AP16 ø5,0xL

Materials

● Rivet body:
Aluminum EN AW-5019 (AW-AlMg5)
● Mandrel:
Stainless steel A2 1.4541

Metal sheet: steel or aluminum

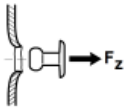
Head type: dome head

Rivet body: ø = 5,0 mm

Predrill: ø = 5,1 mm

Head diameter: D = 16mm

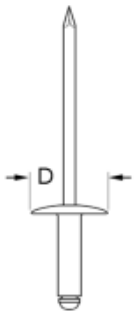
Pull-out load F_z (N)

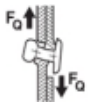
Part II 

Part II (blind side)			Part I (setting side)			Test results (N)		
Material grade	$R_{m,min}$	t_{II} (mm)	Material grade	t_I (mm)	KL in mm	$F_{z,avg}$	s	R_k
Steel Sheet								
S320 GD	390 N/mm²	0.75				1139	22	**854**
S320 GD	390 N/mm²	1.25				2394	43	**1936**
S320 GD	390 N/mm²	1.50				3188	87	**2641**
Aluminum Sheet								
Aluminium	190 N/mm²	1.80				2117	113	**1602**
AlMg3 1/4 hard	220 N/mm²	2.00				2179	76	**1787**
AlMg3 1/4 hard	220 N/mm²	3.00				4355	75	**3525**

Shear load F_q (N)

$F_{q,avg}$ is measured between a displacement of max 3 mm



Part II 

Part I

Part II (blind side)			Part I (setting side)			Test results (N)		
Material grade	$R_{m,min}$	t_{II} (mm)	Material grade	t_I (mm)	KL in mm	$F_{q,avg}$	s	R_k
Steel Sheet			**Steel**					
S320 GD	390 N/mm²	0.75	S235	10.00	10.75	2525	40	**1830**
Aluminum Sheet								
Aluminium	190 N/mm²	1.80	S235	10.00	11.80	3252	60	**2659**

Tensile breaking load Z_b (N)

$Z_b \geq 3.950$ N

Shear breaking load Q_b (N)

$Q_b \geq 2.250$ N

$R_{m,min}$ is the minimum standard tensile strength of Part 1 or 2

t is the nominal steel thickness of Part 1 or 2

F_{avg} or $\bar{X}$ are the arithmetic mean values of the test results.

s is the standard deviation.

R_k is the caracteristic resistance of fastenings according to the EN requirements

All calculations, measurements, fasteners and design methods have to be verified by a responsible designer or engineer, regarding the corresponding structure and load. Please consult your national norms and approvals.

Evaluation of the characteristic value R_k for the F_z, F_u and F_q: equations (1) and (2)

(1) $R_k = (F_{avg} - k * s) * \alpha$

, where F_{avg} is the mean of ultimate failure loads, and corresponds to tests: F_z, F_u and F_q
k is the statistical coefficient
s is the standard deviation
α is the material correction factor

- the sample size n for all tests is 12 pieces
- k = 2,048 with a sample size n = 12
- the maximum value of F_{avg} for shear load, is obtained between a displacement of 0,5-3,0mm
- Part 1 is considered critical for failure in shear unless otherwise marked

(2) $\alpha = (R_{m,min}/R_{m,obs} * t_{min}/t_{obs})$

, where $R_{m,min}$ is the minimum standard tensile strength of Parts 1 or 2
$R_{m,obs}$ is the actual, tested tensile strength of Parts 1 or 2
t_{min} is the minimum standard steel thickness of Parts 1 or 2
t_{obs} is the actual, tested steel thickness of Parts 1 or 2

Sources:
- material properties according to the European product standards (EN)
- thickness tolerances according to the European product standards (EN)
- design thickness t_{min} for aluminium is set to 90% of the nominal
- test methods according to EN 1993-1-3, CUAP 06.02/07 and ECCS 124