

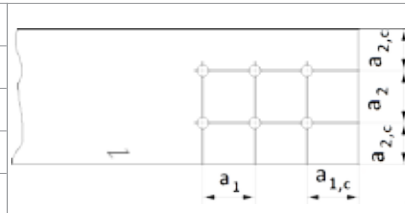


Minimum distances and legend

Minimum distances^{b)} (in mm)

Distance a_2 can be reduced to $2.5 \times d$ ($3 \times d$) if $25 \times d^2$ ($21 \times d^2$) can be maintained for the product for the distances a_1 and a_2 .
 This is valid for screws with $d \leq 8$ mm and can be applied - specific to $\varnothing 10$ mm and $\varnothing 12$ mm - exclusively to half-point screws.

	$\varnothing 4$	$\varnothing 4,5$	$\varnothing 5$	$\varnothing 6$	$\varnothing 8$	$\varnothing 10$	$\varnothing 12$
a_1	20	22,5	25	30	40	70	84
a_2	20	22,5	25	30	40	50	60
$a_{1,c}$	20	22,5	25	30	40	100	120
$a_{2,c}$	16	18	20	24	32	40	48



Legend:

- a) ...For these measurements, there are no shearing distances for wood-wood connections, because the necessary thickness of fixture according to ETA 12/0373 Appendix 7 Table A7.1 is not reached.
 For steel-wood connections there is no stipulated minimum thickness of fixture.
- b) ...The minimum distances are specified in accordance with ETA 12/0373 A.7.3 for stress in the screw axis, and apply - specific to $\varnothing 10$ and $\varnothing 12$ - exclusively to half-point screws.
- c) ...In order to be able to apply these minimum heights ($12 \times d$), the minimum distances must be selected in accordance with Eurocode 5 .
- d) ... $a_{2,red}$ was selected according to the table of minimum distances (contingent upon the screw pairs).
- e) ...The specified tolerance (Tol.) was selected for any mounting inaccuracies in angular position and embedment depth of the screws. For the user, the rated values are reduced.
- f) ...The thickness of fixture (AD) was determined as follows: $AD = L - b/2$
 According to ETA 12/0373 Appendix 7 Table A7.1 the required thickness of fixture for wood-wood connection has to be observed.
 $d = 8$ mm.....ADmin = 30 mm
 $d = 10$ mm.....ADmin = 40 mm
 $d = 12$ mm.....ADmin = 80 mm
 For steel-wood connections there is no stipulated minimum thickness of fixture.
- g) ...The minimum height of the attachment ADmin is calculated on the basis of the length of the screw as follows:
 $ADmin = [L - (b/2)] \cdot \sin(45^\circ)] + (Tol./2)$
- h) ...Other head types are available upon request.
- i) ...For those diameters ETA-values are not available.
- j) ...No Half-tip



Information:

- m....mounted installation dimension, m_{OFL}....screw attachment point
- Geometry and mechanical properties comply with ETA 12/0373.
- The extraction values of the thread are calculated based on an angle of 45° to 90° to the wood grain.
- The specified values relate to wood with a characteristic gross density $\rho_k = 350 \text{ kg/m}^3$ (C24). The calculation for softwoods is made with the factor $(\rho_k/350)^{0.8}$.
- In shear joints, 50% of the thread portion of the fullthread screw must be screwed in on both sides of the joint.
- The thickness of the fixture has been chosen equal to the shaft length.
- All values are calculated on fully screwed-in threads.
- The drill diameter for the RAPID® Dual and RAPID® SuperSenkFix is 1mm larger than the shoulder diameter.
- In the case of steel-wood connections, a steel plate with a thickness $t = d$ (thick steel plate) was taken as the basis of the calculation.
- In primary/secondary support joints, the primary support must be adequately embedded so as to be able to bear torsion and anchor the shaft.
- In primary/secondary support joints, the specified values apply only to vertically aligned stress. Any transverse stresses that exist must be separately verified.
- For the calculation the rope effect was considered.
- Note: In shear joints (with unilateral skewing), only unidirectional forces can be absorbed.
- Allowable stress design values R_{ASD} (grey columns): Measurement according to DIN 1052:1988 and according to German licences Z-9.1-656 for RAPID® Vollgewinde, Z-9.1-564 for RAPID® Komplex, RAPID® 2000 and Z-9.1-435 for StarDrive GPR®, RAPID® Dual and RAPID® SuperSenkFix
- Characteristic values (blue columns): Measurement according to Eurocode 5 (EC5) and ETA 12/0373
- The rated value of load capacity $F_{v,Rd}$ for the final design of the timber joint is obtained from the characteristic values as follows:

$$F_{R,d} = \frac{F_{R,k} \cdot k_{mod}}{\gamma_m}$$

$F_{R,d}$...design value of bearing capacity on shearing and extraction per connection element

$F_{R,k}$...characteristic value of bearing capacity on shearing and extraction per connection element

γ_m, k_{mod} ...coefficients of corresponding national norms

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