10	+0.03 / +0.18	10	±0.2	44	121~143	220
M24	3	1.5	25	±0.42	≥6	25	±0.42	≥12	44	12	+0.05 / +0.23	12	±0.2	81	204~241	370
M30	3.5	1.5	30	±0.42	≥9	30	±0.42	≥15	54	17	+0.05 / +0.23	17	±0.2	134	539~637	980
M36	4	1.5	35	±0.5	≥8	35	±0.5	≥15	63	17	+0.05 / +0.23	17	±0.2	293	539~637	980

- External dimensions: JIS B1177(2007) / ISO4026
- Threads tolerance: Class 6g JIS B0209(2001) / ISO965
- Reference tightening torque is calculated by multiplying 0.6 plus or minus 5% of the proof torque of hexagonal wrenches stipulated in JIS B4648 (ISO2936).

# DIMENSION AND TIGHTENING TORQUE TABLE

## PIN - NORMAL TYPE HLS-C (aka HLS-P)

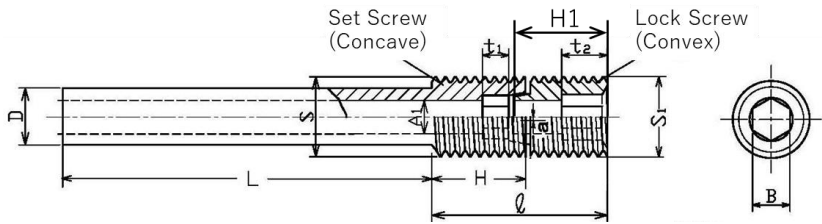


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Size	Materials	Plating
M12 - M36	Property Class 33H Surface Hardness 33 - 44HRC	Black Oxide

Size	Pitch		L	Set Screw (1) (Concave)			Lock Screw (2) (Convex)			Thread length $\ell$	Hexagonal socket *Common to (1) & (2)		Pin dia.		Unit weight (g)	Reference tightening torque *Common to (1)&(2) (Nm)	Proof torque (Nm)
	S, S1	Coarse		Fine	H	Tolerance	t1	H1	Tolerance		t2	B	Tolerance	A, A1			
M12	1.75	1.5	100	15	$\pm 0.35$	$\geq 4$	16	$\pm 0.35$	12	28	6	+0.02 +0.14	8	0 -0.2	53 92	29~34	52
			200														
M16	2	1.5	100	20	$\pm 0.42$	$\geq 6$	20	$\pm 0.42$	12	36	8	+0.03 +0.18	12	0 -0.2	123	66~78	120
															200		
															250		
M20	2.5	1.5	100	25	$\pm 0.42$	$\geq 6$	20	$\pm 0.42$	12	40	10	+0.03 +0.18	16	0 -0.2	217	121~143	220
															200		
															250 300		
M24	3	1.5	100	35	$\pm 0.42$	$\geq 7$	25	$\pm 0.42$	15	54	12	+0.05 +0.23	20	0 -0.2	369	204~241	370
															200		
															250 300		
M30	3.5	1.5	100	40	$\pm 0.42$	$\geq 7$	30	$\pm 0.42$	20	64	17	+0.05 +0.23	24	0 -0.2	570	539~637	980
															200		
															250		
M36	4	1.5	100	40	$\pm 0.5$	$\geq 7$	35	$\pm 0.5$	20	68	17	+0.05 +0.23	30	0 -0.2	948	539~637	980
															200		

## PIN - HOLLOW TYPE HLS-D (aka HLS-TP or HLS-PH)



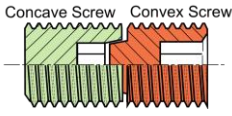
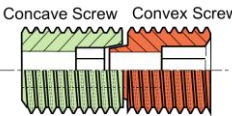
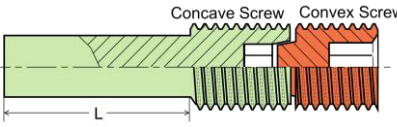
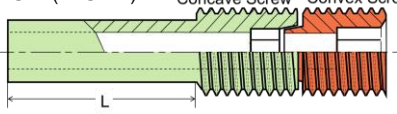
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Size	Materials	Plating
M14 - M36	Property Class 33H Surface Hardness 33 - 44HRC	Black Oxide

Size	Pitch		L	Set Screw(1) (Concave)			Lock Screw(2) (Convex)			Thread length $\ell$	Hexagonal socket *Common to (1)&(2)		Pin dia.		Pin hole dia.		Unit weight (g)	Reference tightening torque *Common to (1)&(2) (Nm)	Proof Torque (Nm)
	S, S1	Coarse		Fine	H	Tolerance	t1	H1	Tolerance		t2	B	Tolerance	D	Tolerance	A, A1			
M14	2	1.5	100	20	$\pm 0.42$	$\geq 5$	16	$\pm 0.35$	9	32	6	+0.02 +0.14	10	0 -0.2	6	$\pm 0.2$	59	29~34	52
			200																
M16	2	1.5	100	20	$\pm 0.42$	$\geq 6$	20	$\pm 0.42$	12	36	8	+0.03 +0.18	12	0 -0.2	7	$\pm 0.2$	87	66~78	120
																	146		
M20	2.5	1.5	100	25	$\pm 0.42$	$\geq 6$	20	$\pm 0.42$	12	40	10	+0.03 +0.18	16	0 -0.2	10	$\pm 0.2$	145	121~143	220
																	239		
M24	3	1.5	100	35	$\pm 0.42$	$\geq 7$	25	$\pm 0.42$	15	54	12	+0.05 +0.23	20	0 -0.2	12	$\pm 0.2$	224	204~241	370
																	345		
M30	3.5	-	100	40	$\pm 0.42$	$\geq 7$	30	$\pm 0.42$	20	64	17	+0.05 +0.23	24	0 -0.2	17	$\pm 0.2$	348	539~637	980
																	507		
M36	4	-	100	40	$\pm 0.5$	$\geq 7$	35	$\pm 0.5$	20	68	17	+0.05 +0.23	30	0 -0.2	17	$\pm 0.2$	703	539~637	980
																	1060		

- External dimensions: JIS B1177(2007) / ISO4026
- Threads tolerance: Class 6g JIS B0209(2001) / ISO965
- Reference tightening torque is calculated by multiplying 0.6 plus or minus 5% of the proof torque of hexagonal wrenches stipulated in JIS B4648 (ISO2936).

## Materials of HARDLOCK Set Screw

Type	Size	Pitch		Material		Property Class
		Coarse	Fine	Concave	Convex	
HARDLOCK Set Screw Standard HLS-A (HLS) 	M8	1.25		JIS SCM435	JIS SCM435	45H (45~53HRC)
	M10	1.5		JIS SCM435	JIS SCM435	45H (45~53HRC)
	M12	1.75		JIS SCM435	JIS SCM435	45H (45~53HRC)
			1.5	JIS S45C	JIS S45C	33H (33~44HRC)
	M14	2.0		JIS SCM435	JIS SCM435	45H (45~53HRC)
			1.5	JIS S45C	JIS S45C	33H (33~44HRC)
	M16	2.0		JIS SCM435	JIS SCM435	45H (45~53HRC)
			1.5	JIS S45C	JIS S45C	33H (33~44HRC)
	M18	2.5		JIS SCM435	JIS SCM435	45H (45~53HRC)
			1.5	JIS S45C	JIS S45C	33H (33~44HRC)
	M20	2.5		JIS SCM435	JIS SCM435	45H (45~53HRC)
			1.5	JIS S45C	JIS S45C	33H (33~44HRC)
	M22	2.5	1.5	JIS S45C	JIS S45C	33H (33~44HRC)
M24	3.0	1.5	JIS S45C	JIS S45C	33H (33~44HRC)	
M30	3.5	1.5	JIS S45C	JIS S45C	33H (33~44HRC)	
M36	4.0	1.5	JIS S45C	JIS S45C	33H (33~44HRC)	
HARDLOCK Set Screw Standard Hollow HLS-B (HLS-T) 	M12	1.8		JIS S45C	JIS S45C	33H 33~44HRC
	M14	2.0	1.5	JIS S45C	JIS S45C	
	M16	2.0	1.5	JIS S45C	JIS S45C	
	M20	2.5	1.5	JIS S45C	JIS S45C	
	M24	3.0	1.5	JIS S45C	JIS S45C	
	M30	3.5	1.5	JIS S45C	JIS S45C	
HARDLOCK Set Screw Pin HLS-C (HLS-P) 	M12	1.75		JIS S45C	JIS SCM435	33H 33~44HRC
			1.5	JIS S45C	JIS S45C	
	M16	2.0		JIS S45C	JIS SCM435	
			1.5	JIS S45C	JIS S45C	
	M20	2.5		JIS S45C	JIS SCM435	
			1.5	JIS S45C	JIS S45C	
M24	3.0	1.5	JIS S45C	JIS S45C		
M30	3.5	1.5	JIS S45C	JIS S45C		
HARDLOCK Set Screw Pin Hollow HLS-D (HLS-TP) 	M14	2.0	1.5	JIS S45C	JIS S45C	33H 33~44HRC
	M16	2.0	1.5	JIS S45C	JIS S45C	
	M20	2.5	1.5	JIS S45C	JIS S45C	
	M24	3.0	1.5	JIS S45C	JIS S45C	
	M30	3.5		JIS S45C	JIS S45C	
	M36	4.0		JIS S45C	JIS S45C	

These materials are subject to change without notice due to the availability of material screw.

**HARDLOCK Industry Co., Ltd.**

1-6-24, Kawamata, Higashi Osaka,  
 Osaka, Japan 577-0063  
 Tel: +81 6 6784 1131  
 Fax: +81 6 6784 1161  
 e-mail: h.office@hardlock.co.jp  
<https://www.hardlock.co.jp/en/>



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