

KDH/KMH

Hardened countersunk head wood screw with partial/full thread

Diameters: $\varnothing 3$ mm | $\varnothing 3,5$ mm | $\varnothing 4$ mm | $\varnothing 4,5$ mm | $\varnothing 5$ mm | $\varnothing 6$ mm

Length range: from 12 to 200 mm



Hardened wood screw for making joints with wood and wood-based elements. Could be also applied to install furniture fittings e.g. hinges, drawer slides, hangers etc. to wooden elements, chipboard, plywood, OSB board.



PZ DRIVE



PN-EN 14592:2008
+A1:2012

SCREW MATERIAL - Carbon steel

ANTI-CORROSION PROTECTION - Galvanized steel (yellow)

PRODUCT ADVANTAGES:



COUNTERSUNK HEAD WITH PZ DRIVE - Allows ideally flush installation of the screw in the wooden member.



GEOMETRY OF THREAD - Specially designed geometry of thread speed up screw installation with securing long-lasting joint.

FULL THREAD - Full thread provides maximum coupling efficiency

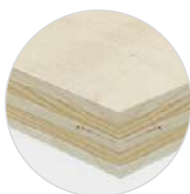
EXAMPLES OF APPLICATIONS:



SUBSTRATES

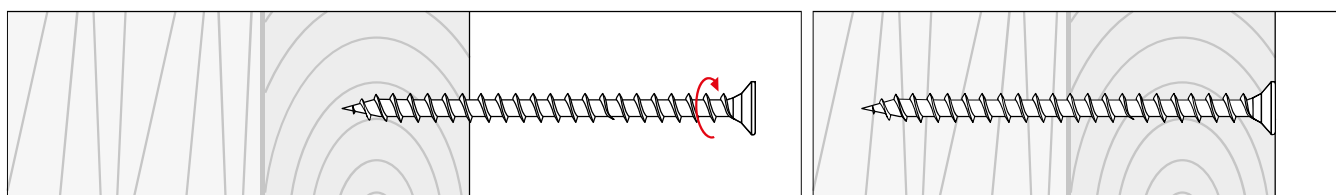


Solid timber

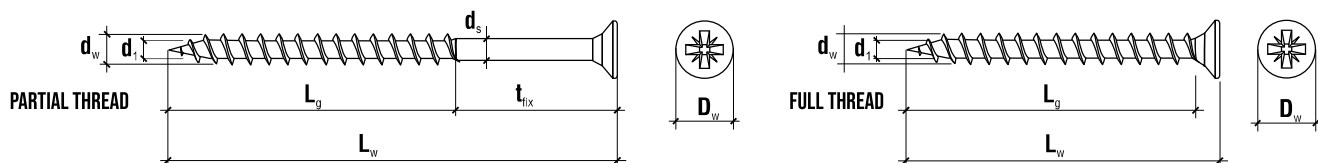

 Glued laminated timber
 CLT, KVH, BSH/GLT

 Wood-based panels - OSB, MDF,
 plywood, chipboard

INSTALLATION INSTRUCTIONS



KDH/KMH - Hardened countersunk head wood screw with partial/full thread



Codes and dimensions									
	Product code				Dimensions	Thread length	Max. usable length	Type of drive	Type of thread
	Galvanized - yellow	[kg]	Galvanized - yellow	[pcs]	$d_w \times L_w$ [mm]	L_g [mm]	t_{fix} [mm]	[-]	[-]
KDH-3 / KMH-3									
ø3	KDH-30012(X5)	5	KMH-30012	2000	3x12	9	-	PZ 1	Full
	KDH-30013(X5)	5	KMH-30013	2000	3x13	10	-	PZ 1	Full
	KDH-30016(X5)	5	KMH-30016	2000	3x16	13	-	PZ 1	Full
	KDH-30020(X5)	5	KMH-30020	2000	3x20	17	2	PZ 1	Full
	KDH-30025(X5)	5	KMH-30025	1500	3x25	22	7	PZ 1	Full
	KDH-30030(X5)	5	KMH-30030	1000	3x30	27	12	PZ 1	Full
	KDH-30035(X5)	5	KMH-30035	1000	3x35	32	17	PZ 1	Full
	KDH-30040(X5)	5	KMH-30040	500	3x40	37	22	PZ 1	Full
KDH-3,5 / KMH-3,5									
ø3,5	KDH-35013(X5)	5	KMH-35013	2000	3,5x13	9	-	PZ 2	Full
	KDH-35016(X5)	5	KMH-35016	2000	3,5x16	12	-	PZ 2	Full
	KDH-35020(X5)	5	KMH-35020	1500	3,5x20	16	-	PZ 2	Full
	KDH-35025(X5)	5	KMH-35025	1000	3,5x25	21	4	PZ 2	Full
	KDH-35030(X5)	5	KMH-35030	500	3,5x30	26	9	PZ 2	Full
	KDH-35035(X5)	5	KMH-35035	500	3,5x35	31	14	PZ 2	Full
	KDH-35040(X5)	5	KMH-35040	500	3,5x40	36	19	PZ 2	Full
	KDH-35045(X5)	5	KMH-35045	500	3,5x45	41	24	PZ 2	Full
	KDH-35050(X5)	5	KMH-35050	400	3,5x50	46	29	PZ 2	Full
	KDH-35060(X5)	5	KMH-35060	400	3,5x60	56	39	PZ 2	Full
KDH-4 / KMH-4									
ø4	KDH-40013(X5)	5	KMH-40013	1000	4x13	8	-	PZ 2	Full
	KDH-40016(X5)	5	KMH-40016	1000	4x16	11	-	PZ 2	Full
	KDH-40020(X5)	5	KMH-40020	1000	4x20	15	-	PZ 2	Full
	KDH-40025(X5)	5	KMH-40025	1000	4x25	20	1	PZ 2	Full
	KDH-40030(X5)	5	KMH-40030	500	4x30	25	6	PZ 2	Full
	KDH-40035(X5)	5	KMH-40035	500	4x35	30	11	PZ 2	Full
	KDH-40040(X5)	5	KMH-40040	500	4x40	35	16	PZ 2	Full
	KDH-40045(X5)	5	KMH-40045	300	4x45	40	21	PZ 2	Full
	KDH-40050(X5)	5	KMH-40050	300	4x50	45	26	PZ 2	Full
	KDH-4005030(X5)	5	KMH-4005030	300	4x50	30	20	PZ 2	Partial
	KDH-40055(X5)	5	KMH-40055	250	4x55	50	31	PZ 2	Full
	KDH-40060(X5)	5	KMH-40060	250	4x60	55	36	PZ 2	Full
	KDH-4006035(X5)	5	KMH-4006035	250	4x60	35	25	PZ 2	Partial
	KDH-40070(X5)	5	KMH-40070	250	4x70	55	15	PZ 2	Partial

1. Max. usable length $t_{fix} = L_w - L_g$ for partially threaded screws
2. Max. usable length $t_{fix} = L_w - 6d_w$ for fully threaded screws

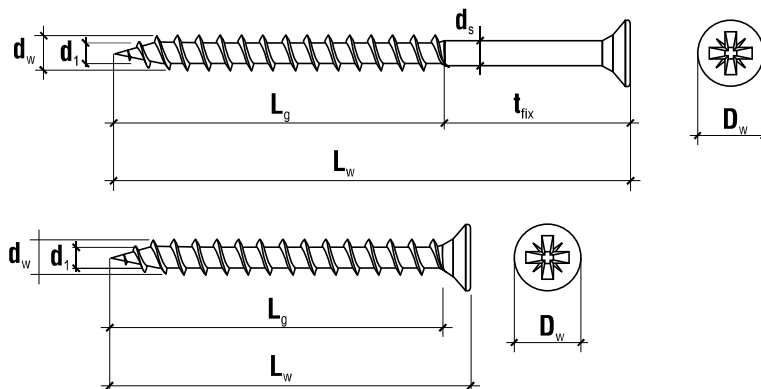
KDH/KMH - Hardened countersunk head wood screw with partial/full thread

Codes and dimensions									
	Product code				Dimensions	Thread length	Max. usable length	Type of drive	Type of thread
	Galvanized - yellow	[kg]	Galvanized - yellow	[pcs]	$d_w \times L_w$ [mm]	L_g [mm]	t_{fix} [mm]	[-]	[-]
KDH-4,5 / KMH-4,5									
ø4,5	KDH-45016(X5)	5	KMH-45016	1000	4,5x16	11	-	PZ 2	Full
	KDH-45020(X5)	5	KMH-45020	1000	4,5x20	15	-	PZ 2	Full
	KDH-45025(X5)	5	KMH-45025	500	4,5x25	20	-	PZ 2	Full
	KDH-45030(X5)	5	KMH-45030	500	4,5x30	25	3	PZ 2	Full
	KDH-45035(X5)	5	KMH-45035	500	4,5x35	30	8	PZ 2	Full
	KDH-45040(X5)	5	KMH-45040	300	4,5x40	35	13	PZ 2	Full
	KDH-45045(X5)	5	KMH-45045	300	4,5x45	40	18	PZ 2	Full
	KDH-45050(X5)	5	KMH-45050	250	4,5x50	45	23	PZ 2	Full
	KDH-45060(X5)	5	KMH-45060	250	4,5x60	55	33	PZ 2	Full
	KDH-45070(X5)	5	KMH-45070	250	4,5x70	55	15	PZ 2	Partial
	KDH-45080(X5)	5	KMH-45080	250	4,5x80	55	25	PZ 2	Partial
KDH-5 / KMH-5									
ø5	KDH-50020(X5)	5	KMH-50020	500	5x20	14	-	PZ 2	Full
	KDH-50025(X5)	5	KMH-50025	500	5x25	19	-	PZ 2	Full
	KDH-50030(X5)	5	KMH-50030	500	5x30	24	-	PZ 2	Full
	KDH-50035(X5)	5	KMH-50035	500	5x35	29	5	PZ 2	Full
	KDH-50040(X5)	5	KMH-50040	500	5x40	34	10	PZ 2	Full
	KDH-50045(X5)	5	KMH-50045	300	5x45	39	15	PZ 2	Full
	KDH-50050(X5)	5	KMH-50050	300	5x50	44	20	PZ 2	Full
	KDH-5005030(X5)	5	KMH-5005030	300	5x50	30	20	PZ 2	Partial
	KDH-50060(X5)	5	KMH-50060	200	5x60	54	30	PZ 2	Full
	KDH-5006035(X5)	5	KMH-5006035	200	5x60	35	25	PZ 2	Partial
	KDH-50070(X5)	5	KMH-50070	200	5x70	55	15	PZ 2	Partial
	KDH-50080(X5)	5	KMH-50080	200	5x80	55	25	PZ 2	Partial
	KDH-50090(X5)	5	KMH-50090	200	5x90	55	35	PZ 2	Partial
	KDH-50100(X5)	5	KMH-50100	200	5x100	55	45	PZ 2	Partial
	KDH-50120(X5)	5	KMH-50120	100	5x120	75	45	PZ 2	Partial
KDH-6 / KMH-6									
ø6	KDH-60040(X5)	5	KMH-60040	200	6x40	32	4	PZ 3	Full
	KDH-60050(X5)	5	KMH-60050	200	6x50	42	14	PZ 3	Full
	KDH-60060(X5)	5	KMH-60060	200	6x60	52	24	PZ 3	Full
	KDH-60070(X5)	5	KMH-60070	200	6x70	55	15	PZ 3	Partial
	KDH-60080(X5)	5	KMH-60080	200	6x80	55	25	PZ 3	Partial
	KDH-60090(X5)	5	KMH-60090	100	6x90	55	35	PZ 3	Partial
	KDH-60100(X5)	5	KMH-60100	100	6x100	55	45	PZ 3	Partial
	KDH-60110(X5)	5	KMH-60110	100	6x110	75	35	PZ 3	Partial
	KDH-60120(X5)	5	KMH-60120	100	6x120	75	45	PZ 3	Partial
	KDH-60140(X5)	5	KMH-60140	100	6x140	75	65	PZ 3	Partial
	KDH-60160(X5)	5	KMH-60160	100	6x160	75	85	PZ 3	Partial
	KDH-60180(X5)	5	KMH-60180	100	6x180	75	105	PZ 3	Partial
	KDH-60200(X5)	5	KMH-60200	100	6x200	75	125	PZ 3	Partial

1. Max. usable length $t_{fix} = L_w - L_g$ for partially threaded screws

2. Max. usable length $t_{fix} = L_w - 6d_w$ for fully threaded screws

KDH/KMH - Hardened countersunk head wood screw with partial/full thread



Geometry

Product	Outer thread diameter	Inner thread diameter	Unthreaded part diameter	Head diameter	Length range
	d_w [mm]	d_1 [mm]	d_s [mm]	D_w [mm]	L_w [mm]
KDH/KMH $\varnothing 3$	3	2	2,2	6	12-40
KDH/KMH $\varnothing 3,5$	3,5	2,2	2,45	7	13-60
KDH/KMH $\varnothing 4$	4	2,5	2,8	8	13-70
KDH/KMH $\varnothing 4,5$	4,5	2,7	3,1	9	16-80
KDH/KMH $\varnothing 5$	5	3,1	3,45	10	20-120
KDH/KMH $\varnothing 6$	6	3,8	4,25	12	40-200

Mechanical characteristics

Product	Characteristic yield moment	Characteristic withdrawal resistance parameter	Characteristic head-pull-through resistance parameter	Characteristic tensile strength	Characteristic torsional strength
	$M_{y,k}$ [N*m]	f_{ack} [N/mm ²]	$f_{head,k}$ [N/mm ²]	$f_{tens,k}$ [kN]	$f_{tor,k}$ [N*m]
KDH/KMH $\varnothing 3$	1,79	17,29	26,96	4,24	1,84
KDH/KMH $\varnothing 3,5$	2,61	16,92	24,29	5,13	2,55
KDH/KMH $\varnothing 4$	3,65	16,75	23,75	6,2	3,24
KDH/KMH $\varnothing 4,5$	6,35	16,69	22,74	7,25	4,63
KDH/KMH $\varnothing 5$	9,38	16,17	22,2	9,49	5,31
KDH/KMH $\varnothing 6$	13,55	15,59	21,82	14,23	11,6

1. Characteristic withdrawal resistance based on reference density of timber $\rho_a = 350 \text{ kg/m}^3$

2. Characteristic head-pull-through resistance based on reference density of timber $\rho_a = 350 \text{ kg/m}^3$

KDH/KMH - Hardened countersunk head wood screw with partial/full thread
TIMBER
Minimum distances for laterally loaded screws - timber

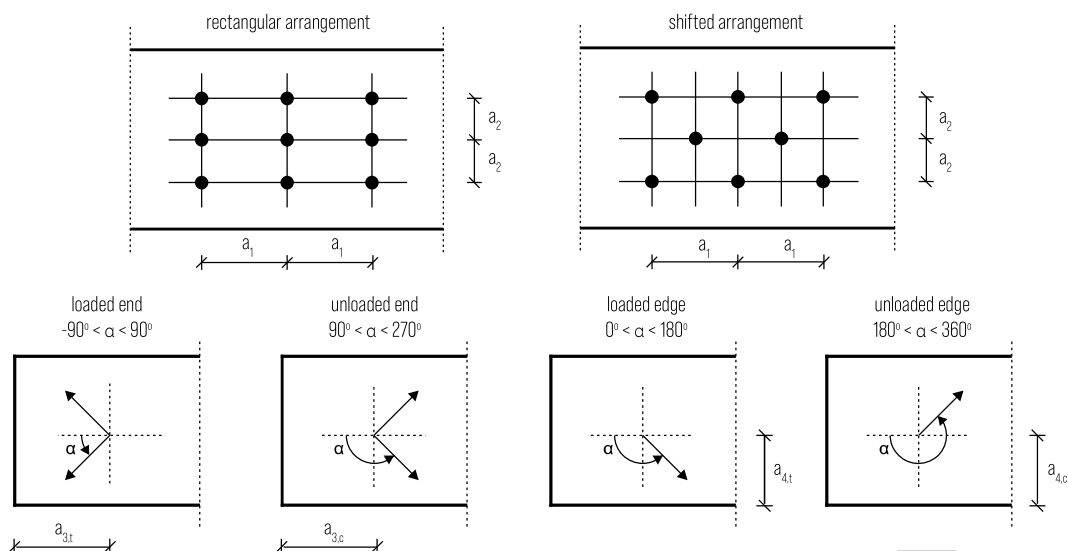
Angle between force and fiber direction $\alpha = 0^\circ$							Angle between force and fiber direction $\alpha = 90^\circ$						
WITHOUT PRE-DRILLED HOLE							WITHOUT PRE-DRILLED HOLE						
d_w [mm]	Ø 3	Ø 3.5	Ø 4	Ø 4.5	Ø 5	Ø 6	d_w [mm]	Ø 3	Ø 3.5	Ø 4	Ø 4.5	Ø 5	Ø 6
a_1 [mm]	30	35	40	45	60	72	a_1 [mm]	15	18	20	23	25	30
a_2 [mm]	15	18	20	23	25	30	a_2 [mm]	15	18	20	23	25	30
$a_{3,t}$ [mm]	45	53	60	68	75	90	$a_{3,t}$ [mm]	30	35	40	45	50	60
$a_{3,c}$ [mm]	30	35	40	45	50	60	$a_{3,c}$ [mm]	30	35	40	45	50	60
$a_{4,t}$ [mm]	15	18	20	23	25	30	$a_{4,t}$ [mm]	21	25	28	32	50	60
$a_{4,c}$ [mm]	15	18	20	23	25	30	$a_{4,c}$ [mm]	15	18	20	23	25	30
WITH PRE-DRILLED HOLE							WITH PRE-DRILLED HOLE						
d_w [mm]	Ø 3	Ø 3.5	Ø 4	Ø 4.5	Ø 5	Ø 6	d_w [mm]	Ø 3	Ø 3.5	Ø 4	Ø 4.5	Ø 5	Ø 6
d_0 [mm]	2	2	2,5	2,5	3	4	d_0 [mm]	2	2	2,5	2,5	3	4
a_1 [mm]	15	18	20	23	25	30	a_1 [mm]	12	14	16	18	20	24
a_2 [mm]	9	11	12	14	15	18	a_2 [mm]	12	14	16	18	20	24
$a_{3,t}$ [mm]	36	42	48	54	60	72	$a_{3,t}$ [mm]	21	25	28	32	35	42
$a_{3,c}$ [mm]	21	25	28	32	35	42	$a_{3,c}$ [mm]	21	25	28	32	35	42
$a_{4,t}$ [mm]	9	11	12	14	15	18	$a_{4,t}$ [mm]	15	18	20	23	35	42
$a_{4,c}$ [mm]	9	11	12	14	15	18	$a_{4,c}$ [mm]	9	11	12	14	15	18

1. Minimum distances in accordance with EN 1995

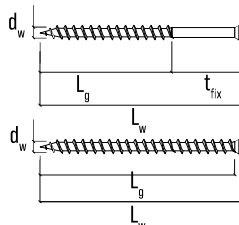
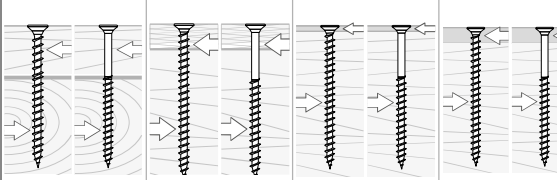
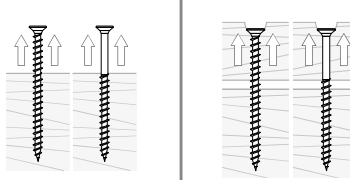
 2. Minimum distances is valid for timber characteristic density of $\rho_k \leq 420 \text{ kg/m}^3$

 3. In case of connection panel-timber minimum distances (a_1, a_2) should be multiplied by a factor of 0,85

 4. In case of connection steel-timber minimum distances (a_1, a_2) should be multiplied by a factor of 0,7

 5. Hole diameter d_0 is valid for softwood


KDH/KMH - Hardened countersunk head wood screw with partial/full thread
TIMBER
Characteristic resistances for laterally and axially loaded screws - timber

DIMENSIONS				SHEAR				TENSION	
Diameter	Length	Thread length	Usable length	timber-timber	OSB-timber	steel-timber (thin plate)	steel-timber (thick plate)	Withdrawal	Head pull-through
									
d_w [mm]	L_w [mm]	L_g [mm]	t_{fix} [mm]	R_{vk} [kN]	R_{vk} [kN]	R_{vk} [kN]	R_{vk} [kN]	$R_{ak,k}$ [kN]	$R_{head,k}$ [kN]
KDH 3									
ø3	3x12	9	-	-	-	0,21	0,45	0,45	0,97
	3x13	10	-	-	-	0,23	0,50	0,50	0,97
	3x16	13	-	-	-	0,29	0,61	0,64	0,97
	3x20	17	2	0,10	-	0,37	0,70	0,84	0,97
	3x25	22	7	0,35	-	0,47	0,84	1,09	0,97
	3x30	27	12	0,54	0,68	0,57	0,98	1,34	0,97
	3x35	32	17	0,58	0,75	0,67	1,08	1,59	0,97
	3x40	37	22	0,63	0,75	0,77	1,15	1,84	0,97
KDH 3,5									
ø3,5	3,5x13	9	-	-	-	0,24	0,51	0,51	1,19
	3,5x16	12	-	-	-	0,31	0,68	0,68	1,19
	3,5x20	16	-	-	-	0,40	0,80	0,91	1,19
	3,5x25	21	4	0,22	-	0,50	0,94	1,19	1,19
	3,5x30	26	9	0,49	0,75	0,61	1,10	1,47	1,19
	3,5x35	31	14	0,70	0,87	0,72	1,26	1,76	1,19
	3,5x40	36	19	0,75	0,90	0,83	1,37	2,04	1,19
	3,5x45	41	24	0,80	0,90	0,94	1,45	2,32	1,19
	3,5x50	46	29	0,82	0,90	1,04	1,52	2,61	1,19
	3,5x60	56	39	0,82	0,90	1,22	1,66	3,17	1,19
KDH 4									
ø4	4x13	8	-	-	-	0,26	0,53	0,51	1,52
	4x16	11	-	-	-	0,33	0,71	0,70	1,52
	4x20	15	-	-	-	0,43	0,92	0,96	1,52
	4x25	20	1	-	-	0,54	1,06	1,28	1,52
	4x30	25	6	0,35	-	0,66	1,23	1,60	1,52
	4x35	30	11	0,65	-	0,78	1,40	1,92	1,52
	4x40	35	16	0,89	1,10	0,90	1,58	2,24	1,52
	4x45	40	21	0,93	1,15	1,02	1,71	2,56	1,52
	4x50	45	26	0,99	1,15	1,13	1,79	2,88	1,52
	4x50	30	20	0,97	1,13	1,13	1,55	1,92	1,52
	4x55	50	31	1,02	1,15	1,25	1,87	3,20	1,52
	4x60	55	36	1,02	1,15	1,37	1,95	3,52	1,52
	4x60	35	25	1,04	1,15	1,32	1,63	2,24	1,52
	4x70	55	15	0,89	1,15	1,51	1,95	3,52	1,52

partially threaded screws

KDH/KMH - Hardened countersunk head wood screw with partial/full thread
TIMBER

Characteristic resistances for laterally and axially loaded screws - timber

DIMENSIONS				SHEAR				TENSION	
Diameter	Length	Thread length	Usable length	timber-timber	OSB-timber	steel-timber (thin plate)	steel-timber (thick plate)	Withdrawal	Head pull-through
d_w [mm]	L_w [mm]	L_g [mm]	t_{fix} [mm]	R_{vk} [kN]	R_{vk} [kN]	R_{vk} [kN]	R_{vk} [kN]	$R_{ax,k}$ [kN]	$R_{head,k}$ [kN]
KDH 4,5									
ø4,5	4,5x16	11	-	-	-	0,36	0,75	0,79	1,84
	4,5x20	15	-	-	-	0,46	1,01	1,08	1,84
	4,5x25	20	-	-	-	0,60	1,31	1,44	1,84
	4,5x30	25	3	0,20	-	0,73	1,47	1,80	1,84
	4,5x35	30	8	0,52	-	0,86	1,65	2,16	1,84
	4,5x40	35	13	0,85	1,21	0,99	1,83	2,51	1,84
	4,5x45	40	18	1,09	1,40	1,12	2,03	2,87	1,84
	4,5x50	45	23	1,14	1,42	1,25	2,23	3,23	1,84
	4,5x60	55	33	1,28	1,42	1,51	2,47	3,95	1,84
	4,5x70	55	15	0,98	1,42	1,77	2,47	3,95	1,84
	4,5x80	55	25	1,27	1,42	2,03	2,47	3,95	1,84
KDH 5									
ø5	5x20	14	-	-	-	0,48	1,03	1,08	2,22
	5x25	19	-	-	-	0,62	1,37	1,47	2,22
	5x30	24	-	-	-	0,75	1,66	1,86	2,22
	5x35	29	5	0,34	-	0,89	1,82	2,24	2,22
	5x40	34	10	0,68	-	1,03	2,01	2,63	2,22
	5x45	39	15	1,03	1,40	1,16	2,21	3,02	2,22
	5x50	44	20	1,29	1,60	1,30	2,41	3,40	2,22
	5x50	30	20	1,29	1,50	1,30	2,14	2,32	2,22
	5x60	54	30	1,41	1,77	1,58	2,84	4,18	2,22
	5x60	35	25	1,43	1,71	1,58	2,47	2,71	2,22
	5x70	55	15	1,03	1,77	1,85	2,91	4,25	2,22
	5x80	55	25	1,50	1,77	2,12	2,91	4,25	2,22
	5x90	55	35	1,66	1,77	2,37	2,91	4,25	2,22
	5x100	55	45	1,84	1,77	2,37	2,91	4,25	2,22
	5x120	75	45	1,84	1,77	2,61	3,29	5,80	2,22

NOTES:

1. Characteristic resistances in accordance with EN 1995

2. In order to obtain a design resistance, use the following formula : $R_d = \frac{R_k * k_{mod}}{\gamma_M}$ Factors γ_M and k_{mod} should be taken in accordance with EN 19953. Characteristic resistances were calculated for a characteristic density of timber $\rho_k = 350 \text{ kg/m}^3$ 4. Characteristic resistances were calculated for penetration length at least $6d_w$

5. Characteristic shear resistances were calculated for connections without pre-drilled holes

6. Characteristic shear resistances for OSB-timber connections were calculated for OSB board with thickness t [mm] and characteristic density $\rho_k = 500 \text{ kg/m}^3$ 7. Characteristic shear resistances for steel-timber connections were calculated for thin steel plate with thickness $t \leq 0,5d_w$ 8. Characteristic shear resistances for steel-timber connections were calculated for thick steel plate with thickness $t \geq d_w$ 9. Characteristic shear resistances were calculated based on usable length $t_{fix} = L_w - L_g$ for partially threaded screws10. Characteristic shear resistances were calculated based on usable length $t_{fix} = L_w - 6d_w$ for fully threaded screws11. Characteristic withdrawal resistances were calculated assuming an angle of 90° between screw and grain direction and for penetration length equal L_g

12. Characteristic head pull-through resistances were calculated for timber element

partially threaded screws

KDH/KMH - Hardened countersunk head wood screw with partial/full thread

TIMBER

Characteristic resistances for laterally and axially loaded screws - timber

DIMENSIONS				SHEAR				TENSION			
Diameter	Length	Thread length	Usable length	timber-timber	OSB-timber	steel-timber (thin plate)	steel-timber (thick plate)	Withdrawal	Head pull-through		
d _w [mm]	L _w [mm]	L _g [mm]	t _{fix} [mm]	R _{Vk} [kN]	R _{Vk} [kN]	R _{Vk} [kN]	R _{Vk} [kN]	R _{ax,k} [kN]	R _{head,k} [kN]		
KDH 6											
ø6	6x40	32	4	0,31	t = 15 mm	-	1,16	t = 6 mm	2,19	2,15	3,14
	6x50	42	14	1,09		1,65	1,47		2,58	2,82	3,14
	6x60	52	24	1,63		1,96	1,78		3,00	3,49	3,14
	6x70	55	15	1,17		1,96	2,09		3,33	3,69	3,14
	6x80	55	25	1,95		1,96	2,41		3,33	3,69	3,14
	6x90	55	35	2,11		1,96	2,64		3,33	3,69	3,14
	6x100	55	45	2,31		1,96	2,64		3,33	3,69	3,14
	6x110	75	35	2,11		1,96	2,99		3,68	5,03	3,14
	6x120	75	45	2,31		1,96	2,99		3,68	5,03	3,14
	6x140	75	65	2,46		1,96	2,99		3,68	5,03	3,14
	6x160	75	85	2,46		1,96	2,99		3,68	5,03	3,14
	6x180	75	105	2,46		1,96	2,99		3,68	5,03	3,14
	6x200	75	125	2,46		1,96	2,99		3,68	5,03	3,14

NOTES:

1. Characteristic resistances in accordance with EN 1995

2. In order to obtain a design resistance, use the following formula :

$$R_d = \frac{R_k * k_{mod}}{\gamma_m}$$

Factors γ_m and k_{mod} should be taken in accordance with EN 1995

3. Characteristic resistances were calculated for a characteristic density of timber $\rho_k = 350 \text{ kg/m}^3$

4. Characteristic resistances were calculated for penetration length at least $6d_w$

5. Characteristic shear resistances were calculated for connections without pre-drilled holes

6. Characteristic shear resistances for OSB-timber connections were calculated for OSB board with thickness t [mm] and characteristic density $\rho_k = 500 \text{ kg/m}^3$

7. Characteristic shear resistances for steel-timber connections were calculated for thin steel plate with thickness $t \leq 0,5d_w$

8. Characteristic shear resistances for steel-timber connections were calculated for thick steel plate with thickness $t \geq d_w$

9. Characteristic shear resistances were calculated based on usable length $t_{fix} = L_w - L_g$ for partially threaded screws

10. Characteristic shear resistances were calculated based on usable length $t_{fix} = L_w - 6d_w$ for fully threaded screws

11. Characteristic withdrawal resistances were calculated assuming an angle of 90° between screw and grain direction and for penetration length equal L_g

12. Characteristic head pull-through resistances were calculated for timber element

partially threaded screws