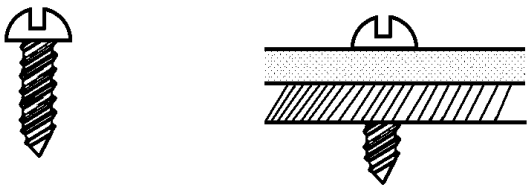
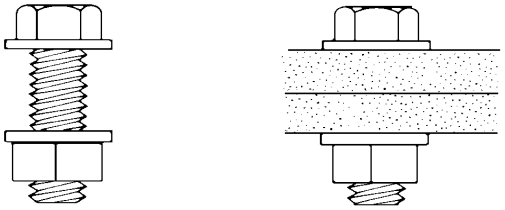
Mechanical Fastenings

Application Fastener Engaged

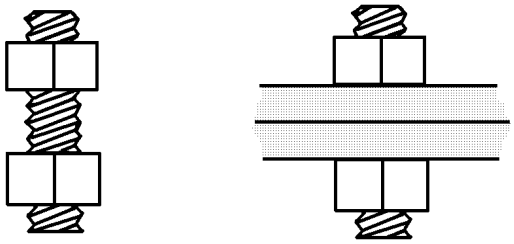
SCREW
Used for fastening FRP profiles to metal. Use metal as backup to fiberglass.



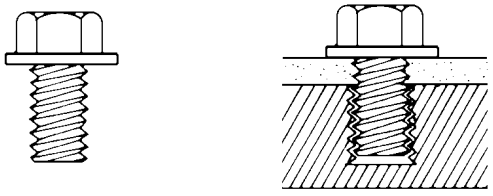
BOLT AND NUT
Used for fastening profiles together. Best to use Washers to distribute load whenever possible. Steel, galvanized, silicon, bronze, nylon, polyester and other materials available for a wide range of applications. Check with your supplier.



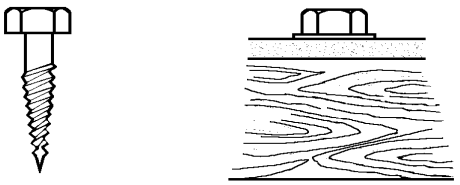
SUPERSTUD!™/NUTS!
Threaded fiberglass rods with moulded fiberglass nuts. Good for highly corrosion applications. Good shear values.



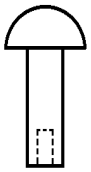
BOLTS AND THREADED HOLE
Possible assembly technique; however, special construction of FRP Profile required. Fiberglass nuts above are made by this technique. Epoxies or other adhesives greatly improve joint strength.

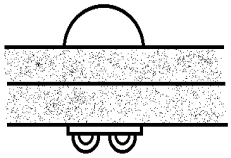


LAG SCREW
Can be used to attach profiles to wood. Washer should be used to distribute load. Not recommended for attaching fiberglass to fiberglass.

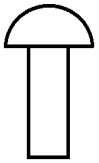


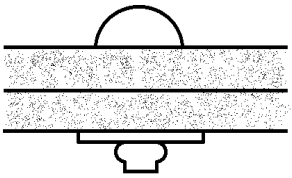
TUBULAR RIVET
Used in conjunction with washer or metal backup plate. Stronger than pop-rivets because of solid shank. Requires accessibility from both sides of profile.



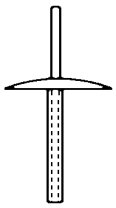


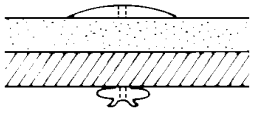
SOLID RIVET
Use with backup plate or washer. Must have accessibility to both sides of profile.





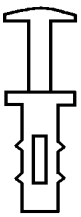
BLIND RIVET
Pull-up mandrel. Special tool required. Assembly from one side only. Good for fiberglass to metal or with washer backup. Steel or aluminium.

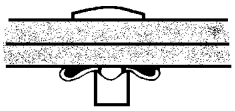




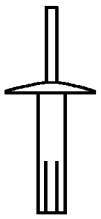
Application | Fastener | Engaged

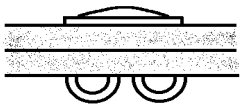
NYLON RIVET
Crimp type rivet. Requires special tool for installation. Good for insulating in mildly corrosive environment.



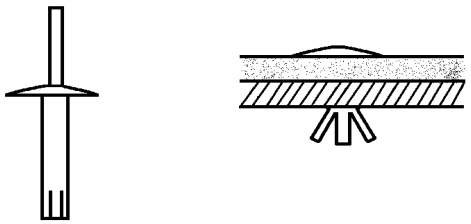


T-RIVET (Aluminium)
Good for metal to fiberglass or fiberglass to fiberglass with backup plate. Wide expansion provides good load distribution and prevents tear.

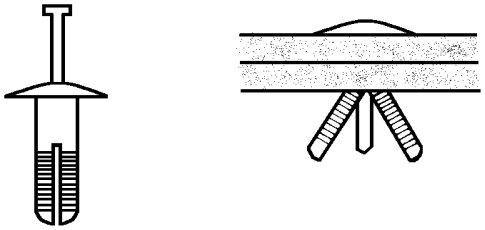




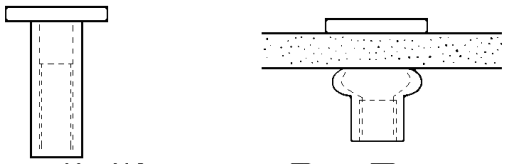
DRIVE RIVET (Aluminium)
Good for fiberglass to metal. Can be installed with hammer. Can also be removed from one side by driving out mandrel.



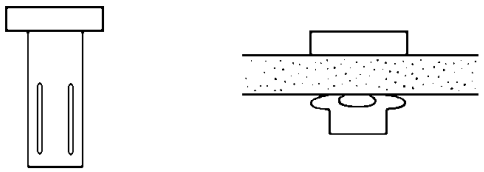
DRIVE RIVET (Nylon)
Installed with hammer. Same as above. Lower shear value than metal. Center core stays in place.



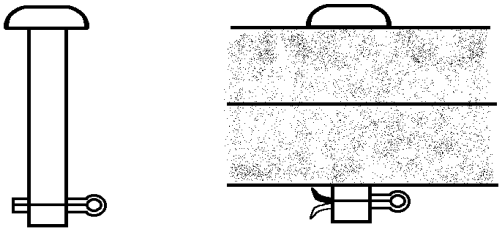
BLIND THREAD INSERTS
Applies metal threads to profile. Good for products for which disassembly is required. Hexagon shape available to prevent twist. Special tool required.



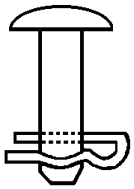
BLIND THREAD INSERTS
Better torque and shear strength. Loads are more evenly spread on back surface

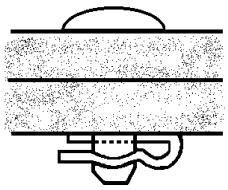


CLEVIS AND PIN (Metal)
Can be used for some installations. Not normally a very tight fit.



CLEVIS AND PIN (Nylon)
Used in some installations. Electrical insulating properties





Hole Placing for bolts and rivets

Placement ratio distance / bolt diameter		
	Range	Recommended
Distance to an edge – end	2.0 – 4.5	3.0
Distance to an edge – side	1.5 – 3.5	2.0
Distance between holes	4.0 – 5.0	5.0

Recommendations on Twisting Level

ASTM A325	Low twisting moment	High twisting moment
	37.5% of bolt strength	75% of bolt strength
Bolt size	Rotation (N m)	Rotation (N m)
13	39	77
16	77	153

Bolt Connections Shearing Strength (kN)

Bolts' strength class: 8,8
Washers diameters for bolt and nut: $D=D_{bolt}$ *2
Bolt hole diameter: $D=D_{bolt}$ + 1mm

Strength (P) in kN in longitudinal direction

Bolt	Bolt Shearing Strength (kN)		Thickness of an Element (mm)															
	1 shear	2 shears	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
M 6	2.7	5.4	3.5	4.2	4.8	5.5	6.2	6.9	7.6	8.3	9.0	9.7	10.4	11.1	11.8	12.5	13.2	13.8
M 8	4.8	9.5	4.6	5.5	6.5	7.4	8.3	9.2	10.2	11.1	12.0	12.9	13.8	14.8	15.7	16.6	17.5	18.5
M 10	7.4	14.9	5.8	6.9	8.1	9.2	10.4	11.5	12.7	13.8	15.0	16.2	17.3	18.5	19.6	20.8	21.9	23.1
M 12	10.7	21.4	6.9	8.3	9.7	11.1	12.5	13.8	15.2	16.6	18.0	19.4	20.8	22.2	23.5	24.9	26.3	27.7
M 14	14.6	29.2	8.1	9.7	11.3	12.9	14.5	16.2	17.8	19.4	21.0	22.6	24.2	25.8	27.5	29.1	30.7	32.3
M 16	19	38.1	9.2	11.1	12.9	14.8	16.6	18.5	20.3	22.2	24.0	25.8	27.7	29.5	31.4	33.2	35.1	36.9
M 20	30	59	11.5	13.8	16.2	18.5	20.8	23.1	25.4	27.7	30.0	32.3	34.6	36.9	39.2	41.5	43.8	46.2
M 22	36	72	12.7	15.2	17.8	20.3	22.8	25.4	27.9	30.5	33.0	35.5	38.1	40.6	43.2	45.7	48.2	50.8
M 24	43	86	13.8	16.6	19.4	22.2	24.9	27.7	30.5	33.2	36.0	38.8	41.5	44.3	47.1	49.8	52.6	55.4
M 27	54	109	15.6	18.7	21.8	24.9	28.0	31.2	34.3	37.4	40.5	43.6	46.7	49.8	53.0	56.1	59.2	62.3
M 30	67	134	17.3	20.8	24.2	27.7	31.2	34.6	38.1	41.5	45.0	48.5	51.9	55.4	58.8	62.3	65.8	69.2
M 36	96	193	20.8	24.9	29.1	33.2	37.4	41.5	45.7	49.8	54.0	58.2	62.3	66.5	70.6	74.8	78.9	83.1
M 42	131	262	24.2	29.1	33.9	38.8	43.6	48.5	53.3	58.2	63.0	67.8	72.7	77.5	82.4	87.2	92.1	96.9
M 48	171	343	27.7	33.2	38.8	44.3	49.8	55.4	60.9	66.5	72.0	77.5	83.1	88.6	94.2	99.7	105.2	110.8

Strength (P) in kN in lateral direction																		
Bolt	Bolt Shearing Strength (kN)		Thickness of an Element (mm)															
	1 shear	2 shears	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
M 6	2.7	5.4	1.6	1.9	2.3	2.6	2.9	3.2	3.6	3.9	4.2	4.5	4.8	5.2	5.5	5.8	6.1	6.5
M 8	4.8	9.5	2.2	2.6	3.0	3.4	3.9	4.3	4.7	5.2	5.6	6.0	6.5	6.9	7.3	7.8	8.2	8.6
M 10	7.4	14.9	2.7	3.2	3.8	4.3	4.8	5.4	5.9	6.5	7.0	7.5	8.1	8.6	9.2	9.7	10.2	10.8
M 12	10.7	21.4	3.2	3.9	4.5	5.2	5.8	6.5	7.1	7.8	8.4	9.0	9.7	10.3	11.0	11.6	12.3	12.9
M 14	14.6	29.2	3.8	4.5	5.3	6.0	6.8	7.5	8.3	9.0	9.8	10.6	11.3	12.1	12.8	13.6	14.3	15.1
M 16	19	38.1	4.3	5.2	6.0	6.9	7.8	8.6	9.5	10.3	11.2	12.1	12.9	13.8	14.6	15.5	16.4	17.2
M 20	30	59	5.4	6.5	7.5	8.6	9.7	10.8	11.8	12.9	14.0	15.1	16.2	17.2	18.3	19.4	20.5	21.5
M 22	36	72	5.9	7.1	8.3	9.5	10.7	11.8	13.0	14.2	15.4	16.6	17.8	19.0	20.1	21.3	22.5	23.7
M 24	43	86	6.5	7.8	9.0	10.3	11.6	12.9	14.2	15.5	16.8	18.1	19.4	20.7	22.0	23.3	24.6	25.8
M 27	54	109	7.3	8.7	10.2	11.6	13.1	14.5	16.0	17.4	18.9	20.4	21.8	23.3	24.7	26.2	27.6	29.1
M 30	67	134	8.1	9.7	11.3	12.9	14.5	16.2	17.8	19.4	21.0	22.6	24.2	25.8	27.5	29.1	30.7	32.3
M 36	96	193	9.7	11.6	13.6	15.5	17.4	19.4	21.3	23.3	25.2	27.1	29.1	31.0	33.0	34.9	36.8	38.8
M 42	131	262	11.3	13.6	15.8	18.1	20.4	22.6	24.9	27.1	29.4	31.7	33.9	36.2	38.4	40.7	43.0	45.2
M 48	171	343	12.9	15.5	18.1	20.7	23.3	25.8	28.4	31.0	33.6	36.2	38.8	41.4	43.9	46.5	49.1	51.7

Bolt Connection Tensile/Compression Strength

Bolts' strength class: 8,8

Washers diameters for bolt and nut: $D=D_{bolt}$ *2

Bolt hole diameter: $D=D_{bolt}$ + 1mm

Bolt Connection Tensile/Compression Strength																	
Bolt	Bolt Power	Split thickness (mm)															
		5	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
M 6	2.7	3.6	4.3	5.1	5.8	6.5	7.2	8.0	8.7	9.4	10.1	10.9	11.6	12.3	13.0	13.8	14.5
M 8	5.1	4.8	5.8	6.8	7.7	8.7	9.7	10.6	11.6	12.6	13.5	14.5	15.5	16.4	17.4	18.4	19.3
M 10	8.1	6.0	7.2	8.5	9.7	10.9	12.1	13.3	14.5	15.7	16.9	18.1	19.3	20.5	21.7	23.0	24.2
M 12	11.8	7.2	8.7	10.1	11.6	13.0	14.5	15.9	17.4	18.8	20.3	21.7	23.2	24.6	26.1	27.5	29.0
M 14	16.1	8.5	10.1	11.8	13.5	15.2	16.9	18.6	20.3	22.0	23.7	25.4	27.1	28.8	30.4	32.1	33.8
M 16	21.9	9.7	11.6	13.5	15.5	17.4	19.3	21.3	23.2	25.1	27.1	29.0	30.9	32.9	34.8	36.7	38.7
M 20	34	12.1	14.5	16.9	19.3	21.7	24.2	26.6	29.0	31.4	33.8	36.2	38.7	41.1	43.5	45.9	48.3
M 22	42	13.3	15.9	18.6	21.3	23.9	26.6	29.2	31.9	34.6	37.2	39.9	42.5	45.2	47.8	50.5	53.2
M 24	49	14.5	17.4	20.3	23.2	26.1	29.0	31.9	34.8	37.7	40.6	43.5	46.4	49.3	52.2	55.1	58.0

M 27	64	16.3	19.6	22.8	26.1	29.4	32.6	35.9	39.1	42.4	45.7	48.9	52.2	55.5	58.7	62.0	65.2
M 30	78	18.1	21.7	25.4	29.0	32.6	36.2	39.9	43.5	47.1	50.7	54.4	58.0	61.6	65.2	68.9	72.5
M 36	114	21.7	26.1	30.4	34.8	39.1	43.5	47.8	52.2	56.5	60.9	65.2	69.6	73.9	78.3	82.6	87.0
M 42	156	25.4	30.4	35.5	40.6	45.7	50.7	55.8	60.9	66.0	71.0	76.1	81.2	86.3	91.3	96.4	101.5
M 48	205	29.0	34.8	40.6	46.4	52.2	58.0	63.8	69.6	75.4	81.2	87.0	92.8	98.6	104.4	110.2	116.0