

TURNED WASHER

COMPATIBILITY

It is the ideal coupling for countersunk screws (HBS, VGS, SBS-SPP, SCI, etc.) when the axial strength of the connection is to be increased.

TIMBER-TO-METAL

It is the optimal choice for connections on metal plates with cylindrical holes.

HUS EVO

The HUS EVO version increases the washer's corrosion resistance due to the special surface treatment. This allows it to be used in exposure condition 3 and atmospheric corrosion class C4.

HUS 15°

The 15° angled washer is specifically designed for particular timber-to-metal applications where just a small angle is needed for screw insertion. The HUS BAND double-sided adhesive tape holds the washer in place during overhead applications.



CANADIAN DESIGN VALUES

USA, EU and more design values available online.



HUS



HUS 15°



HUS EVO



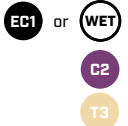
HUS A4

MATERIAL

HUS 15°



aluminium alloy
EN AW 6082-T6



HUS



electrogalvanized
carbon steel



HUS EVO



carbon steel with
C4 EVO coating



HUS A4



A4 | AISI316
austenitic stainless steel

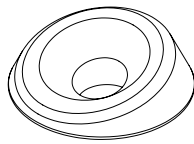


FIELDS OF USE

- thin, thick metal plates with cylindrical holes
- timber based panels
- solid timber and glulam
- CLT and LVL
- high density woods



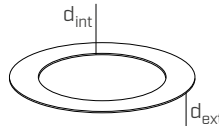
CODES AND DIMENSIONS



HUS 15° - 15° angled washer

alu

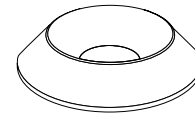
CODE	d_{HBS} [mm]	d_{VGS} [mm]	pcs
HUS815	8	9	50



HUS BAND - double-sided adhesive for HUS washers

CODE	d_{int} [mm]	d_{ext} [mm]	pcs
HUSBAND	22	30	50

Compatible with HUS815, HUS10, HUS12, HUS10A4.



HUS - turned washer

Zn
ELECTRO
PLATED

CODE	d_{HBS} [mm]	d_{VGS} [mm]	pcs
HUS6	6	-	100
HUS8	8	9	50
HUS10	10	11	50
HUS12	12	13	25

C4
EVO
COATING

HUS EVO - turned washer

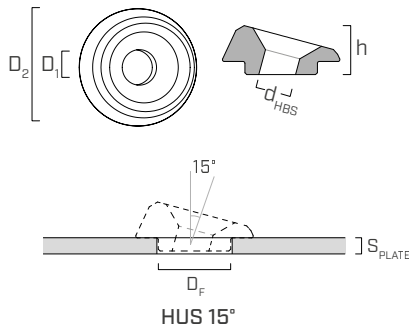
CODE	d_{HBS} EVO [mm]	d_{VGS} EVO [mm]	pcs
HUSEVO6	6	-	100
HUSEVO8	8	9	50

A4
AISI 316

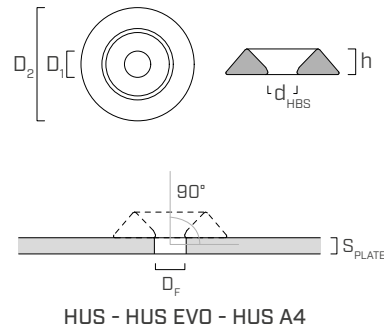
HUS A4 - turned washer

CODE	d_{SCI} [mm]	d_{VGS} A4 [mm]	pcs
HUS6A4	6	-	100
HUS8A4	8	9	100
HUS10A4	-	11	50

GEOMETRY AND MECHANICAL CHARACTERISTICS



HUS 15°



HUS - HUS EVO - HUS A4

GEOMETRY

Washer		HUS815	HUS6 HUSEVO6 HUS6A4	HUS8 HUSEVO8 HUS8A4	HUS10 HUS10A4	HUS12
Internal diameter	D_1 [mm]	9,50	7,50	8,50	10,80	14,00
External diameter	D_2 [mm]	31,40	20,00	25,00	30,00	37,00
Height	h [mm]	13,60	4,50	5,50	6,50	8,50
Plate hole diameter ⁽¹⁾	D_F [mm]	20 - 22	6,5 - 8,0	8,5 - 10,0	10,5 - 12,0	12,5 - 14,0
Steel plate thickness	S_{PLATE} [mm]	4 - 18	-	-	-	-

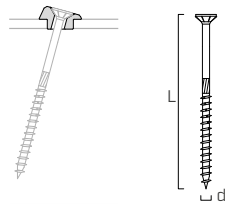
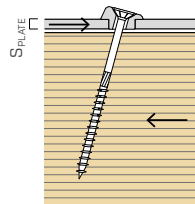
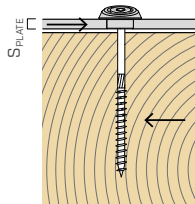
⁽¹⁾ The choice of diameter is also linked to the diameter of the screw used.

MECHANICAL PROPERTIES

Nominal diameter	$d_{1,HBS}$ [mm]	6	8	10	12	
Specified head pull-through resistance per screw with HUS washer(*)	F_{pt} [kN]	G=0.35	2,72	3,85	5,01	6,63
		G=0.42	3,27	4,62	6,02	7,96
		G=0.49	3,81	5,39	7,02	9,28
		G=0.55	4,28	6,05	7,88	10,42

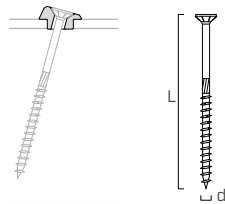
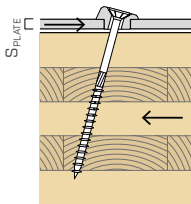
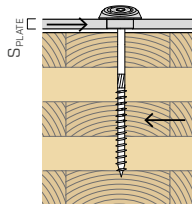
^(*)Head pull-through values have been determined in accordance with CSA O86:24, Clause A.12.12.8.3, and are likewise applicable to CLT connections. These values do not apply to HUS 15° washers.

HUS 15°

				SHEAR ^{(1) [2]}								
geometry				steel-to-timber α=75°				steel-to-timber α=75°				
												
d _{1,HBS}		L		S _{PLATE} [mm] [in]	factored lateral resistance N _r ⁽³⁾				factored lateral resistance N _r ⁽⁴⁾			
[mm] [in]	[mm] [in]	G	G		G	G	G	G	G	G		
0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55	
[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	
HUS 15°	8 0.32	80	3 1/8	6,4 1/4	2,32	2,65	2,96	3,23	2,35	2,68	3,00	3,27
		100	4		2,53	2,90	3,26	3,49	2,56	2,94	3,27	3,49
		120	4 3/4		2,81	3,11	3,40	3,63	2,81	3,11	3,40	3,63
		140	5 1/2		2,81	3,11	3,40	3,63	2,81	3,11	3,40	3,63
		160	6 1/4		3,05	3,39	3,71	3,98	3,05	3,39	3,71	3,98
		180	7 1/8		3,05	3,39	3,71	3,98	3,05	3,39	3,71	3,98
		200	8		3,05	3,39	3,71	3,98	3,05	3,39	3,71	3,98
		220	8 5/8		3,05	3,39	3,71	3,98	3,05	3,39	3,71	3,98
		240	9 1/2		3,05	3,39	3,71	3,98	3,05	3,39	3,71	3,98
		260	10 1/4		3,05	3,39	3,71	3,98	3,05	3,39	3,71	3,98
		280	11		3,05	3,39	3,71	3,98	3,05	3,39	3,71	3,98
		300	11 3/4		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		320	12 5/8		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		340	13 3/8		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		360	14 1/4		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		380	15		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		400	15 3/4		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		440	17 1/4		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		480	19		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		520	20 1/2		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		560	22		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		580	22 13/16		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		600	23 5/8		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32

α = screw-to-grain angle

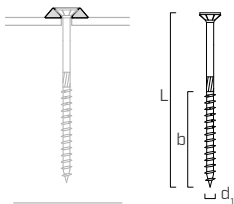
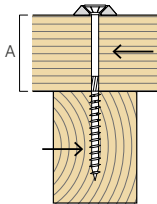
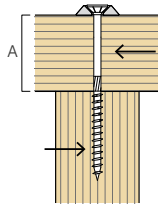
HUS 15°

				SHEAR ^{(1) [2]}								
geometry				steel-to-CLT $\alpha=75^\circ$				steel-to-CLT $\alpha=75^\circ$				
												
$d_{1,HBS}$ [mm] [in]			L [mm] [in]	S_{PLATE} [mm] [in]	factored lateral resistance $N_r^{(3)}$				factored lateral resistance $N_r^{(4)}$			
					G				G			
					0.35 [kN]	0.42 [kN]	0.49 [kN]	0.55 [kN]	0.35 [kN]	0.42 [kN]	0.49 [kN]	0.55 [kN]
HUS 15°	8 0.32	80	3 1/8	6,4 1/4	2,20	2,50	2,80	3,05	2,22	2,53	2,83	3,08
		100	4		2,39	2,73	3,07	3,35	2,41	2,77	3,11	3,35
		120	4 3/4		2,67	2,99	3,27	3,49	2,70	2,99	3,27	3,49
		140	5 1/2		2,70	2,99	3,27	3,49	2,70	2,99	3,27	3,49
		160	6 1/4		2,94	3,27	3,58	3,84	2,94	3,27	3,58	3,84
		180	7 1/8		2,94	3,27	3,58	3,84	2,94	3,27	3,58	3,84
		200	8		2,94	3,27	3,58	3,84	2,94	3,27	3,58	3,84
		220	8 5/8		2,94	3,27	3,58	3,84	2,94	3,27	3,58	3,84
		240	9 1/2		2,94	3,27	3,58	3,84	2,94	3,27	3,58	3,84
		260	10 1/4		2,94	3,27	3,58	3,84	2,94	3,27	3,58	3,84
		280	11		2,94	3,27	3,58	3,84	2,94	3,27	3,58	3,84
		300	11 3/4		3,18	3,55	3,90	4,18	3,18	3,55	3,90	4,18
		320	12 5/8		3,18	3,55	3,90	4,18	3,18	3,55	3,90	4,18
		340	13 3/8		3,18	3,55	3,90	4,18	3,18	3,55	3,90	4,18
		360	14 1/4		3,18	3,55	3,90	4,18	3,18	3,55	3,90	4,18
		380	15		3,18	3,55	3,90	4,18	3,18	3,55	3,90	4,18
		400	15 3/4		3,18	3,55	3,90	4,18	3,18	3,55	3,90	4,18
		440	17 1/4		3,18	3,55	3,90	4,18	3,18	3,55	3,90	4,18
		480	19		3,18	3,55	3,90	4,18	3,18	3,55	3,90	4,18
		520	20 1/2		3,18	3,55	3,90	4,18	3,18	3,55	3,90	4,18
		560	22		3,18	3,55	3,90	4,18	3,18	3,55	3,90	4,18
		580	22 13/16		3,18	3,55	3,90	4,18	3,18	3,55	3,90	4,18
		600	23 5/8		3,18	3,55	3,90	4,18	3,18	3,55	3,90	4,18

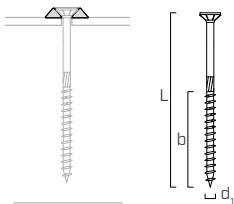
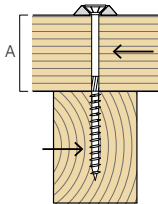
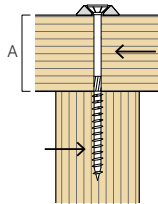
α = screw-to-grain angle

HUS/HUS EVO

SHEAR⁽¹⁾ [2]

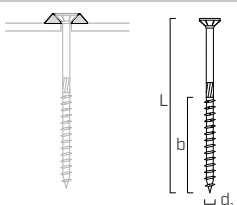
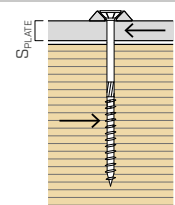
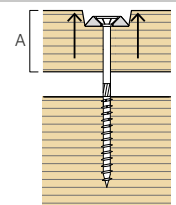
geometry					timber-to-timber $\alpha=90^\circ$								timber-to-timber $\alpha=0^\circ$			
																
					factored lateral resistance N_r				factored lateral resistance $N_r^{(5)}$ ⁽⁶⁾							
					G				G							
$d_{1,HBS}$	L	b	A		0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55				
[mm] [in]	[mm] [in]	[mm] [in]	[mm] [in]		[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]				
HUS HUS EVO	6 0.24	80	3 1/8	40	35	0,90	1,08	1,26	1,41	0,66	0,81	0,86	0,93			
		90	3 1/2	50	35	0,99	1,14	1,29	1,41	0,70	0,88	0,94	1,03			
		100	4	50	45	1,09	1,26	1,38	1,48	0,73	0,90	0,94	1,03			
		110	4 3/8	60	45	1,09	1,26	1,38	1,48	0,77	0,95	0,99	1,09			
		120	4 3/4	60	55	1,14	1,27	1,38	1,48	0,77	0,95	0,99	1,09			
		130	5 1/8	60	65	1,14	1,27	1,38	1,48	0,77	0,95	0,99	1,09			
		140	5 1/2	75	60	1,14	1,27	1,38	1,48	0,83	1,04	1,08	1,18			
		150	6	75	70	1,14	1,27	1,38	1,48	0,83	1,04	1,08	1,18			
		160	6 1/4	75	80	1,14	1,27	1,38	1,48	0,83	1,04	1,08	1,18			
		180	7 1/8	75	100	1,14	1,27	1,38	1,48	0,83	1,04	1,08	1,18			
		200	8	75	120	1,14	1,27	1,38	1,48	0,83	1,04	1,08	1,18			
		220	8 5/8	75	140	1,14	1,27	1,38	1,48	0,83	1,04	1,08	1,18			
		240	9 1/2	75	160	1,14	1,27	1,38	1,48	0,83	1,04	1,08	1,18			
		260	10 1/4	75	180	1,14	1,27	1,38	1,48	0,83	1,04	1,08	1,18			
		280	11	75	200	1,14	1,27	1,38	1,48	0,83	1,04	1,08	1,18			
		300	11 3/4	75	220	1,14	1,27	1,38	1,48	0,83	1,04	1,08	1,18			
		320	12 5/8	75	240	1,14	1,27	1,38	1,48	0,83	1,04	1,08	1,18			
		340	13 3/8	75	260	1,14	1,27	1,38	1,48	0,83	1,04	1,08	1,18			
		360	14 1/4	75	280	1,14	1,27	1,38	1,48	0,83	1,04	1,08	1,18			
		380	15	75	300	1,14	1,27	1,38	1,48	0,83	1,04	1,08	1,18			
		400	15 3/4	75	320	1,14	1,27	1,38	1,48	0,83	1,04	1,08	1,18			
HUS HUS EVO	8 0.32	80	3 1/8	52	22	1,11	1,33	1,56	1,75	0,74	0,97	1,03	1,16			
		100	4	52	42	1,35	1,62	1,89	2,12	0,98	1,26	1,37	1,51			
		120	4 3/4	60	54	1,59	1,91	2,18	2,39	1,13	1,44	1,44	1,57			
		140	5 1/2	60	74	1,76	2,02	2,23	2,39	1,13	1,44	1,44	1,57			
		160	6 1/4	80	74	1,85	2,05	2,23	2,39	1,22	1,59	1,58	1,72			
		180	7 1/8	80	94	1,85	2,05	2,23	2,39	1,22	1,59	1,58	1,72			
		200	8	80	114	1,85	2,05	2,23	2,39	1,22	1,59	1,58	1,72			
		220	8 5/8	80	134	1,85	2,05	2,23	2,39	1,22	1,59	1,58	1,72			
		240	9 1/2	80	154	1,85	2,05	2,23	2,39	1,22	1,59	1,58	1,72			
		260	10 1/4	80	174	1,85	2,05	2,23	2,39	1,22	1,59	1,58	1,72			
		280	11	80	194	1,85	2,05	2,23	2,39	1,22	1,59	1,58	1,72			
		300	11 3/4	100	194	1,85	2,05	2,23	2,39	1,32	1,73	1,71	1,88			
		320	12 5/8	100	214	1,85	2,05	2,23	2,39	1,32	1,73	1,71	1,88			
		340	13 3/8	100	234	1,85	2,05	2,23	2,39	1,32	1,73	1,71	1,88			
		360	14 1/4	100	254	1,85	2,05	2,23	2,39	1,32	1,73	1,71	1,88			
		380	15	100	274	1,85	2,05	2,23	2,39	1,32	1,73	1,71	1,88			
		400	15 3/4	100	294	1,85	2,05	2,23	2,39	1,32	1,73	1,71	1,88			
		440	17 1/4	100	334	1,85	2,05	2,23	2,39	1,32	1,73	1,71	1,88			
		480	19	100	374	1,85	2,05	2,23	2,39	1,32	1,73	1,71	1,88			
		520	20 1/2	100	414	1,85	2,05	2,23	2,39	1,32	1,73	1,71	1,88			
		560	22	100	454	1,85	2,05	2,23	2,39	1,32	1,73	1,71	1,88			
		580	22 13/16	100	474	1,85	2,05	2,23	2,39	1,32	1,73	1,71	1,88			
		600	23 5/8	100	494	1,85	2,05	2,23	2,39	1,32	1,73	1,71	1,88			

HUS/HUS EVO

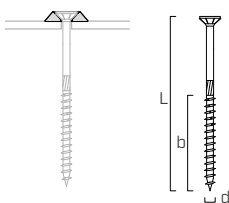
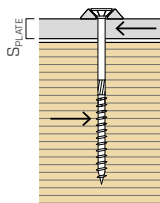
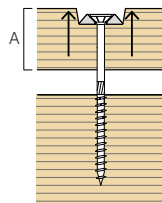
					SHEAR ⁽¹⁾ [2]							
geometry					timber-to-timber $\alpha=90^\circ$				timber-to-timber $\alpha=0^\circ$			
												
					factored lateral resistance N_r				factored lateral resistance $N_r^{(5)}$ (6)			
					G				G			
$d_{1,HBS}$	L	b	A		0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55
[mm] [in]	[mm] [in]	[mm] [in]	[mm] [in]		[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
HUS 10 0.40	80	3 1/8	52	21	1,35	1,62	1,89	2,13	0,91	1,20	1,24	1,38
	100	4	52	41	1,63	1,96	2,29	2,57	1,19	1,54	1,63	1,82
	120	4 3/4	60	53	1,91	2,30	2,68	3,01	1,41	1,84	1,96	2,14
	140	5 1/2	60	73	2,19	2,63	3,00	3,28	1,54	2,01	1,96	2,14
	160	6 1/4	80	73	2,48	2,88	3,18	3,40	1,65	2,19	2,12	2,31
	180	7 1/8	80	93	2,60	2,92	3,18	3,40	1,65	2,19	2,12	2,31
	200	8	80	113	2,60	2,92	3,18	3,40	1,65	2,19	2,12	2,31
	220	8 5/8	80	133	2,60	2,92	3,18	3,40	1,65	2,19	2,12	2,31
	240	9 1/2	80	153	2,60	2,92	3,18	3,40	1,65	2,19	2,12	2,31
	260	10 1/4	80	173	2,60	2,92	3,18	3,40	1,65	2,19	2,12	2,31
	280	11	80	193	2,60	2,92	3,18	3,40	1,65	2,19	2,12	2,31
	300	11 3/4	100	193	2,63	2,92	3,18	3,40	1,76	2,38	2,28	2,49
	320	12 5/8	100	213	2,63	2,92	3,18	3,40	1,76	2,38	2,28	2,49
	340	13 3/8	100	233	2,63	2,92	3,18	3,40	1,76	2,38	2,28	2,49
	360	14 1/4	100	253	2,63	2,92	3,18	3,40	1,76	2,38	2,28	2,49
	380	15	100	273	2,63	2,92	3,18	3,40	1,76	2,38	2,28	2,49
	400	15 3/4	100	293	2,63	2,92	3,18	3,40	1,76	2,38	2,28	2,49
	440	17 1/4	100	333	2,63	2,92	3,18	3,40	1,76	2,38	2,28	2,49
	480	19	100	373	2,63	2,92	3,18	3,40	1,76	2,38	2,28	2,49
	520	20 1/2	100	413	2,63	2,92	3,18	3,40	1,76	2,38	2,28	2,49
	560	22	100	453	2,63	2,92	3,18	3,40	1,76	2,38	2,28	2,49
	600	23 5/8	100	493	2,63	2,92	3,18	3,40	1,76	2,38	2,28	2,49
HUS 12 0.48	120	4 3/4	80	31	2,17	2,57	2,87	3,12	1,41	1,96	1,97	2,21
	160	6 1/4	80	71	2,81	3,34	3,76	4,06	1,95	2,65	2,50	2,73
	200	8	80	111	3,04	3,47	3,79	4,06	1,95	2,65	2,50	2,73
	240	9 1/2	80	151	3,04	3,47	3,79	4,06	1,95	2,65	2,50	2,73
	280	11	80	191	3,04	3,47	3,79	4,06	1,95	2,65	2,50	2,73
	320	12 5/8	120	191	3,13	3,47	3,79	4,06	2,20	3,04	2,86	3,13
	360	14 1/4	120	231	3,13	3,47	3,79	4,06	2,20	3,04	2,86	3,13
	400	15 3/4	120	271	3,13	3,47	3,79	4,06	2,20	3,04	2,86	3,13
	440	17 1/4	120	311	3,13	3,47	3,79	4,06	2,20	3,04	2,86	3,13
	480	19	120	351	3,13	3,47	3,79	4,06	2,20	3,04	2,86	3,13
	520	20 1/2	120	391	3,13	3,47	3,79	4,06	2,20	3,04	2,86	3,13
	560	22	120	431	3,13	3,47	3,79	4,06	2,20	3,04	2,86	3,13
	600	23 5/8	120	471	3,13	3,47	3,79	4,06	2,20	3,04	2,86	3,13
	700	27 1/2	120	571	3,13	3,47	3,79	4,06	2,20	3,04	2,86	3,13
	800	31 1/2	120	671	3,13	3,47	3,79	4,06	2,20	3,04	2,86	3,13
	900	35 1/2	120	771	3,13	3,47	3,79	4,06	2,20	3,04	2,86	3,13
	1000	39 3/8	120	871	3,13	3,47	3,79	4,06	2,20	3,04	2,86	3,13

α = screw-to-grain angle

HUS/HUS EVO

geometry					SHEAR ^{(1) [2]}					TENSION				
					steel-to-timber					head pull-through with HUS washer				
														
					S _{PLATE} [mm] [in]	factored lateral resistance N _r				factored head pull-through resistance P _{pt}				
						G				G				
d _{1,HBS} [mm] [in]	L [mm] [in]	b [mm] [in]	A [mm] [in]	0.35 [kN]		0.42 [kN]	0.49 [kN]	0.55 [kN]	0.35 [kN]	0.42 [kN]	0.49 [kN]	0.55 [kN]		
HUS HUS EVO	6 0.24	80	3 1/8	40	35	3,2 1/8	1,69	1,87	2,04	2,17	1,91	2,29	2,67	2,99
		90	3 1/2	50	35		1,78	1,98	2,16	2,30	1,91	2,29	2,67	2,99
		100	4	50	45		1,78	1,98	2,16	2,30	1,91	2,29	2,67	2,99
		110	4 3/8	60	45		1,87	2,08	2,28	2,43	1,91	2,29	2,67	2,99
		120	4 3/4	60	55		1,87	2,08	2,28	2,43	1,91	2,29	2,67	2,99
		130	5 1/8	60	65		1,87	2,08	2,28	2,43	1,91	2,29	2,67	2,99
		140	5 1/2	75	60		2,01	2,24	2,46	2,63	1,91	2,29	2,67	2,99
		150	6	75	70		2,01	2,24	2,46	2,63	1,91	2,29	2,67	2,99
		160	6 1/4	75	80		2,01	2,24	2,46	2,63	1,91	2,29	2,67	2,99
		180	7 1/8	75	100		2,01	2,24	2,46	2,63	1,91	2,29	2,67	2,99
		200	8	75	120		2,01	2,24	2,46	2,63	1,91	2,29	2,67	2,99
		220	8 5/8	75	140		2,01	2,24	2,46	2,63	1,91	2,29	2,67	2,99
		240	9 1/2	75	160		2,01	2,24	2,46	2,63	1,91	2,29	2,67	2,99
		260	10 1/4	75	180		2,01	2,24	2,46	2,63	1,91	2,29	2,67	2,99
		280	11	75	200		2,01	2,24	2,46	2,63	1,91	2,29	2,67	2,99
		300	11 3/4	75	220		2,01	2,24	2,46	2,63	1,91	2,29	2,67	2,99
		320	12 5/8	75	240		2,01	2,24	2,46	2,63	1,91	2,29	2,67	2,99
		340	13 3/8	75	260		2,01	2,24	2,46	2,63	1,91	2,29	2,67	2,99
		360	14 1/4	75	280		2,01	2,24	2,46	2,63	1,91	2,29	2,67	2,99
		380	15	75	300		2,01	2,24	2,46	2,63	1,91	2,29	2,67	2,99
		400	15 3/4	75	320		2,01	2,24	2,46	2,63	1,91	2,29	2,67	2,99
HUS HUS EVO	8 0.32	80	3 1/8	52	22	3,2 1/8	2,53	2,89	3,25	3,54	2,69	3,23	3,77	4,23
		100	4	52	42		2,77	3,13	3,41	3,63	2,69	3,23	3,77	4,23
		120	4 3/4	60	54		2,92	3,24	3,54	3,77	2,69	3,23	3,77	4,23
		140	5 1/2	60	74		2,92	3,24	3,54	3,77	2,69	3,23	3,77	4,23
		160	6 1/4	80	74		3,17	3,52	3,86	4,13	2,69	3,23	3,77	4,23
		180	7 1/8	80	94		3,17	3,52	3,86	4,13	2,69	3,23	3,77	4,23
		200	8	80	114		3,17	3,52	3,86	4,13	2,69	3,23	3,77	4,23
		220	8 5/8	80	134		3,17	3,52	3,86	4,13	2,69	3,23	3,77	4,23
		240	9 1/2	80	154		3,17	3,52	3,86	4,13	2,69	3,23	3,77	4,23
		260	10 1/4	80	174		3,17	3,52	3,86	4,13	2,69	3,23	3,77	4,23
		280	11	80	194		3,17	3,52	3,86	4,13	2,69	3,23	3,77	4,23
		300	11 3/4	100	194		3,41	3,81	4,17	4,48	2,69	3,23	3,77	4,23
		320	12 5/8	100	214		3,41	3,81	4,17	4,48	2,69	3,23	3,77	4,23
		340	13 3/8	100	234		3,41	3,81	4,17	4,48	2,69	3,23	3,77	4,23
		360	14 1/4	100	254		3,41	3,81	4,17	4,48	2,69	3,23	3,77	4,23
		380	15	100	274		3,41	3,81	4,17	4,48	2,69	3,23	3,77	4,23
		400	15 3/4	100	294		3,41	3,81	4,17	4,48	2,69	3,23	3,77	4,23
		440	17 1/4	100	334		3,41	3,81	4,17	4,48	2,69	3,23	3,77	4,23
		480	19	100	374		3,41	3,81	4,17	4,48	2,69	3,23	3,77	4,23
		520	20 1/2	100	414		3,41	3,81	4,17	4,48	2,69	3,23	3,77	4,23
		560	22	100	454		3,41	3,81	4,17	4,48	2,69	3,23	3,77	4,23
580	22 13/16	100	474	3,41	3,81	4,17	4,48	2,69	3,23	3,77	4,23			
600	23 5/8	100	494	3,41	3,81	4,17	4,48	2,69	3,23	3,77	4,23			

HUS/HUS EVO

HUS/HUS EVO					SHEAR ^{(1) [2]}					TENSION			
geometry					steel-to-timber					head pull-through with HUS washer			
													
d _{1,HBS}	L	b	A	S _{PLATE}	factored lateral resistance N _r				factored head pull-through resistance P _{pt}				
					G				G				
[mm] [in]	[mm] [in]	[mm] [in]	[mm] [in]	[mm] [in]	0.35 [kN]	0.42 [kN]	0.49 [kN]	0.55 [kN]	0.35 [kN]	0.42 [kN]	0.49 [kN]	0.55 [kN]	
HUS 10 0.40	80	3 1/8	52	21	6,4 1/4	3,20	3,64	4,07	4,42	3,51	4,21	4,91	5,51
	100	4	52	41		3,48	3,98	4,46	4,86	3,51	4,21	4,91	5,51
	120	4 3/4	60	53		3,88	4,43	4,83	5,15	3,51	4,21	4,91	5,51
	140	5 1/2	60	73		4,01	4,43	4,83	5,15	3,51	4,21	4,91	5,51
	160	6 1/4	80	73		4,31	4,79	5,23	5,59	3,51	4,21	4,91	5,51
	180	7 1/8	80	93		4,31	4,79	5,23	5,59	3,51	4,21	4,91	5,51
	200	8	80	113		4,31	4,79	5,23	5,59	3,51	4,21	4,91	5,51
	220	8 5/8	80	133		4,31	4,79	5,23	5,59	3,51	4,21	4,91	5,51
	240	9 1/2	80	153		4,31	4,79	5,23	5,59	3,51	4,21	4,91	5,51
	260	10 1/4	80	173		4,31	4,79	5,23	5,59	3,51	4,21	4,91	5,51
	280	11	80	193		4,31	4,79	5,23	5,59	3,51	4,21	4,91	5,51
	300	11 3/4	100	193		4,62	5,14	5,63	6,03	3,51	4,21	4,91	5,51
	320	12 5/8	100	213		4,62	5,14	5,63	6,03	3,51	4,21	4,91	5,51
	340	13 3/8	100	233		4,62	5,14	5,63	6,03	3,51	4,21	4,91	5,51
	360	14 1/4	100	253		4,62	5,14	5,63	6,03	3,51	4,21	4,91	5,51
	380	15	100	273		4,62	5,14	5,63	6,03	3,51	4,21	4,91	5,51
	400	15 3/4	100	293		4,62	5,14	5,63	6,03	3,51	4,21	4,91	5,51
	440	17 1/4	100	333		4,62	5,14	5,63	6,03	3,51	4,21	4,91	5,51
480	19	100	373	4,62	5,14	5,63	6,03	3,51	4,21	4,91	5,51		
520	20 1/2	100	413	4,62	5,14	5,63	6,03	3,51	4,21	4,91	5,51		
560	22	100	453	4,62	5,14	5,63	6,03	3,51	4,21	4,91	5,51		
600	23 5/8	100	493	4,62	5,14	5,63	6,03	3,51	4,21	4,91	5,51		
HUS 12 0.48	120	4 3/4	80	31	6,4 1/4	4,84	5,55	6,18	6,60	4,64	5,57	6,50	7,29
	160	6 1/4	80	71		5,09	5,65	6,18	6,60	4,64	5,57	6,50	7,29
	200	8	80	111		5,09	5,65	6,18	6,60	4,64	5,57	6,50	7,29
	240	9 1/2	80	151		5,09	5,65	6,18	6,60	4,64	5,57	6,50	7,29
	280	11	80	191		5,09	5,65	6,18	6,60	4,64	5,57	6,50	7,29
	320	12 5/8	120	191		5,83	6,50	7,14	7,65	4,64	5,57	6,50	7,29
	360	14 1/4	120	231		5,83	6,50	7,14	7,65	4,64	5,57	6,50	7,29
	400	15 3/4	120	271		5,83	6,50	7,14	7,65	4,64	5,57	6,50	7,29
	440	17 1/4	120	311		5,83	6,50	7,14	7,65	4,64	5,57	6,50	7,29
	480	19	120	351		5,83	6,50	7,14	7,65	4,64	5,57	6,50	7,29
	520	20 1/2	120	391		5,83	6,50	7,14	7,65	4,64	5,57	6,50	7,29
	560	22	120	431		5,83	6,50	7,14	7,65	4,64	5,57	6,50	7,29
	600	23 5/8	120	471		5,83	6,50	7,14	7,65	4,64	5,57	6,50	7,29
	700	27 1/2	120	571		5,83	6,50	7,14	7,65	4,64	5,57	6,50	7,29
	800	31 1/2	120	671		5,83	6,50	7,14	7,65	4,64	5,57	6,50	7,29
	900	35 1/2	120	771		5,83	6,50	7,14	7,65	4,64	5,57	6,50	7,29
	1000	39 3/8	120	871		5,83	6,50	7,14	7,65	4,64	5,57	6,50	7,29

α = screw-to-grain angle

GENERAL PRINCIPLES

- The reference factored lateral resistance for self-tapping screws has been determined following the guidelines in Clause 12.12 of the CSA O86:24 including the withdrawal restraint effect. Listed values are based on standard long term load duration factor ($K_D = 1.0$), dry service condition factor ($K_{SF} = 1.0$), and treatment factor ($K_T = 1.0$).
- The reference lateral design values are calculated for screws inserted without pre-drilling as per CSA O86:24 Clause 12.12.10.5.3. The direction of the bearing-to-grain angle does not influence lateral resistance. In the case of screws inserted with pre-drilling, greater resistance values can be obtained.
- The steel plate is assumed to be ASTM A36 with a minimum ultimate tensile strength, f_u , equal to 58 ksi (400 MPa).
- Head pull-through values have been determined in accordance with CSA O86:24, Clause A.12.12.8.3, and are likewise applicable to CLT connections.
- Connection design requires comparing head pull-through resistance to both screw tensile capacity and thread withdrawal - the minimum of the three governs.
- Not all screw lengths satisfy the required embedment depth in either the side member ($4d_F$) or the main member ($8d_F$). Engineering discretion and judgment should be applied to evaluate the potential impact of reduced penetration on the connection's load-carrying capacity.
- HBS screws must be positioned in accordance with the minimum distances.
- G is the mean relative density according to CSA O86:24 Table A12. Most common wood species are assumed such as Northern species ($G = 0.35$), Spruce-Pine-Fir ($G = 0.42$), Douglas Fir ($G = 0.49$), and Southern Pine ($G = 0.55$).
- The tabulated lateral design values are based on both wood members having the same specific gravity G .
- As part of the connection design, the designer must size and verify both the structural wood members and the steel plates separately.
- Combined shear and tensile stresses shall comply with the interaction criteria outlined in CSA O86:24 Clause 12.12.11.

NOTES

- (1) Lateral resistances are factored and according to CSA O86:24 Clause 12.12.10. Values apply to dry service conditions and are representative of a single screw.
- (2) Factored withdrawal resistances were calculated with the entire threaded portion of the screw, b (in millimeters), minus the tip length, L_{tip} . The length of the tip is equal to the nominal diameter of the respective fasteners, d_1 , as specified in Table 1A of the ELC-4645 report. Factor for fastener axis-to-grain angle, J_{α} , and the factor for dowel bearing effect for laterally loaded connections, J_{wv} , varies according to connection geometry. The factored tensile resistance of the connector (P_{rt}) is governed by the lower value between the withdrawal resistance (P_{rw}), head pull-through resistance (P_{pt}) and the steel strength (T_{rg}).
- (3) The projected embedment length of the screw within the main member was taken as equal to its penetration length into the point-side member.
- (4) The length along the axis of the screw within the main member was taken as equal to its penetration length into the point-side member.
- (5) The angle between the fastener axis and the grain direction of the wood member, α , is taken as zero for the end grain calculations.
- (6) HBS screws installed in the end grain may not meet the minimum penetration requirement for withdrawal ($20d_1$) specified in CSA O86:24 Clause 12.12.6.1. Discretion and engineering judgment must be exercised to evaluate the impact of reduced penetration on the connection's capacity.

HUS 15° INSTALLATION



Drill a $D_F = 20$ mm diameter hole in the metal plate at the insertion point of the HUS815 washer.



We recommend applying HUSBAND adhesive underneath the HUS815 washer to facilitate application.



Remove the liner and apply the washer at the hole, paying attention to the insertion direction.



Drill a guide hole with a diameter of 5 mm and a minimum length of 20 mm, preferably using the JIGVGU945 template to ensure the correct installation direction.

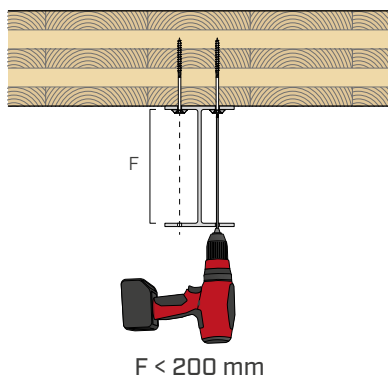


Install the HBS screw of the desired length. Do not use pulse screw guns. Pay attention when tightening the connection.

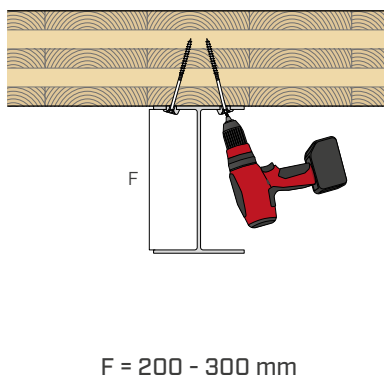


Installation completed. The 15° screw angle ensures that the distance to the head of the panel (or beam) is maintained.

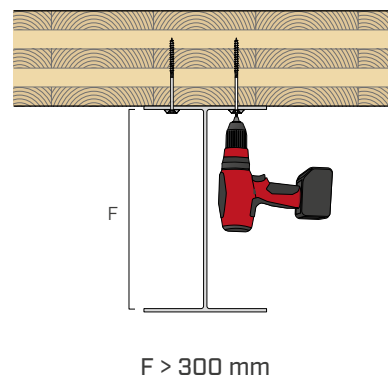
STEEL-TIMBER INSTALLATION FROM BELOW



If the clearance (F) is small, the screws are installed using a long insert; both flanges must be drilled.



In this F range, there are not enough long bits and not enough free space for the operator to manoeuvre. The slight inclination of the HUS 15° allows for easy fastening.



When sufficient free space is available for installation, a HUS washer can also be used, within the minimum distances.

RELATED PRODUCTS



HBS



VGS



CATCH



TORQUE LIMITER