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# INTERNATIONAL STANDARD



# 1175

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Shipbuilding — Dimensions and sectional properties of aluminium alloy sections for marine use

*Construction navale — Dimensions et caractéristiques des sections des profilés en alliages d'aluminium pour usage maritime*

First edition — 1974-02-01

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**Descriptors :** shipbuilding, sections, aluminium alloys, dimensions, cross sections, linear density, materials specifications.

Price based on 6 pages

## FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 8 has reviewed ISO Recommendation R 1175 and found it suitable for transformation. International Standard ISO 1175 therefore replaces ISO Recommendation R 1175-1970.

ISO Recommendation R 1175 was approved by the Member Bodies of the following countries :

|                     |             |                |
|---------------------|-------------|----------------|
| Australia           | India       | Poland         |
| Belgium             | Israel      | Spain          |
| Czechoslovakia      | Italy       | Sweden         |
| Egypt, Arab Rep. of | Japan       | Thailand       |
| France              | Netherlands | Turkey         |
| Germany             | New Zealand | United Kingdom |
| Greece              | Norway      | Yugoslavia     |

The Member Body of the following country has subsequently approved this Recommendation :

Philippines

The Member Body of the following country expressed disapproval of the Recommendation on technical grounds :

U.S.S.R.

The Member Body of the following country disapproved the transformation of ISO/R 1175 into an International Standard :

U.S.S.R.

# Shipbuilding — Dimensions and sectional properties of aluminium alloy sections for marine use

## 1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies dimensions, sectional properties and masses per unit length of aluminium alloy sections, with and without welding flange, for marine use.

## 2 CLASSIFICATION

The dimensions, sectional properties and masses per unit length of the following aluminium alloy sections are given in clause 3 :

- tee bars without welding flange;
- tee bars with welding flange;
- bulb plates without welding flange;
- bulb plates with welding flange;
- bulb angles.

## 3 DIMENSIONS, SECTIONAL PROPERTIES AND MASSES PER UNIT LENGTH

The calculated masses in kilograms per metre, shown in the tables, are based on an average density of 2,65 kg/dm<sup>3</sup>.

Where  $e_{NA} > A$ , the neutral axis lies in the plate.

Where  $e_{NA} < \frac{A+t}{2}$ , the neutral axis is closer to the outer face of the tee bar or bulb plate than to the upper face of the plate.

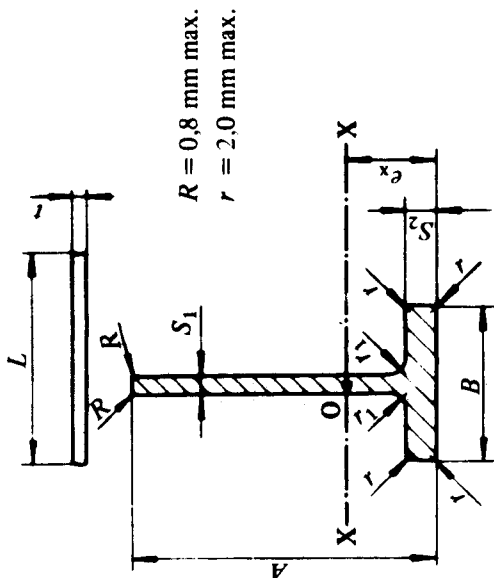
## 3.1 Tee bars without welding flange

## Section without plate

$F$  = sectional area  
 $O$  = centre of gravity  
 $e_x$  = distance of centre of gravity from the outer face of the flange  
 $G$  = mass  
 $I_x$  = second moment of area

## Section with plate

$NA$  = neutral axis  
 $e_{NA}$  = distance of centre of gravity of assembly from the outer face of the flange  
 $I$  = distance of neutral axis from the extreme outer fibres  
 $Z = \frac{I}{e_{NA}}$  = second moment of area  
 $t$  = section modulus  
 $L$  = plate thickness : 5, 10 or 15 mm  
 $= 40 t$



$R = 0,8 \text{ mm max.}$   
 $r = 2,0 \text{ mm max.}$

| Dimensions |     |                |                | Mass<br>(without<br>plate) | Sectional properties  |                |                 |                 |                    |                 |                 |                 |                 |                 |                 |                 |
|------------|-----|----------------|----------------|----------------------------|-----------------------|----------------|-----------------|-----------------|--------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|            |     |                |                |                            | Section without plate |                |                 |                 | Section with plate |                 |                 |                 |                 |                 |                 |                 |
| A          | B   | S <sub>1</sub> | S <sub>2</sub> | r <sub>1</sub>             | F                     | e <sub>x</sub> | I <sub>x</sub>  | e <sub>NA</sub> | I                  | Z               | e <sub>NA</sub> | I               | Z               | e <sub>NA</sub> | I               | Z               |
| mm         | mm  | mm             | mm             | mm                         | cm <sup>2</sup>       | cm             | cm <sup>4</sup> | cm              | cm <sup>4</sup>    | cm <sup>3</sup> | cm              | cm <sup>4</sup> | cm <sup>3</sup> | cm              | cm <sup>4</sup> | cm <sup>3</sup> |
| 80         | 40  | 4,0            | 8,0            | 6,0                        | 6,197                 | 2,27           | 36,9            | 5,96            | 174,0              | 29,2            | 7,66            | 248,6           | 32,4            | 8,33            | 297,4           | 35,7            |
| 90         | 45  | 4,0            | 9,0            | 6,0                        | 7,407                 | 2,43           | 54,5            | 6,35            | 252,8              | 39,8            | 8,39            | 370,5           | 44,1            | 9,19            | 438,4           | 47,7            |
| 100        | 50  | 4,0            | 10,0           | 6,0                        | 8,717                 | 2,57           | 77,1            | 6,67            | 351,8              | 52,7            | 9,08            | 530,1           | 58,4            | 10,03           | 625,3           | 62,4            |
| 110        | 55  | 4,0            | 11,0           | 6,0                        | 10,127                | 2,71           | 105,3           | 6,95            | 472,7              | 68,0            | 9,72            | 733,3           | 75,4            | 10,84           | 866,4           | 80,0            |
| 120        | 60  | 4,0            | 12,0           | 6,0                        | 11,637                | 2,83           | 140,0           | 7,19            | 617,0              | 85,9            | 10,32           | 985,5           | 95,5            | 11,61           | 1 170,1         | 100,7           |
| 130        | 65  | 4,5            | 13,0           | 7,0                        | 13,888                | 3,12           | 198,4           | 7,36            | 794,7              | 107,9           | 10,83           | 1 311,6         | 121,2           | 12,33           | 1 573,8         | 127,6           |
| 140        | 70  | 5,0            | 14,0           | 7,5                        | 16,304                | 3,42           | 273,1           | 7,53            | 1 000,9            | 132,8           | 11,29           | 1 699,6         | 150,5           | 13,01           | 2 063,4         | 158,6           |
| 150        | 75  | 5,0            | 15,0           | 7,5                        | 18,204                | 3,54           | 342,1           | 7,69            | 1 227,3            | 159,5           | 11,76           | 2 134,7         | 181,5           | 13,70           | 2 616,0         | 191,0           |
| 160        | 80  | 5,5            | 16,0           | 8,5                        | 20,993                | 3,83           | 453,3           | 7,84            | 1 498,2            | 191,2           | 12,14           | 2 666,4         | 219,7           | 14,31           | 3 311,3         | 231,5           |
| 170        | 85  | 6,0            | 17,0           | 9,0                        | 23,941                | 4,12           | 589,0           | 7,99            | 1 804,8            | 225,9           | 12,49           | 3 272,5         | 262,0           | 14,89           | 4 117,6         | 276,6           |
| 180        | 90  | 6,0            | 18,0           | 9,0                        | 26,231                | 4,25           | 709,9           | 8,11            | 2 129,5            | 262,5           | 12,86           | 3 931,1         | 305,8           | 15,48           | 4 998,4         | 323,0           |
| 190        | 95  | 6,5            | 19,0           | 10,0                       | 29,557                | 4,54           | 898,6           | 8,26            | 2 516,1            | 304,7           | 13,14           | 4 707,0         | 358,2           | 15,99           | 6 064,3         | 379,3           |
| 200        | 100 | 7,0            | 20,0           | 10,5                       | 33,036                | 4,83           | 1 121,9         | 8,41            | 2 947,4            | 350,3           | 13,41           | 5 567,9         | 415,1           | 16,48           | 7 263,4         | 440,9           |
| 220        | 110 | 7,5            | 22,0           | 11,0                       | 39,532                | 5,25           | 1 611,2         | 8,68            | 3 918,4            | 451,4           | 13,92           | 7 531,9         | 540,9           | 17,41           | 10 041,6        | 576,8           |
| 240        | 120 | 8,0            | 24,0           | 12,0                       | 46,661                | 5,66           | 2 244,8         | 8,94            | 5 090,4            | 569,2           | 14,36           | 9 891,0         | 688,9           | 18,23           | 13 457,9        | 738,1           |
| 260        | 130 | 9,0            | 26,0           | 13,5                       | 55,605                | 6,24           | 3 179,7         | 9,29            | 6 571,9            | 707,1           | 14,72           | 12 727,7        | 864,7           | 18,92           | 17 647,8        | 932,8           |

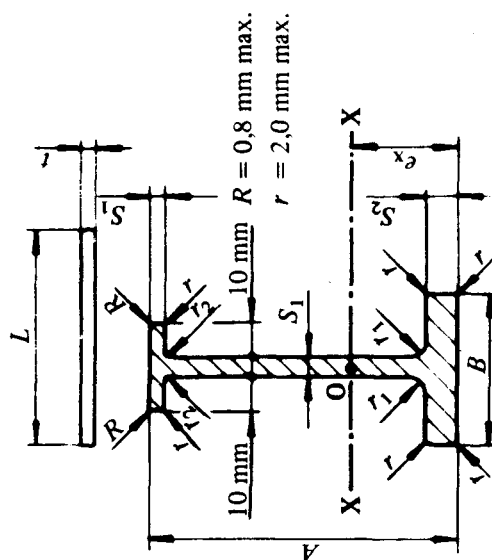
## 3.2 Tee bars with welding flange

## Section without plate

$F$  = sectional area  
 $O$  = centre of gravity  
 $e_x$  = distance of centre of gravity from the outer face of the flange  
 $G$  = mass  
 $I_x$  = second moment of area

## Section with plate

$NA$  = neutral axis  
 $e_{NA}$  = distance of centre of gravity of assembly from the outer face of the flange  
 $I$  = distance of neutral axis from the extreme outer fibres  
 $Z = \frac{I}{e_{NA}}$  = section modulus  
 $t$  = plate thickness : 5, 10 or 15 mm  
 $L$  = 40  $t$



| Dimensions |     | Mass<br>(without<br>plate) | Sectional properties  |                |                |          |                 |      |                    |                 |                 |                 |                 |                 |
|------------|-----|----------------------------|-----------------------|----------------|----------------|----------|-----------------|------|--------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|            |     |                            | Section without plate |                |                |          |                 |      | Section with plate |                 |                 |                 |                 |                 |
|            |     |                            | $F$                   | $e_x$          | $I_x$          | $e_{NA}$ | $I$             | $Z$  | $e_{NA}$           | $I$             | $Z$             | $e_{NA}$        | $I$             | $Z$             |
| A          | B   | S <sub>1</sub>             | S <sub>2</sub>        | r <sub>1</sub> | r <sub>2</sub> | G        |                 |      |                    |                 |                 |                 |                 |                 |
| mm         | mm  | mm                         | mm                    | mm             | mm             | kg/m     | cm <sup>2</sup> | cm   | cm <sup>4</sup>    | cm <sup>3</sup> | cm <sup>4</sup> | cm <sup>3</sup> | cm <sup>4</sup> | cm <sup>3</sup> |
| 80         | 40  | 4,0                        | 8,0                   | 6,0            | 4,0            | 1,868    | 7,049           | 2,93 | 59,7               | 176,7           | 29,2            | 7,57            | 248,6           | 32,4            |
| 90         | 45  | 4,0                        | 9,0                   | 6,0            | 4,0            | 2,189    | 8,259           | 3,08 | 85,3               | 257,6           | 39,9            | 8,40            | 370,6           | 44,1            |
| 100        | 50  | 4,0                        | 10,0                  | 6,0            | 4,0            | 2,536    | 9,569           | 3,21 | 117,4              | 359,6           | 52,8            | 9,09            | 530,6           | 58,3            |
| 110        | 55  | 4,0                        | 11,0                  | 6,0            | 4,0            | 2,909    | 10,979          | 3,33 | 156,5              | 484,7           | 68,2            | 9,74            | 734,3           | 75,4            |
| 120        | 60  | 4,0                        | 12,0                  | 6,0            | 4,0            | 3,310    | 12,489          | 3,44 | 203,5              | 634,3           | 86,2            | 10,35           | 987,3           | 95,4            |
| 130        | 65  | 4,5                        | 13,0                  | 7,0            | 4,5            | 3,937    | 14,858          | 3,75 | 282,4              | 821,8           | 108,5           | 10,86           | 1 315,2         | 121,1           |
| 140        | 70  | 5,0                        | 14,0                  | 7,5            | 5,0            | 4,610    | 17,394          | 4,06 | 381,6              | 1 041,0         | 133,8           | 11,34           | 1 706,0         | 150,5           |
| 150        | 75  | 5,0                        | 15,0                  | 7,5            | 5,0            | 5,113    | 19,294          | 4,17 | 470,7              | 1 279,1         | 160,8           | 11,81           | 2 144,1         | 181,5           |
| 160        | 80  | 5,5                        | 16,0                  | 8,5            | 5,5            | 5,885    | 22,206          | 4,48 | 614,4              | 1 570,1         | 193,0           | 12,21           | 2 681,4         | 219,6           |
| 170        | 85  | 6,0                        | 17,0                  | 9,0            | 6,0            | 6,699    | 25,278          | 4,79 | 788,0              | 1 901,4         | 228,6           | 12,58           | 3 295,2         | 262,0           |
| 180        | 90  | 6,0                        | 18,0                  | 9,0            | 6,0            | 7,305    | 27,568          | 4,90 | 938,6              | 2 247,0         | 265,8           | 12,95           | 3 961,3         | 305,9           |
| 190        | 95  | 6,5                        | 19,0                  | 10,0           | 6,5            | 8,221    | 31,021          | 5,20 | 1 175,3            | 2 667,8         | 309,2           | 13,26           | 4 750,2         | 358,4           |
| 200        | 100 | 7,0                        | 20,0                  | 10,5           | 7,0            | 9,177    | 34,629          | 5,51 | 1 453,0            | 3 139,3         | 356,3           | 13,54           | 5 627,5         | 415,5           |
| 220        | 110 | 7,5                        | 22,0                  | 11,0           | 7,5            | 10,933   | 41,257          | 5,93 | 2 050,5            | 4 194,6         | 460,2           | 14,09           | 7 630,2         | 541,7           |
| 240        | 120 | 8,0                        | 24,0                  | 12,0           | 8,0            | 12,857   | 48,518          | 6,35 | 2 814,5            | 5 472,6         | 581,9           | 14,55           | 10 043,8        | 690,3           |
| 260        | 130 | 9,0                        | 26,0                  | 13,5           | 9,0            | 15,300   | 57,736          | 6,95 | 3 936,5            | 7 110,6         | 725,4           | 14,95           | 12 967,8        | 867,2           |

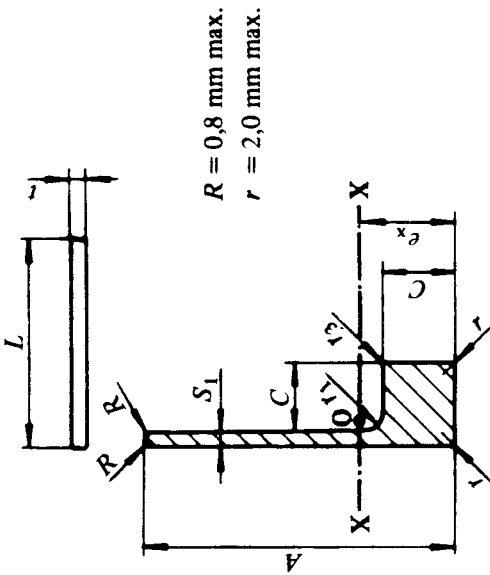
3.3 Bulb plates without welding flange

Section without plate

- $F$  = sectional area  
 $O$  = centre of gravity  
 $e_x$  = distance of centre of gravity from the outer face of the bulb  
 $G$  = mass  
 $I_x$  = second moment of area

Section with plate

- NA = neutral axis  
 $e_{NA}$  = distance of centre of gravity of assembly from the outer face of the bulb  
= distance of neutral axis from the extreme outer fibres  
 $I$  = second moment of area  
 $Z = \frac{I}{e_{NA}}$  = section modulus  
 $t$  = plate thickness : 5, 10 or 15 mm  
 $L$  = 40  $t$



| Dimensions |         |                      |                      | Mass<br>(without<br>plate) | Sectional properties   |             |                          |                |                        |                        |                    |                        |                        |                |                        |                        |
|------------|---------|----------------------|----------------------|----------------------------|------------------------|-------------|--------------------------|----------------|------------------------|------------------------|--------------------|------------------------|------------------------|----------------|------------------------|------------------------|
|            |         |                      |                      |                            | Section without plate  |             |                          |                |                        |                        | Section with plate |                        |                        |                |                        |                        |
|            |         |                      |                      |                            | $F$<br>cm <sup>2</sup> | $e_x$<br>cm | $I_x$<br>cm <sup>4</sup> | $e_{NA}$<br>cm | $I$<br>cm <sup>4</sup> | $Z$<br>cm <sup>3</sup> | $e_{NA}$<br>cm     | $I$<br>cm <sup>4</sup> | $Z$<br>cm <sup>3</sup> | $e_{NA}$<br>cm | $I$<br>cm <sup>4</sup> | $Z$<br>cm <sup>3</sup> |
| A<br>mm    | C<br>mm | S <sub>1</sub><br>mm | r <sub>1</sub><br>mm | r <sub>3</sub><br>mm       | G<br>kg/m              |             |                          |                |                        |                        |                    |                        |                        |                |                        |                        |
| 50         | 12      | 3,5                  | 4,5                  | 3,0                        | 0,852                  | 1,67        | 6,79                     | 4,38           | 38,25                  | 8,74                   | 5,21               | 53,86                  | 10,33                  | 5,61           | 75,43                  | 13,45                  |
| 60         | 14      | 3,5                  | 4,5                  | 3,0                        | 1,082                  | 1,91        | 12,18                    | 4,99           | 66,95                  | 13,41                  | 6,07               | 93,51                  | 15,39                  | 6,54           | 120,49                 | 18,42                  |
| 70         | 16      | 3,5                  | 4,5                  | 3,0                        | 1,334                  | 2,14        | 19,97                    | 5,54           | 107,55                 | 19,41                  | 6,90               | 151,68                 | 21,98                  | 7,45           | 186,79                 | 25,06                  |
| 80         | 18      | 4,0                  | 5,5                  | 3,0                        | 1,713                  | 2,44        | 33,24                    | 5,97           | 165,94                 | 27,80                  | 7,66               | 240,89                 | 31,46                  | 8,33           | 290,20                 | 34,85                  |
| 90         | 20      | 4,5                  | 6,0                  | 3,0                        | 2,143                  | 2,76        | 53,11                    | 6,35           | 241,63                 | 38,06                  | 8,37               | 362,02                 | 43,27                  | 9,17           | 432,53                 | 47,15                  |
| 100        | 22      | 4,5                  | 6,0                  | 4,0                        | 2,481                  | 2,98        | 74,64                    | 6,73           | 330,41                 | 49,06                  | 9,07               | 507,01                 | 55,88                  | 10,02          | 603,50                 | 60,24                  |
| 110        | 24      | 5,0                  | 7,0                  | 4,0                        | 2,997                  | 3,30        | 109,93                   | 7,03           | 445,63                 | 63,39                  | 9,69               | 706,22                 | 72,86                  | 10,81          | 844,34                 | 78,13                  |
| 120        | 26      | 5,0                  | 7,5                  | 4,0                        | 3,399                  | 3,51        | 145,65                   | 7,34           | 575,24                 | 78,39                  | 10,32              | 934,18                 | 90,55                  | 11,60          | 1 121,32               | 96,69                  |
| 130        | 28      | 5,5                  | 8,5                  | 4,0                        | 3,999                  | 3,83        | 202,67                   | 7,58           | 736,68                 | 97,14                  | 10,85              | 1 230,77               | 113,43                 | 12,33          | 1 491,55               | 121,01                 |
| 140        | 30      | 6,0                  | 9,0                  | 4,0                        | 4,643                  | 4,15        | 274,93                   | 7,82           | 924,48                 | 118,21                 | 11,35              | 1 583,22               | 139,52                 | 13,02          | 1 939,35               | 148,92                 |
| 150        | 32      | 6,0                  | 9,0                  | 4,5                        | 5,128                  | 4,30        | 343,69                   | 8,07           | 1 126,28               | 139,60                 | 11,87              | 1 966,51               | 165,72                 | 13,73          | 2 428,01               | 176,79                 |
| 160        | 34      | 6,5                  | 10,0                 | 4,5                        | 5,859                  | 4,68        | 449,73                   | 8,28           | 1 731,99               | 165,66                 | 12,29              | 2 443,13               | 198,77                 | 14,37          | 3 053,32               | 212,49                 |
| 170        | 36      | 7,0                  | 10,5                 | 4,5                        | 6,634                  | 5,00        | 578,48                   | 8,50           | 1 650,83               | 194,28                 | 12,69              | 2 987,32               | 235,43                 | 14,98          | 3 778,84               | 252,33                 |
| 180        | 38      | 7,5                  | 11,5                 | 4,5                        | 7,463                  | 5,32        | 733,01                   | 8,71           | 1 966,54               | 225,78                 | 13,06              | 3 606,14               | 276,21                 | 15,55          | 4 617,27               | 296,93                 |
| 200        | 42      | 8,0                  | 12,0                 | 4,5                        | 8,980                  | 5,85        | 1 082,22                 | 9,13           | 2 683,79               | 293,94                 | 13,78              | 5 023,42               | 364,53                 | 16,67          | 6 565,21               | 393,75                 |
| 220        | 46      | 9,0                  | 13,5                 | 4,5                        | 10,941                 | 6,49        | 1 609,57                 | 9,57           | 3 608,23               | 377,19                 | 14,37              | 6 817,83               | 474,44                 | 17,64          | 9 105,72               | 516,26                 |