BS EN 6101:2016

BSI Standards Publication

Aerospace series — Rivet, 100° medium flush head, close tolerance — Inch series

bsi.

National foreword

This British Standard is the UK implementation of EN 6101:2016.

The UK participation in its preparation was entrusted to Technical Committee ACE/12, Aerospace fasteners and fastening systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

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EN 6101

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English Version

Aerospace series - Rivet, 100° medium flush head, close tolerance - Inch series

Série aérospatiale - Rivets de précision, 100° tête fraisée médium - Série en inches

Luft- und Raumfahrt - Vollniet, 100° Medium Senkkopf, enge Toleranz - Zoll-Reihe

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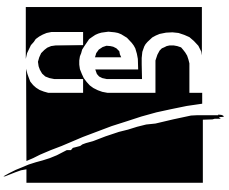

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European foreword

This document (EN 6101:2016) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

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1 Scope

This European Standard specifies the dimensions, tolerances and mass of rivets with 100° medium flush head, close tolerance, inch series, for aerospace application.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 2114, *Aluminium 1050A-H14 — Wire for solid rivets — D ≤ 10 mm*[1)]

EN 2115, *Aerospace series — Aluminium alloy 2117-T42 — Wire for solid rivets — D ≤ 10 mm*

EN 2116, *Aerospace series — Aluminium alloy 2017A-T42 — Wire for solid rivets — D ≤ 10 mm*

EN 2117, *Aerospace series — Aluminium alloy AL-P5056A (5056A)-H32 — Wire for solid rivets — D ≤ 10 mm*

EN 2424, *Aerospace series — Marking of aerospace products*

EN 2941, *Aerospace series — Nickel alloy rivets — Technical specification*

EN 3115, *Aerospace series — Aluminium alloy 7050-T73 — Wire for solid rivets — D ≤ 10 mm*

EN 4372, *Aerospace series — Heat resisting nickel alloy with copper NI-PD9001 (NiCu31) — Wire for solid rivets — D ≤ 10 mm*

EN 6104, *Aerospace series — Rivets, solid, in aluminium or aluminium alloy — Inch series — Technical specification*

EN 6118, *Aerospace series — Process specification — Aluminium base protection for fasteners*[1)]

ISO 8080, *Aerospace — Anodic treatment of titanium and titanium alloys — Sulfuric acid process*

SAE AMS 4982, *Titanium alloy wire 44.5 Cb*[2)]

SAE AMS-QQ-P-416, *Plating, cadmium (electrodeposited)*[2)]

MIL-A-8625, *Anodic coatings for aluminum and aluminum alloys*[3)]

MIL-C-5541, *Chemical conversion coatings on aluminium and aluminium alloys*[3)]

NAS 9800, *Head protrusion gaging, 100° flush head fasteners, gage block, gage diameters and stylus*[4)]

NASM 5674, *Rivets, structural, aluminium alloy, titanium columbium alloy, general specification for*[4)]

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1) Published as ASD-STAN Prestandard at the date of publication of this standard (www.asd-stan.org).

2) Published by: Society of Automotive Engineers (SAE), 400 Commonwealth Drive, Warrendale, PA 15096-0001.

3) Published by: Department of Defense(DoD), the Pentagon, Washington, D.C. 20301.

4) Published by: Aerospace Industries Association of America, Inc. (AIA), 1250 Eye Street, N.W., Washington, D.C. 20005-3924, USA

3 Requirements

3.1 Configuration, dimensions, tolerances and mass

The configuration shall conform with Figure 1.

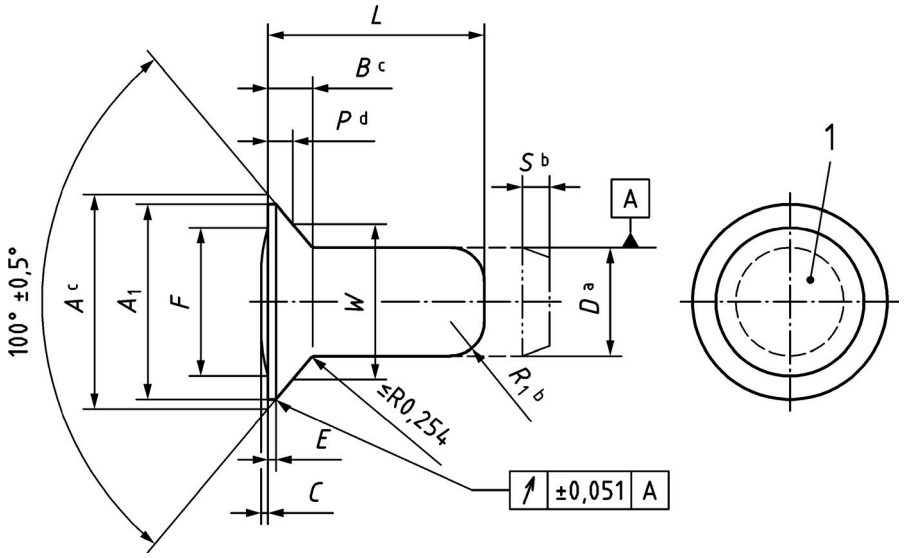
The dimensions, tolerances and mass shall conform with Figure 1 and Tables 1 and 3.

The dimensions and tolerances of oversizes (for repair purposes only) shall conform with Figure 1 and Tables 2 and 3.

Dimensions and tolerances are expressed in millimetres.

3.2 Material and surface treatment

See Table 4.



Key

1 Angular misalignment of rivet head to rivet shank axis 0,5°max.
2 Marking (see clause 5)
a 0,025 mm increase of shank diameter is permissible within 2,54 mm of the base of the head
b Chamfered ends with radius to the R_1 dimensions or a 20° chamfer to dimension "*S*"
c Maximum head diameters are to theoretical sharp corners as measured by projection
d Measurement method for inspection of head characteristics in accordance with NAS9800

Figure 1 — Configuration

Table 1 — Dimensions and tolerances

Diameter code	*D* **Nominal diameter** +0,03 −0,03	*A* max.	*A* min.	A_1 min.	*B* Ref.	*C* +0,05 0	*E* Ref.	*F* ±0,13	*P* max.	*P* min.	R_1 ±0,25	*S* ±0,25	*W* max.	*W* min.
2	1,58	2,90	2,80	2,44	0,53	0,08	0,08 to 0,15	2,07	0,287	0,238	0,48	0,41	2,228	2,223
3	2,38	4,55	4,45	4,09	0,89			3,29	0,471	0,419	0,74	0,58	3,443	3,438
4	3,18	5,70	5,60	5,24	1,04			4,14	0,545	0,492	0,99	0,79	4,418	4,413
5	3,97	7,18	7,10	6,74	1,33			5,25	0,861	0,810	1,24	0,99	5,151	5,146
6	4,76	8,43	8,35	7,99	1,52	0,10		6,20	0,946	0,894	1,50	1,19	6,200	6,195
7	5,56	9,67	9,59	9,23	1,70			7,15	1,001	0,948	1,75	1,37	7,310	7,305
8	6,36	11,02	10,92	10,56	1,93			8,15	1,103	1,040	1,98	1,57	8,420	8,415
10	7,93	13,75	13,65	13,29	2,42			10,15	1,471	1,402	2,49	1,98	10,279	10,274
12	9,53	16,42	16,32	15,96	2,87			12,15	1,734	1,660	2,97	2,39	12,329	12,324

Table 2 — Dimensions and tolerances for oversize rivets

Diameter code	*D* **Nominal diameter** +0,03 −0,03	*A* max.	*A* min.	A_1 min.	*B* Ref.	*C* +0,05 0	*E* Ref.	*F* ±0,13	*P* max.	*P* min.	R_1 ±0,25	*S* ±0,25	*W* max.	*W* min.
3X	2,78	4,55	4,45	4,09	0,72	0,08	0,08 to 0,15	3,29	0,471	0,419	0,74	0,58	3,443	3,438
4X	3,58	5,70	5,60	5,24	0,87			4,14	0,545	0,492	0,99	0,79	4,418	4,413
5X	4,37	7,18	7,10	6,74	1,16			5,25	0,861	0,810	1,24	0,99	5,151	5,146
6X	5,16	8,43	8,35	7,99	1,36	0,10		6,20	0,946	0,894	1,50	1,19	6,200	6,195
7X	5,96	9,67	9,59	9,23	1,54			7,15	1,001	0,948	1,75	1,37	7,310	7,305

Table 3 — Length code and masses

Length [a] [b]		Diameter code								
		2	3	4	5	6	7	8	10	12
code	$L \pm 0{,}254$	Mass [c] kg/ 1 000 parts								
03	4,76	0,02	0,07	–	–	–	–	–	–	–
04	6,35	0,04	0,09	0,16	0,26	–	–	–	–	–
05	7,94	0,05	0,11	0,20	0,32	0,46	–	–	–	–
06	9,53	0,05	0,13	0,23	0,37	0,54	0,74	–	–	–
07	11,11	0,06	0,15	0,27	0,43	0,62	0,85	1,13	–	–
08	12,70	0,07	0,17	0,30	0,48	0,70	0,96	1,27	-	-
09	14,29	0,08	0,19	0,34	0,54	0,78	1,07	1,41	2,26	-
10	15,88	0,09	0,21	0,37	0,59	0,85	1,17	1,55	2,47	3,65
11	17,46	0,10	0,23	0,41	0,64	0,93	1,28	1,69	2,69	3,96
12	19,05	0,11	0,25	0,44	0,70	1,01	1,39	1,83	2,91	4,28
13	20,64	0,12	0,27	0,48	0,75	1,09	1,50	1,97	3,13	4,59
14	22,23	0,12	0,29	0,51	0,81	1,17	1,60	2,11	3,35	4,91
15	23,81	0,13	0,31	0,55	0,86	1,25	1,71	2,25	3,57	5,22
16	25,40	0,14	0,33	0,58	0,92	1,33	1,82	2,40	3,79	5,54
17	26,99	-	0,35	0,62	0,97	1,41	1,93	2,54	4,00	5,86
18	28,58	-	0,37	0,65	1,03	1,49	2,03	2,68	4,22	6,17
20	31,75	-	0,41	0,72	1,14	1,64	2,25	2,96	4,66	6,80
22	34,93	-	0,45	0,79	1,25	1,80	2,46	3,24	5,10	7,44
24	38,10	-	-	0,86	1,36	1,96	2,68	3,52	5,53	8,07

[a] Lengths missing in table can be created in 1/16 inch (1,59 mm) steps, e. g. length code 19 corresponds to: 19/16 inch (30,16 mm).

[b] 1/32 inch (0,79 mm) length increments may be obtained by adding code 5 after last digit of part number, e. g. length code 06-5 corresponds to: 6/16 inch (9,53 mm) + 1/32 inch (0,79 mm) = 13/32 inch (10,32 mm).

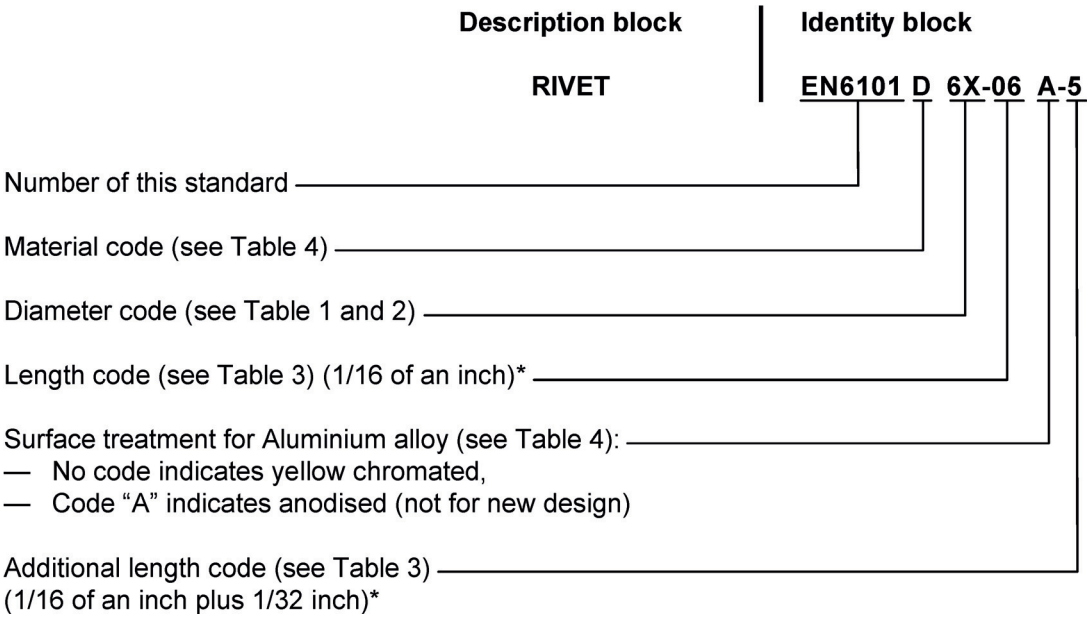
[c] Mass based on aluminium alloy with a density of 2,79 kg/dm^3, refer to Table 4 for conversion factors.

Table 4 — Material code

<table>
<tr><th rowspan="2">Material code</th><th colspan="9">Diameter code</th><th rowspan="2">Surface treatment (code see clause 4)</th><th rowspan="2">Density [kg/dm³]</th><th rowspan="2">Multiplicator of mass (see Table 3)</th></tr>
<tr><th>2</th><th>3
3X</th><th>4
4X</th><th>5
5X</th><th>6
6X</th><th>7
7X</th><th>8</th><th>10</th><th>12</th></tr>
<tr><td>H [b]</td><td colspan="2">Aluminium alloy 1050A-H14 per EN2114</td><td colspan="6">–</td><td colspan="2">Yellow chromated per MIL-C-5541, class 1A</td><td>2,7</td><td>0,97</td></tr>
<tr><td>AD</td><td colspan="7">Aluminium alloy 2117-T4 per EN2115</td><td>–</td><td rowspan="5">Yellow chromated per MIL-C-5541, class 1A</td><td rowspan="5">Anodized per MIL-A-8625, type II, class 1, clear [a]</td><td>2,75</td><td>0,98</td></tr>
<tr><td>D</td><td>–</td><td colspan="6">Aluminium alloy 2017A-T4 per EN2116</td><td></td><td>2,79</td><td>1</td></tr>
<tr><td>B [a]</td><td colspan="2">Aluminium alloy 5056A-H32 per EN2117</td><td colspan="6">–</td><td>2,64</td><td>0,95</td></tr>
<tr><td>KE</td><td rowspan="5">–</td><td colspan="6">Aluminium alloy 7050-T73 per EN3115</td><td></td><td>2,82</td><td>1,01</td></tr>
<tr><td>M</td><td colspan="5" rowspan="3">Heat resisting alloy NiCu31 per EN4372, annealed</td><td rowspan="3">–</td><td colspan="2">Cadmiunm plated per AMS-QQ-P-416, type II, class 3</td><td rowspan="3">8,85</td><td rowspan="3">3,17</td></tr>
<tr><td>N</td><td colspan="2">None</td></tr>
<tr><td>R</td><td colspan="2">IVD per EN 6118</td></tr>
<tr><td>T</td><td colspan="5" rowspan="2">Titanium alloy 44.5 Cb, annealed per AMS4982</td><td rowspan="2">–</td><td colspan="2">Anodized per ISO 8080</td><td rowspan="2">5,8</td><td rowspan="2">2,08</td></tr>
<tr><td>V</td><td colspan="2">IVD per EN 6118</td></tr>
<tr><td colspan="12">a Not for new design
b Not for oversize rivets</td></tr>
</table>

4 Designation

EXAMPLE



* For supplying purpose only, see footnote [a] and [b] in Table 3.

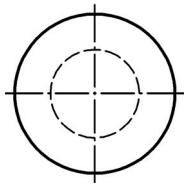
NOTE If necessary, the code I9005 shall be placed between the description block and the identity block.

5 Marking

5.1 Material identification

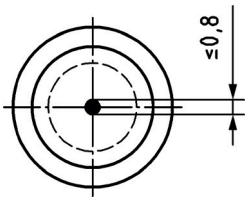
Symbol on the rivet head see Figure 2.

EN 2114



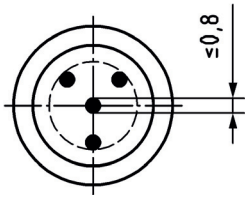
No head marking

EN 2115



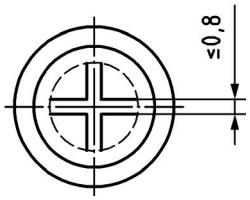
Indented 0,2 mm max.

EN 2116



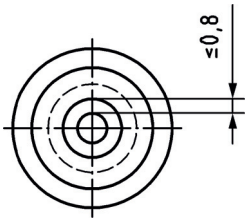
Embossed 0,2 mm max.

EN 2117



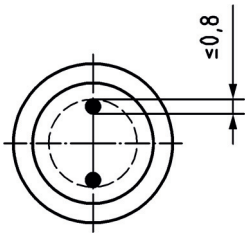
Embossed 0,2 mm max.

EN 3115

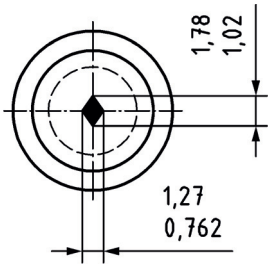


Embossed 0,2 mm max.

EN 4372



Embossed 0,2 mm max.



Indented 0,25 mm max.

Figure 2 — Material identification

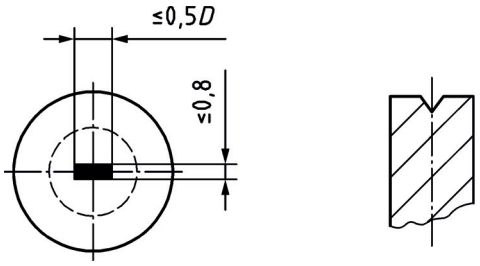
5.2 Manufacturers identification

EN 2424, style F to be embossed or indented on rivet head.

Manufacturer's identification is required on rivet heads for diameter code 4 and larger.

5.3 Identification of oversize rivets

Symbol on rivet shank end see Figure 3.



Triangular shape indented 0,2 mm max.

Figure 3 — Identification of oversize rivets

6 Technical specification

6.1 Aluminium alloy rivet

Aluminium alloy rivets shall conform with the requirements of EN 6104.

6.2 Heat resisting alloy NiCu31 rivets

NiCu31 rivets shall conform with the requirements of EN2941.

Shear strength Rc = 340 MPa to 407 MPa.

NOTE Rivets manufactured prior to August 1st 2005 a max. shear strength of 450 MPa may be procured and used until stocks are depleted.

6.3 Titanium alloy rivet

Titanium alloy 44.5 Cb rivets shall conform with the requirements of NASM 5674 except for the finish as stated.

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