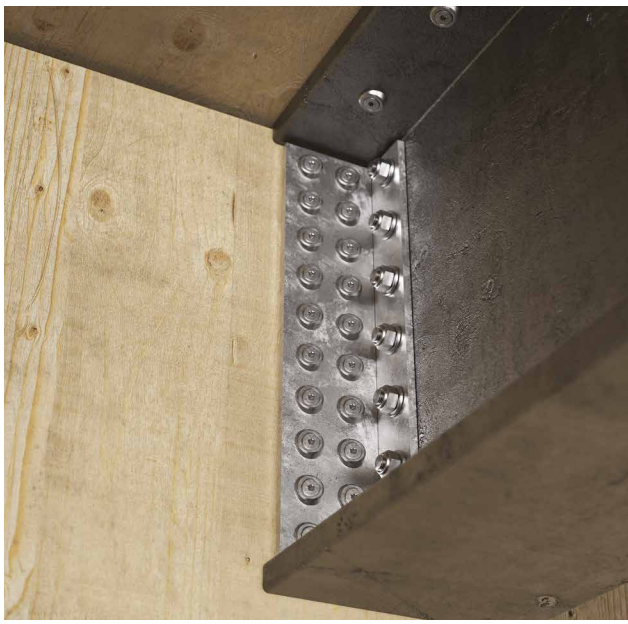
HUS

TURNED WASHER

ICC ES ELC-4645 | ICC ES ESR-4645 | UKCA UKTA-0836 22/6195 | CE ETA-11/0030



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°
EC1 or WET, C2, T3
alu — aluminium alloy EN AW 6082-T6

HUS
EC1, DRY, C2, T2
Zn ELECTRO PLATED — electrogalvanized carbon steel

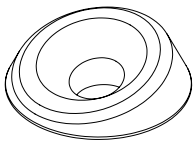
HUS EVO
EC1, EC3, C4, T3
C4 EVO COATING — carbon steel with C4 EVO coating

HUS A4
EC1, EC2, EC3, EC4, WET, C5, T5
A4 AISI 316 — 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

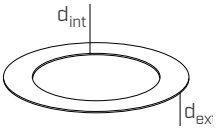
CODES AND DIMENSIONS



alu

HUS 15° - 15° angled washer

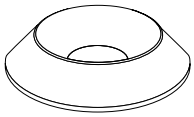
CODE	d_{HBS} [mm]	d_{VGS} [mm]	pcs
HUS815	8	9	50



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.



Zn ELECTRO PLATED

HUS - turned washer

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

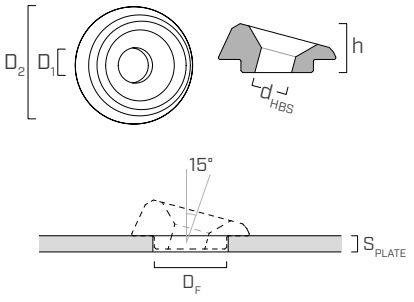
CODE	$d_{HBS\ EVO}$ [mm]	$d_{VGS\ EVO}$ [mm]	pcs
HUSEVO6	6	-	100
HUSEVO8	8	9	50

A4 AISI 316

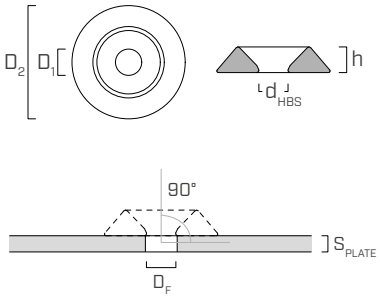
HUS A4 - turned washer

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.

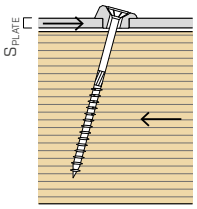
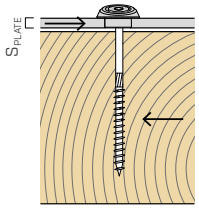
MECHANICAL PROPERTIES

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.

STRUCTURAL VALUES | LATERAL RESISTANCE

HUS 15°

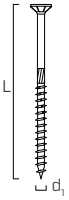
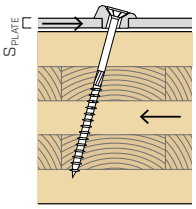
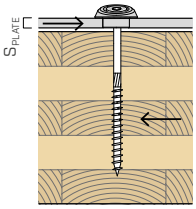
geometry				SHEAR[1] [2]							
				steel-to-timber α=75°				steel-to-timber α=75°			
											
				factored lateral resistance N_r [3]				factored lateral resistance N_r [4]			
				G				G			
	$d_{1,HBS}$	L	S_{PLATE}	0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55
	[mm] *[in]*	[mm]	[mm] *[in]*	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
HUS 15°	8 0.32	80	6,4 *1/4*	2,32	2,65	2,96	3,23	2,35	2,68	3,00	3,27
		100		2,53	2,90	3,26	3,49	2,56	2,94	3,27	3,49
		120		2,81	3,11	3,40	3,63	2,81	3,11	3,40	3,63
		140		2,81	3,11	3,40	3,63	2,81	3,11	3,40	3,63
		160		3,05	3,39	3,71	3,98	3,05	3,39	3,71	3,98
		180		3,05	3,39	3,71	3,98	3,05	3,39	3,71	3,98
		200		3,05	3,39	3,71	3,98	3,05	3,39	3,71	3,98
		220		3,05	3,39	3,71	3,98	3,05	3,39	3,71	3,98
		240		3,05	3,39	3,71	3,98	3,05	3,39	3,71	3,98
		260		3,05	3,39	3,71	3,98	3,05	3,39	3,71	3,98
		280		3,05	3,39	3,71	3,98	3,05	3,39	3,71	3,98
		300		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		320		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		340		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		360		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		380		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		400		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		440		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		480		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		520		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		560		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		580		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32
		600		3,29	3,67	4,03	4,32	3,29	3,67	4,03	4,32

α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 10.

STRUCTURAL VALUES | LATERAL RESISTANCE

HUS 15°

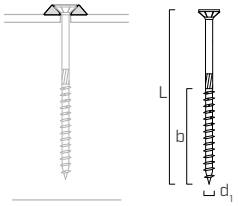
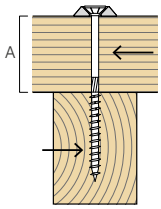
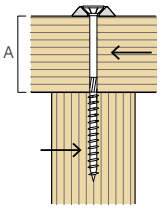
geometry				SHEAR[1] [2]							
				steel-to-CLT α=75°				steel-to-CLT α=75°			
											
	$d_{1,HBS}$	L		S_{PLATE}	factored lateral resistance N_r [3]				factored lateral resistance N_r [4]			
					G				G			
	0.35				**0.35**	**0.42**	**0.49**	**0.55**	**0.35**	**0.42**	**0.49**	**0.55**
	[mm] [in]	[mm]	*[in]*	[mm] *[in]*	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[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

NOTES and GENERAL PRINCIPLES on page 10.

STRUCTURAL VALUES | LATERAL RESISTANCE

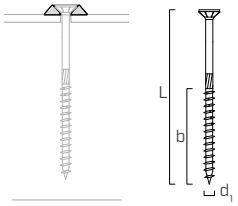
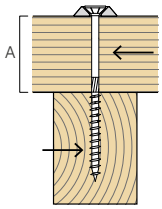
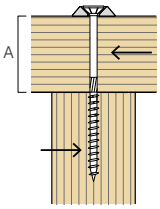
HUS/HUS EVO

geometry					SHEAR[1] [2]							
					timber-to-timber α=90°				timber-to-timber α=0°			
												
					factored lateral resistance N_r				factored lateral resistance N_r[5] [6]			
					G				G			
	$d_{1,HBS}$ [mm] *[in]*	L [mm]	L *[in]*	b [mm]	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	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

STRUCTURAL VALUES | LATERAL RESISTANCE

HUS/HUS EVO

SHEAR[1] [2]

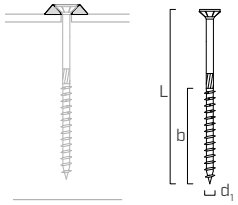
geometry					timber-to-timber α=90°				timber-to-timber α=0°			
												
					factored lateral resistance N_r				factored lateral resistance N_r[5] [6]			
					G				G			
	$d_{1,HBS}$ [mm] *[in]*	L [mm]	L *[in]*	b [mm]	A [mm]	0.35 [kN]	0.42 [kN]	0.49 [kN]	0.55 [kN]	0.35 [kN]	0.42 [kN]	0.49 [kN]	0.55 [kN]
HUS	10 0.40	80	*3 1/8*	52	21	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

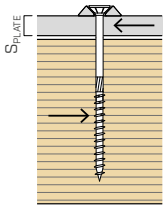
α = screw-to-grain angle

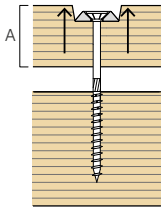
NOTES and **GENERAL PRINCIPLES** on page 10.

STRUCTURAL VALUES | LATERAL AND HEAD PULL-THROUGH RESISTANCE

HUS/HUS EVO



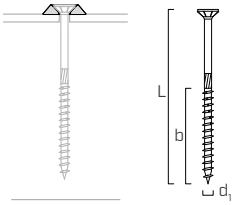
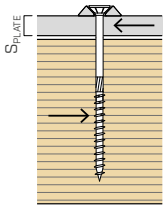
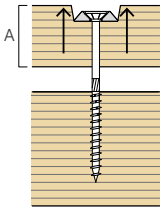




geometry						SHEAR[1] [2] steel-to-timber				TENSION head pull-through with HUS washer			
						factored lateral resistance N_r				factored head pull-through resistance P_{pt}			
						G				G			
	$d_{1,HBS}$	L		b	A	S_{PLATE}	0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55
	[mm] *[in]*	[mm]	*[in]*	[mm]	[mm]	[mm] *[in]*	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[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

STRUCTURAL VALUES | LATERAL AND HEAD PULL-THROUGH RESISTANCE

HUS/HUS EVO

geometry						SHEAR[1] [2] steel-to-timber				TENSION 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]	[mm]	[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

NOTES and GENERAL PRINCIPLES on page 10.

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_w, 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_{rs}).

(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.

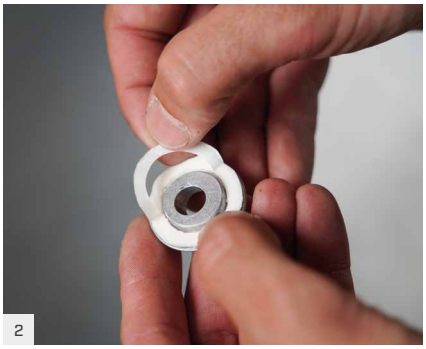
(4) The length along the axis of the screw within the main member was taken as equal to its penetration length into the point-side member.

(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.

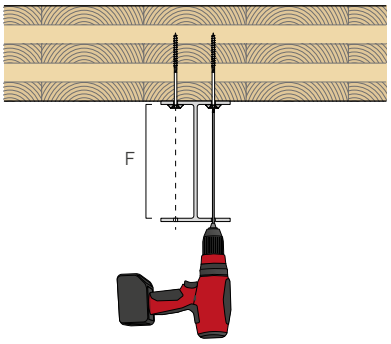
Remove the liner and apply the washer at the hole, paying attention to the insertion direction.

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.

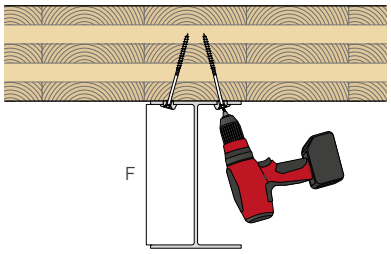
Installation completed.
The 15° screw angle ensures that the distance to the head of the panel (or beam) is maintained.

STEEL-TIMBER INSTALLATION FROM BELOW



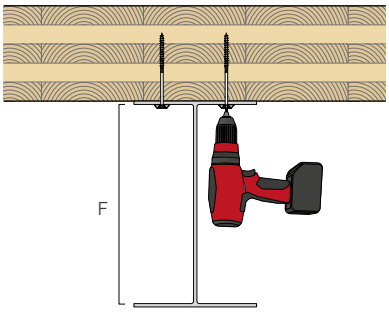
F < 200 mm

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



F = 200 - 300 mm

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.



F > 300 mm

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