

# SLOVENSKI STANDARD

## SIST EN 2929:2001

01-januar-2001

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**Aerospace series - Bolts, double hexagon head, relieved shank, long thread, in heat resisting nickel base alloy NI-P101HT (Waspaloy) - Classification: 1 210 MPa (at ambient temperature)/730 °C**

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Luft- und Raumfahrt - Zwölfkantschrauben, Dünnschaft, langes Gewinde, aus hochwarmfester Nickelbasislegierung NI-P101HT (Waspaloy) - Klasse: 1210 MPa (bei Raumtemperatur)/730°C

Série aérospatiale - Vis à tête bihexagonale, fut dégagé, filetage long, en alliage résistant à chaud à base de nickel NI-P101HT (Waspaloy) - Classification: 1210 MPa (à température ambiante)/730°C

**Ta slovenski standard je istoveten z: EN 2929:1996**

**ICS:**

49.030.20 Sorniki, vijaki, stebelni vijaki Bolts, screws, studs

**SIST EN 2929:2001**

**en**

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EUROPEAN STANDARD

EN 2929

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 1996

ICS 49.040.20

Descriptors: aircraft industry, double hexagonal head screw, nickel alloy, heat resistant material, classification, dimension, designation

English version

**Aerospace series - Bolts, double hexagon head, relieved shank, long thread, in heat resisting nickel base alloy NI-P101HT (Waspaloy) - Classification : 1 210 MPa (at ambient temperature) / 730 °C**

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## CEN

European Committee for Standardization  
 Comité Européen de Normalisation  
 Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

**Foreword**

This European Standard has been prepared by the European Association of Aerospace Manufacturers (AECMA).

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

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 1996, and conflicting national standards shall be withdrawn at the latest by September 1996.

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ANALOGUE  
.....T010  
BYTIDAJODAN NOTER ON TDSVERP



## 1 Scope

This standard specifies the characteristics of double hexagon headed bolts with relieved shank and long thread, in NI-P101HT, for aerospace applications.

Classification : 1 210 MPa <sup>1)</sup> / 730 °C <sup>2)</sup>

## 2 Normative references

This European Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

|            |   |
|------------|---|
| ISO 3353   | Aerospace - Rolled threads for bolts - Lead and runout requirements   |
| ISO 4095   | Fasteners for aerospace construction - Bi-hexagonal wrenching configuration   |
| ISO 5855-2 | Aerospace - MJ threads - Part 2 : Limit dimensions for bolts and nuts   |
| EN 2424    | Aerospace series - Marking of aerospace products  |
| EN 2582    | Aerospace series - Bolts in heat resisting nickel base alloy NI-P101HT (Waspaloy) - Classification : 1 210 MPa / 730 °C - Technical specification <sup>3)</sup>                                   |
| EN 2959    | Aerospace series - Heat resisting nickel base alloy (NI-P101HT) - Solution treated and cold worked - Bar for hot upset forging for fasteners - $3 \leq D \leq 30$ mm <sup>3)</sup>                |
| EN 3220    | Aerospace series - Heat resisting nickel base alloy (NI-P101HT) - Cold worked and softened - Bar and wire for continuous forging or extrusion for fasteners - $3 \leq D \leq 30$ mm <sup>3)</sup> |

## 3 Required characteristics

### 3.1 Configuration - Dimensions - Tolerances - Masses

See figure 1 and tables 1 and 2. Dimensions and tolerances are in millimetres.

### 3.2 Materials

EN 2959 or EN 3220

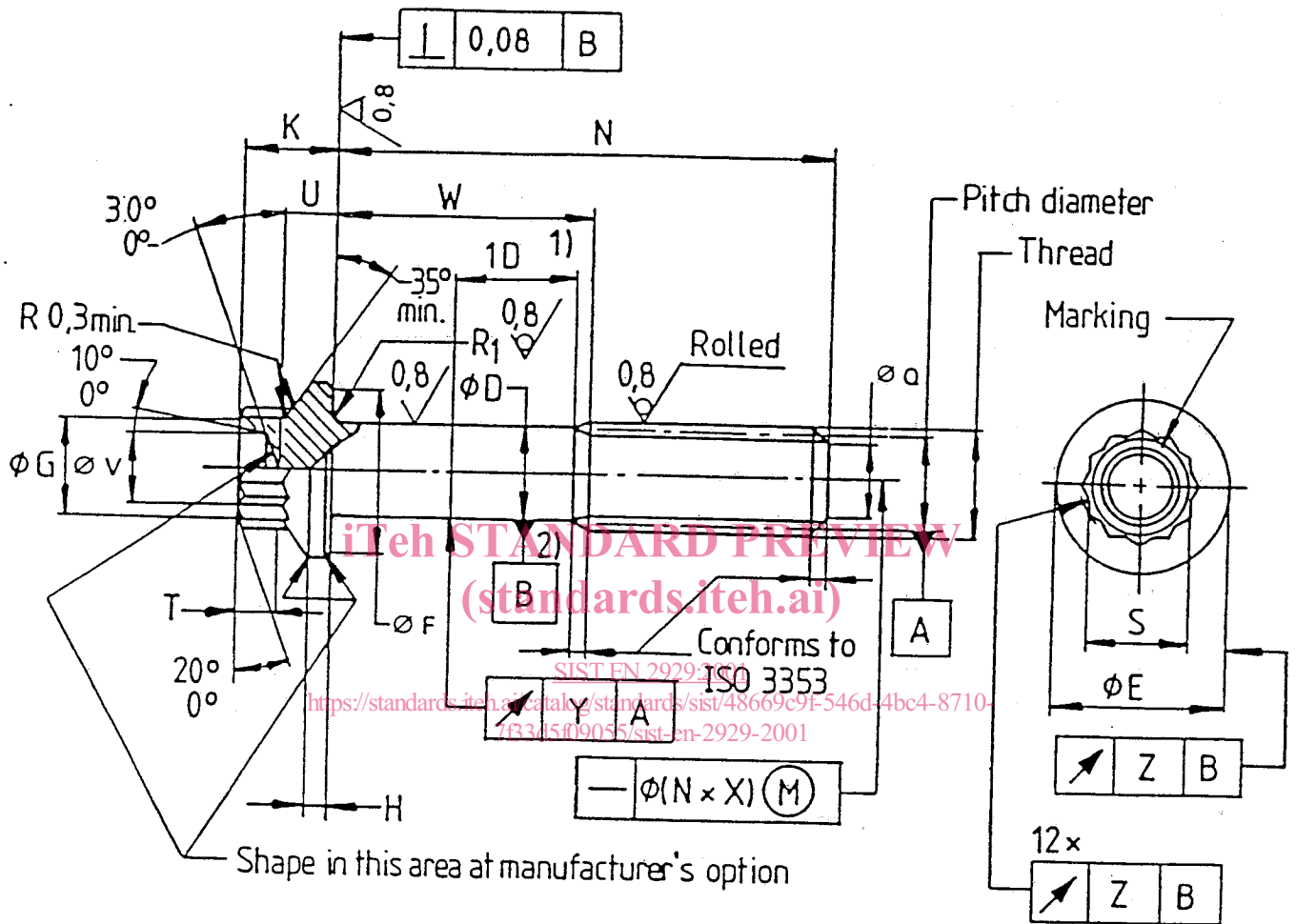
1) Minimum tensile strength of the material at ambient temperature

2) Maximum test temperature of the parts

3) Published as AECMA Prestandard at the date of publication of this standard

3,2 / ( 0,8 / 0,8 / 0,8 / 0,8 / 0,8 / Rolled )

Remove sharp edges 0,1 to 0,4



- 1) When the length of the shank is less than one times the nominal value of the shank diameter  $D$ , the run-out is measured at a distance equal to half the actual shank length.
- 2) For bolts having a shank length less than one times the nominal value of the shank diameter  $D$ , and for those threaded to head, the pitch diameter axis shall be used as the datum.

Figure 1

Table 1

| Code | Thread <sup>1)</sup><br>Designation | $D$<br>$\pm 0,13$ | $E$<br>max. | $F$<br>min. | $G$<br>min. | $H$<br>min. | $K$<br>max. min. | $Q$<br>$\pm 0,5$ | $R_1$<br>max. min. | $S$ <sup>2)</sup> | $T$<br>min. | $U$  |      | $V$  |      | $X$   | $Y$  | $Z$    |      |
|------|-------------------------------------|-------------------|-------------|-------------|-------------|-------------|------------------|------------------|--------------------|-------------------|-------------|------|------|------|------|-------|------|--------|------|
|      |                                     |                   |             |             |             |             |                  |                  |                    |                   |             | max. | min. | max. | min. |       |      |        |      |
| 050  | MJ5x0,8-4h6h                        | 4,48              | 9,1         | 8,3         | 6,8         | 1           | 5,65 5,02        | 3,4              | 0,5 0,3            | 7                 | 2           | 2,9  | 2,5  | 3,7  | 3,2  | 0,003 | 0,12 | 0,13   |      |
| 060  | MJ6x1-4h6h                          | 5,35              | 10,6        | 9,8         | 7,8         | 1,2         | 6,15 5,52        | 4,2              | 0,7 0,5            | 8                 | 2,3         | 3,2  | 2,8  | 4,6  | 4,1  |       |      | 0,15   |      |
| 070  | MJ7x1-4h6h                          | 6,35              | 12,1        | 11,3        | 8,8         | 1,4         | 6,68 5,92        | 5,2              |                    | 9                 | 2,6         | 3,7  | 3,3  | 5,4  | 4,9  |       |      | 0,18   |      |
| 080  | MJ8x1-4h6h                          | 7,35              | 13,6        | 12,8        | 9,8         | 1,6         | 7,18 6,42        | 6,2              |                    | 10                | 2,8         | 4,1  | 3,7  | 5,7  | 5,2  |       |      | 0,15   | 0,2  |
| 100  | MJ10x1,25-4h6h                      | 9,19              | 16,7        | 15,7        | 11,8        | 2           | 8,18 7,42        | 7,9              |                    | 0,8               | 0,6         | 12   | 3,1  | 5,1  | 4,7  | 7,2   | 6,7  | 0,0025 | 0,18 |
| 120  | MJ12x1,25-4h6h                      | 11,19             | 19,9        | 18,8        | 13,7        | 2,4         | 9,38 8,62        | 9,8              | 0,9                | 14                |             | 3,5  | 6    | 5,6  | 8,5  | 8     | 0,3  |        |      |

1) In accordance with ISO 5855-2

2) Bihexagonal wrenching configuration in conformity with ISO 4095 over length  $T$  min.

Table 2

| Length code | N<br>± 0,3 | Thread code |      |                    |      |      |       |                    |      |       |      |                    |       |      |      |                    |      |      |       |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
|-------------|------------|-------------|------|--------------------|------|------|-------|--------------------|------|-------|------|--------------------|-------|------|------|--------------------|------|------|-------|--------------------|------|------|------|--------------------|------|------|------|--------------------|------|--|--|-----|--|--|--|--|--|
|             |            | 050         |      |                    |      |      |       | 060                |      |       |      |                    |       | 070  |      |                    |      |      |       | 080                |      |      |      |                    |      | 100  |      |                    |      |  |  | 120 |  |  |  |  |  |
|             |            | W           |      | Mass <sup>1)</sup> |      | W    |       | Mass <sup>1)</sup> |      | W     |      | Mass <sup>1)</sup> |       | W    |      | Mass <sup>1)</sup> |      | W    |       | Mass <sup>1)</sup> |      | W    |      | Mass <sup>1)</sup> |      | W    |      | Mass <sup>1)</sup> |      |  |  |     |  |  |  |  |  |
| max.        | min.       | max.        | min. | max.               | min. | max. | min.  | max.               | min. | max.  | min. | max.               | min.  | max. | min. | max.               | min. | max. | min.  | max.               | min. | max. | min. | max.               | min. | max. | min. | max.               | min. |  |  |     |  |  |  |  |  |
| 008         | 8          |             |      |                    |      |      |       |                    |      |       |      |                    |       |      |      |                    |      |      |       |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 010         | 10         |             | 3,26 |                    |      |      |       |                    |      |       |      |                    |       |      |      |                    |      |      |       |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 012         | 12         |             | 3,52 |                    |      |      |       |                    |      |       |      |                    |       |      |      |                    |      |      |       |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 014         | 14         |             | 3,78 |                    |      |      |       |                    |      |       |      |                    |       |      |      |                    |      |      |       |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 016         | 16         | 2,1         | 1,7  |                    |      |      |       |                    |      |       |      |                    |       |      |      |                    |      |      |       |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 018         | 18         |             | 4,29 |                    |      |      |       |                    |      |       |      |                    |       |      |      |                    |      |      |       |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 020         | 20         |             | 4,55 |                    |      |      |       |                    |      |       |      |                    |       |      |      |                    |      |      |       |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 022         | 22         | 4           | 2,5  | 4,81               |      |      |       |                    |      |       |      |                    |       |      |      |                    |      |      |       |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 024         | 24         | 6           | 4,5  | 5,07               | 4    | 2,5  | 7,32  |                    |      |       |      |                    |       |      |      |                    |      |      |       |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 026         | 26         | 8           | 6,5  | 5,33               | 6    | 4,5  | 7,69  | 4                  | 2,5  | 10,83 |      |                    |       |      |      |                    |      |      |       |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 028         | 28         | 10          | 8,5  | 5,59               | 8    | 6,5  | 8,06  | 6                  | 4,5  | 11,36 | 4    | 2,5                | 15,20 |      |      |                    |      |      |       |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 030         | 30         | 12          | 10,5 | 5,85               | 10   | 8,5  | 8,43  | 8                  | 6,5  | 11,88 | 6    | 4,5                | 15,90 | 4    | 2,5  | 16,60              |      |      |       |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 032         | 32         | 14          | 12,5 | 6,11               | 12   | 10,5 | 8,80  | 10                 | 8,5  | 12,40 | 8    | 6,5                | 16,60 | 6    | 4,5  | 17,30              | 4    | 2,7  | 26,72 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 034         | 34         | 16          | 14,5 | 6,37               | 14   | 12,5 | 9,17  | 12                 | 10,5 | 12,92 | 10   | 8,5                | 17,30 | 8    | 6,5  | 17,99              | 6    | 4,5  | 27,81 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 036         | 36         | 18          | 16,5 | 6,63               | 16   | 14,5 | 9,54  | 14                 | 12,5 | 13,44 | 12   | 10,5               | 17,99 | 10   | 8,5  | 18,69              | 8    | 6,5  | 28,90 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 038         | 38         | 20          | 18,5 | 6,89               | 18   | 16,5 | 9,91  | 16                 | 14,5 | 13,96 | 14   | 12,5               | 18,69 | 12   | 10,5 | 19,39              | 10   | 8,5  | 29,98 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 040         | 40         | 22          | 20,5 | 7,15               | 20   | 18,5 | 10,28 | 18                 | 16,5 | 14,48 | 16   | 14,5               | 19,39 | 14   | 12,5 | 20,09              | 12   | 10,5 | 31,07 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 042         | 42         | 24          | 22,5 | 7,40               | 22   | 20,5 | 10,65 | 20                 | 18,5 | 15,00 | 18   | 16,5               | 20,09 | 16   | 14,5 | 20,78              | 14   | 12,5 | 32,16 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 044         | 44         | 26          | 24,5 | 7,66               | 24   | 22,5 | 11,02 | 22                 | 20,5 | 15,52 | 20   | 18,5               | 20,78 | 18   | 16,5 | 21,48              | 16   | 14,5 | 33,25 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 046         | 46         | 28          | 26,5 | 7,92               | 26   | 24,5 | 11,39 | 24                 | 22,5 | 16,04 | 22   | 20,5               | 21,48 | 20   | 18,5 | 22,18              | 18   | 16,5 | 34,34 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 048         | 48         | 30          | 28,5 | 8,18               | 28   | 26,5 | 11,76 | 26                 | 24,5 | 16,56 | 24   | 22,5               | 22,18 | 22   | 20,5 | 22,88              | 20   | 18,5 | 35,43 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 050         | 50         | 32          | 30,5 | 8,44               | 30   | 28,5 | 12,13 | 28                 | 26,5 | 17,08 | 26   | 24,5               | 22,88 | 24   | 22,5 | 23,57              | 22   | 20,5 | 36,51 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 052         | 52         | 34          | 32,5 | 8,70               | 32   | 30,5 | 12,50 | 30                 | 28,5 | 17,60 | 28   | 26,5               | 23,57 | 26   | 24,5 | 24,27              | 24   | 22,5 | 37,60 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 054         | 54         | 36          | 34,5 | 8,96               | 34   | 32,5 | 12,87 | 32                 | 30,5 | 18,12 | 30   | 28,5               | 24,27 | 28   | 26,5 | 24,97              | 26   | 24,5 | 38,69 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 056         | 56         | 38          | 36,5 | 9,22               | 36   | 34,5 | 13,24 | 34                 | 32,5 | 18,65 | 32   | 30,5               | 24,97 | 30   | 28,5 | 25,67              | 28   | 26,5 | 39,78 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 058         | 58         | 40          | 38,5 | 9,48               | 38   | 36,5 | 13,61 | 36                 | 34,5 | 19,17 | 34   | 32,5               | 25,67 | 32   | 30,5 | 26,36              | 30   | 28,5 | 40,87 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 060         | 60         | 42          | 40,5 | 9,74               | 40   | 38,5 | 13,98 | 38                 | 36,5 | 19,69 | 36   | 34,5               | 26,36 | 34   | 32,5 | 27,06              | 32   | 30,5 | 41,96 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 062         | 62         | 44          | 42,5 | 10,00              | 42   | 40,5 | 14,35 | 40                 | 38,5 | 20,21 | 38   | 36,5               | 27,06 | 36   | 34,5 | 27,76              | 34   | 32,5 | 43,04 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 064         | 64         | 46          | 44,5 | 10,26              | 44   | 42,5 | 14,72 | 42                 | 40,5 | 20,73 | 40   | 38,5               | 27,76 | 38   | 36,5 | 28,46              | 36   | 34,5 | 44,13 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 066         | 66         | 48          | 46,5 | 10,51              | 46   | 44,5 | 15,09 | 44                 | 42,5 | 21,25 | 42   | 40,5               | 28,46 | 40   | 38,5 | 29,16              | 38   | 36,5 | 45,22 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 068         | 68         | 50          | 48,5 | 10,77              | 48   | 46,5 | 15,46 | 46                 | 44,5 | 21,77 | 44   | 42,5               | 29,16 | 42   | 40,5 | 30,5               | 40   | 38,5 | 46,31 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |
| 068         | 68         | 52          | 50,5 | 11,03              | 50   | 48,5 | 15,83 | 48                 | 46,5 | 22,29 | 46   | 44,5               | 29,85 | 44   | 42,5 | 31,07              | 42   | 40,5 | 47,40 |                    |      |      |      |                    |      |      |      |                    |      |  |  |     |  |  |  |  |  |

(continued)

Table 2 (concluded)

| Length code | N<br>± 0,3 | Thread code |      |                    |           |      |                    |           |       |                    |           |       |                    |           |       |                    |           |       |                    |
|-------------|------------|-------------|------|--------------------|-----------|------|--------------------|-----------|-------|--------------------|-----------|-------|--------------------|-----------|-------|--------------------|-----------|-------|--------------------|
|             |            | 050         |      |                    | 060       |      |                    | 070       |       |                    | 080       |       |                    | 100       |       |                    | 120       |       |                    |
|             |            | W<br>max.   | min. | Mass <sup>1)</sup> | W<br>max. | min. | Mass <sup>1)</sup> | W<br>max. | min.  | Mass <sup>1)</sup> | W<br>max. | min.  | Mass <sup>1)</sup> | W<br>max. | min.  | Mass <sup>1)</sup> | W<br>max. | min.  | Mass <sup>1)</sup> |
| 070         | 70         | 54          | 52,5 | 11,29              |           |      | 50                 | 48,5      | 22,81 | 48                 | 46,5      | 30,55 | 44                 | 42,5      | 48,48 | 40                 | 38,5      | 72,99 |                    |
| 072         | 72         |             |      |                    | 52        | 50,5 | 16,56              | 52        | 50,5  | 23,33              | 50        | 48,5  | 31,25              | 46        | 44,5  | 49,57              | 42        | 40,5  | 74,61              |
| 074         | 74         |             |      |                    | 56        | 54,5 | 16,93              | 54        | 52,5  | 23,85              | 52        | 50,5  | 31,95              | 48        | 46,5  | 50,66              | 44        | 42,5  | 76,22              |
| 076         | 76         |             |      |                    | 58        | 56,5 | 17,30              | 56        | 54,5  | 24,37              | 54        | 52,5  | 32,67              | 50        | 48,5  | 51,75              | 46        | 44,5  | 77,83              |
| 078         | 78         |             |      |                    | 60        | 58,5 | 17,67              | 58        | 56,5  | 24,89              | 56        | 54,5  | 33,34              | 52        | 50,5  | 52,84              | 48        | 46,5  | 79,45              |
| 080         | 80         |             |      |                    | 62        | 60,5 | 18,04              | 60        | 58,5  | 25,41              | 58        | 56,5  | 34,04              | 54        | 52,5  | 53,93              | 50        | 48,5  | 81,06              |
| 082         | 82         |             |      |                    | 64        | 62,5 | 18,41              | 62        | 60,5  | 25,94              | 60        | 58,5  | 34,74              | 56        | 54,5  | 55,01              | 52        | 50,5  | 82,68              |
| 084         | 84         |             |      |                    | 66        | 64,5 | 18,78              | 64        | 62,5  | 26,46              | 62        | 60,5  | 35,43              | 58        | 56,5  | 56,10              | 54        | 52,5  | 84,29              |
| 086         | 86         |             |      |                    |           |      |                    | 66        | 64,5  | 26,98              | 64        | 62,5  | 36,13              | 60        | 58,5  | 57,19              | 56        | 54,5  | 85,91              |
| 088         | 88         |             |      |                    |           |      |                    | 68        | 66,5  | 27,50              | 66        | 64,5  | 36,83              | 62        | 60,5  | 58,28              | 58        | 56,5  | 87,52              |
| 090         | 90         |             |      |                    |           |      |                    | 70        | 68,5  | 28,02              | 68        | 66,5  | 37,53              | 64        | 62,5  | 59,37              | 60        | 58,5  | 89,13              |
| 092         | 92         |             |      |                    |           |      |                    | 72        | 70,5  | 28,54              | 70        | 68,5  | 38,22              | 66        | 64,5  | 60,46              | 62        | 60,5  | 90,75              |
| 094         | 94         |             |      |                    |           |      |                    | 74        | 72,5  | 29,06              | 72        | 70,5  | 38,92              | 68        | 66,5  | 61,54              | 64        | 62,5  | 92,36              |
| 096         | 96         |             |      |                    |           |      |                    | 76        | 74,5  | 29,58              | 74        | 72,5  | 39,62              | 70        | 68,5  | 62,63              | 66        | 64,5  | 93,98              |
| 098         | 98         |             |      |                    |           |      |                    | 78        | 76,5  | 30,10              | 76        | 74,5  | 40,32              | 72        | 70,5  | 63,72              | 68        | 66,5  | 95,59              |
| 100         | 100        |             |      |                    |           |      |                    |           |       |                    | 78        | 76,5  | 41,02              | 74        | 72,5  | 64,81              | 70        | 68,5  | 97,20              |
| 104         | 104        |             |      |                    |           |      |                    |           |       |                    | 82        | 80,5  | 42,41              | 78        | 76,5  | 66,99              | 74        | 72,5  | 100,43             |
| 108         | 108        |             |      |                    |           |      |                    |           |       |                    | 86        | 84,5  | 43,81              | 82        | 80,5  | 69,16              | 78        | 76,5  | 103,66             |
| 112         | 112        |             |      |                    |           |      |                    |           |       |                    | 90        | 88,5  | 45,20              | 86        | 84,5  | 71,34              | 82        | 80,5  | 106,89             |
| 116         | 116        |             |      |                    |           |      |                    |           |       |                    |           |       |                    | 90        | 88,5  | 73,51              | 86        | 84,5  | 110,12             |
| 120         | 120        |             |      |                    |           |      |                    |           |       |                    |           |       |                    | 94        | 92,5  | 75,69              | 90        | 88,5  | 113,35             |
| 124         | 124        |             |      |                    |           |      |                    |           |       |                    |           |       |                    | 98        | 96,5  | 77,87              | 94        | 92,5  | 116,57             |
| 128         | 128        |             |      |                    |           |      |                    |           |       |                    |           |       |                    | 102       | 100,5 | 80,04              | 98        | 96,5  | 119,80             |
| 132         | 132        |             |      |                    |           |      |                    |           |       |                    |           |       |                    | 106       | 104,5 | 82,22              | 102       | 100,5 | 123,03             |
| 136         | 136        |             |      |                    |           |      |                    |           |       |                    |           |       |                    | 110       | 108,5 | 84,40              | 106       | 104,5 | 126,26             |
| 140         | 140        |             |      |                    |           |      |                    |           |       |                    |           |       |                    | 114       | 112,5 | 86,57              | 110       | 108,5 | 129,49             |
| 144         | 144        |             |      |                    |           |      |                    |           |       |                    |           |       |                    |           |       |                    | 114       | 112,5 | 132,71             |
| 148         | 148        |             |      |                    |           |      |                    |           |       |                    |           |       |                    |           |       |                    | 118       | 116,5 | 135,94             |
| 152         | 152        |             |      |                    |           |      |                    |           |       |                    |           |       |                    |           |       |                    | 122       | 120,5 | 139,17             |
| 156         | 156        |             |      |                    |           |      |                    |           |       |                    |           |       |                    |           |       |                    | 126       | 124,5 | 142,40             |
| 160         | 160        |             |      |                    |           |      |                    |           |       |                    |           |       |                    |           |       |                    | 130       | 128,5 | 145,63             |
| 164         | 164        |             |      |                    |           |      |                    |           |       |                    |           |       |                    |           |       |                    | 134       | 132,5 | 148,86             |
| 168         | 168        |             |      |                    |           |      |                    |           |       |                    |           |       |                    |           |       |                    | 138       | 136,5 | 152,09             |

1) Mass ≈ quoted in kg/1 000 parts