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Seamless precision steel tubes
Dimensions

DIN
2391
Part 1

ICS 23.040.10

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Descriptors. Tube, steel tube, precision tube, dimensions.

Nahtlose Präzisionsstahlrohre mit besonderer Maßgenauigkeit; Maße

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

Dimensions in mm

1 Scope and field of application

This standard specifies dimensions for cold finished, seamless precision steel tubes and is to be used in conjunction with DIN 2391 Part 2 which states the relevant technical delivery conditions. The preferred sizes listed in table 2 are mainly used in mechanical and automotive engineering.

Where steel tubes of dimensions specified in this standard are to comply with the technical delivery conditions listed in subclause 1.2 of DIN 2391 Part 2, they shall be ordered in quality grade C.

2 Dimensions

The tube diameter is subject to the limit deviations specified in table 2.

If one of the limit deviations is to be zero, this shall be stated in the order, e.g. instead of (55 ± 0,25) mm, either (55^{+0,5}₀) mm or (55_{-0,5}) mm.

Table 1: Limit deviations for the diameter of heat treated tubes

| Wall thickness, <i>T</i> | Limit deviations for diameter, <i>D</i> |
|---|---|
| 0,05 · <i>D</i> and above | As specified in table 2. |
| Above 0,05 · <i>D</i> up to 0,025 · <i>D</i> | 1,5 times the values in table 2. |
| Above 0,025 · <i>D</i> | Twice the values in table 2. |

The limit deviations for diameters given in table 2 allow for ovality and apply for the cold finished (hard) (BK) and cold finished (soft) (BKW) conditions.

For heat treated tubes, i.e. cold finished and stress-relief annealed (BKS), annealed (GBK) or normalized (NBK) tubes, the limit deviations for the diameter increase as a function of the wall thickness/diameter ratio (see table 1). The dimensions given in table 1 also apply to the inside diameter of steel tubes.

In the case of intermediate sizes, the deviations for the next largest size shall apply.

The limit deviations for wall thickness shall be ±10% of the nominal size and include the concentricity tolerance, which is calculated as a percentage using the following formula:

$$\frac{T_{max} - T_{min}}{T_{max} + T_{min}} \cdot 100$$

where

*T*_{max} is the largest wall thickness measured of a tube cross section;

*T*_{min} the smallest wall thickness measured of a tube cross section.

Tubes are generally ordered in terms of outside diameter and inside diameter.

Where the wall thickness is of significance, the tubes may also be ordered in terms of outside diameter and wall thickness or inside diameter and wall thickness. In this case, the limit deviations specified here refer only to two of three possible parameters, the deviations for the third being subject to agreement. Such tubes shall be ordered in quality grade C.

Continued on pages 2 to 6.

18.2.03

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3 Designation

Designation of a seamless precision steel tube, made of St 35 steel, with an outside diameter, D , of 100 mm and an inside diameter, D_1 , of 94 mm (ID 94), normalized (NBK):

Tube DIN 2391 – St 35 NBK 100 × ID 94

Designation of seamless precision steel tube, made of St 35 steel, with an outside diameter, D , of 100 mm and a wall thickness, T , of 3 mm, normalized (NBK):

Tube DIN 2391 – St 35 NBK 100 × 3

Designation of seamless precision steel tube, made of St 35 steel, with an inside diameter, D_1 , of 94 mm (ID 94) and a wall thickness, T , of 3 mm, normalized (NBK):

Tube DIN 2391 – St 35 NBK ID 94 × 3

Designation of seamless precision steel tube, made of St 35.8 steel, quality grade C, with an outside diameter, D , of 25 mm and a wall thickness, T , of 1,5 mm, normalized (NBK), complying with the technical delivery conditions specified in DIN 17 175:

Tube DIN 2391 – C – 25 × 1,5 – DIN 17 175 – St 35.8

Table 2: Dimensions

| Wall thickness, T (nominal size) | | 0,5 | 0,8 | 1 | 1,2 | 1,5 | 1,8 | 2 | 2,2 | 2,5 | 2,8 | 3 | 3,5 | 4 |
|---------------------------------------|---|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-----------|-----------|-----------|
| Outside diameter, D | Inside diameter, D_1 (nominal size and limit deviations) | | | | | | | | | | | | | |
| | Nominal size | Limit deviations | | | | | | | | | | | | |
| 4 | ± 0,08 | 3 ± 0,15 | 2,4 ± 0,15 | 2 ± 0,15 | 1,6 ± 0,15 | | | | | | | | | |
| 5 | | 4 ± 0,15 | 3,4 ± 0,15 | 3 ± 0,15 | 2,6 ± 0,15 | | | | | | | | | |
| 6 | | 5 ± 0,15 | 4,4 ± 0,15 | 4 ± 0,15 | 3,8 ± 0,15 | 3 ± 0,15 | 2,4 ± 0,15 | 2 ± 0,15 | | | | | | |
| 7 | | 6 ± 0,15 | 5,4 ± 0,15 | 5 ± 0,15 | 4,8 ± 0,15 | 4 ± 0,15 | 3,4 ± 0,15 | 3 ± 0,15 | | | | | | |
| 8 | | 7 ± 0,15 | 6,4 ± 0,15 | 6 ± 0,15 | 5,6 ± 0,15 | 5 ± 0,15 | 4,4 ± 0,15 | 4 ± 0,15 | 3,6 ± 0,15 | 3 ± 0,25 | | | | |
| 9 | | 8 ± 0,15 | 7,4 ± 0,15 | 7 ± 0,15 | 6,6 ± 0,15 | 6 ± 0,15 | 5,4 ± 0,15 | 5 ± 0,15 | 4,6 ± 0,15 | 4 ± 0,25 | 3,4 ± 0,25 | | | |
| 10 | | 9 ± 0,15 | 8,4 ± 0,15 | 8 ± 0,15 | 7,6 ± 0,15 | 7 ± 0,15 | 6,4 ± 0,15 | 6 ± 0,15 | 5,6 ± 0,15 | 5 ± 0,15 | 4,4 ± 0,25 | 4 ± 0,25 | | |
| 12 | | 11 ± 0,15 | 10,4 ± 0,15 | 10 ± 0,15 | 9,6 ± 0,15 | 9 ± 0,15 | 8,4 ± 0,15 | 8 ± 0,15 | 7,6 ± 0,15 | 7 ± 0,15 | 6,4 ± 0,15 | 6 ± 0,25 | 5 ± 0,25 | 4 ± 0,25 |
| 14 | | 13 ± 0,08 | 12,4 ± 0,08 | 12 ± 0,08 | 11,6 ± 0,15 | 11 ± 0,15 | 10,4 ± 0,15 | 10 ± 0,15 | 9,6 ± 0,15 | 9 ± 0,15 | 8,4 ± 0,15 | 8 ± 0,15 | 7 ± 0,15 | 6 ± 0,25 |
| 15 | | 14 ± 0,08 | 13,4 ± 0,08 | 13 ± 0,08 | 12,6 ± 0,08 | 12 ± 0,15 | 11,4 ± 0,15 | 11 ± 0,15 | 10,6 ± 0,15 | 10 ± 0,15 | 9,4 ± 0,15 | 9 ± 0,15 | 8 ± 0,15 | 7 ± 0,15 |
| 16 | | 15 ± 0,08 | 14,4 ± 0,08 | 14 ± 0,08 | 13,6 ± 0,08 | 13 ± 0,08 | 12,4 ± 0,15 | 12 ± 0,15 | 11,6 ± 0,15 | 11 ± 0,15 | 10,4 ± 0,15 | 10 ± 0,15 | 9 ± 0,15 | 8 ± 0,15 |
| 18 | | 17 ± 0,08 | 16,4 ± 0,08 | 16 ± 0,08 | 15,6 ± 0,08 | 15 ± 0,08 | 14,4 ± 0,08 | 14 ± 0,08 | 13,6 ± 0,15 | 13 ± 0,15 | 12,4 ± 0,15 | 12 ± 0,15 | 11 ± 0,15 | 10 ± 0,15 |
| 20 | | 19 ± 0,08 | 18,4 ± 0,08 | 18 ± 0,08 | 17,6 ± 0,08 | 17 ± 0,08 | 16,4 ± 0,08 | 16 ± 0,08 | 15,6 ± 0,15 | 15 ± 0,15 | 14,4 ± 0,15 | 14 ± 0,15 | 13 ± 0,15 | 12 ± 0,15 |
| 22 | | 21 ± 0,08 | 20,4 ± 0,08 | 20 ± 0,08 | 19,6 ± 0,08 | 19 ± 0,08 | 18,4 ± 0,08 | 18 ± 0,08 | 17,6 ± 0,08 | 17 ± 0,15 | 16,4 ± 0,15 | 16 ± 0,15 | 15 ± 0,15 | 14 ± 0,15 |
| 25 | | 24 ± 0,08 | 23,4 ± 0,08 | 23 ± 0,08 | 22,6 ± 0,08 | 22 ± 0,08 | 21,4 ± 0,08 | 21 ± 0,08 | 20,6 ± 0,08 | 20 ± 0,08 | 19,4 ± 0,15 | 19 ± 0,15 | 18 ± 0,15 | 17 ± 0,15 |
| 26 | | 25 ± 0,08 | 24,4 ± 0,08 | 24 ± 0,08 | 23,6 ± 0,08 | 23 ± 0,08 | 22,4 ± 0,08 | 22 ± 0,08 | 21,6 ± 0,08 | 21 ± 0,08 | 20,4 ± 0,15 | 20 ± 0,15 | 19 ± 0,15 | 18 ± 0,15 |
| 28 | | 27 ± 0,08 | 26,4 ± 0,08 | 26 ± 0,08 | 25,6 ± 0,08 | 25 ± 0,08 | 24,4 ± 0,08 | 24 ± 0,08 | 23,6 ± 0,08 | 23 ± 0,08 | 22,4 ± 0,08 | 22 ± 0,15 | 21 ± 0,15 | 20 ± 0,15 |
| 30 | 29 ± 0,08 | 28,4 ± 0,08 | 28 ± 0,08 | 27,6 ± 0,08 | 27 ± 0,08 | 26,4 ± 0,08 | 26 ± 0,08 | 25,6 ± 0,08 | 25 ± 0,08 | 24,4 ± 0,08 | 24 ± 0,15 | 23 ± 0,15 | 22 ± 0,15 | |

(continued)

Dimensions in mm

| 4,5 | 5 | 5,5 | 6 | 7 | 8 | 9 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 25 | Wall thickness, T |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----|----|----|----|----|----|----|-----------------------|
| Inside diameter, D_1 (nominal size and limit deviations) | | | | | | | | | | | | | | | Outside diameter, D |
| | | | | | | | | | | | | | | | 4 |
| | | | | | | | | | | | | | | | 5 |
| | | | | | | | | | | | | | | | 6 |
| | | | | | | | | | | | | | | | 7 |
| | | | | | | | | | | | | | | | 8 |
| | | | | | | | | | | | | | | | 9 |
| | | | | | | | | | | | | | | | 10 |
| | | | | | | | | | | | | | | | 12 |
| | | | | | | | | | | | | | | | 14 |
| 5 ± 0,25 | | | | | | | | | | | | | | | 15 |
| 6 ± 0,25 | 5 ± 0,25 | | | | | | | | | | | | | | 16 |
| 7 ± 0,15 | 6 ± 0,25 | 5 ± 0,25 | 4 ± 0,25 | | | | | | | | | | | | 18 |
| 9 ± 0,15 | 8 ± 0,15 | 7 ± 0,25 | 6 ± 0,25 | | | | | | | | | | | | 20 |
| 11 ± 0,15 | 10 ± 0,15 | 9 ± 0,15 | 8 ± 0,25 | 6 ± 0,25 | | | | | | | | | | | 22 |
| 13 ± 0,15 | 12 ± 0,15 | 11 ± 0,15 | 10 ± 0,15 | 8 ± 0,25 | | | | | | | | | | | 25 |
| 16 ± 0,15 | 15 ± 0,15 | 14 ± 0,15 | 13 ± 0,15 | 11 ± 0,15 | 9 ± 0,25 | | | | | | | | | | 26 |
| 17 ± 0,15 | 16 ± 0,15 | 15 ± 0,15 | 14 ± 0,15 | 12 ± 0,15 | 10 ± 0,25 | | | | | | | | | | 28 |
| 19 ± 0,15 | 18 ± 0,15 | 17 ± 0,15 | 16 ± 0,15 | 14 ± 0,15 | 12 ± 0,15 | | | | | | | | | | 30 |
| 21 ± 0,15 | 20 ± 0,15 | 19 ± 0,15 | 18 ± 0,15 | 16 ± 0,15 | 14 ± 0,15 | 12 ± 0,15 | 10 ± 0,25 | | | | | | | | |

For the sizes given between the continuous thick stepped lines, the wall thickness/outside diameter ratio is 0,05 or 0,025.

Dimensions in mm

| | 4,5 | 5 | 5,5 | 6 | 7 | 8 | 9 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 25 | Wall thickness, T |
|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-----------|-----------|-----------------------|
| Inside diameter, D_1 (nominal size and limit deviations) | | | | | | | | | | | | | | | | Outside diameter, D |
| | | | | | | | | | | | | | | | | |
| | 23 ± 0,15 | 22 ± 0,15 | 21 ± 0,15 | 20 ± 0,15 | 18 ± 0,15 | 16 ± 0,15 | 14 ± 0,15 | 12 ± 0,25 | | | | | | | | 82 |
| | 26 ± 0,15 | 25 ± 0,15 | 24 ± 0,15 | 23 ± 0,15 | 21 ± 0,15 | 19 ± 0,15 | 17 ± 0,15 | 15 ± 0,15 | | | | | | | | 85 |
| | 29 ± 0,15 | 28 ± 0,15 | 27 ± 0,15 | 26 ± 0,15 | 24 ± 0,15 | 22 ± 0,15 | 20 ± 0,15 | 18 ± 0,15 | | | | | | | | 88 |
| | 31 ± 0,15 | 30 ± 0,15 | 29 ± 0,15 | 28 ± 0,15 | 26 ± 0,15 | 24 ± 0,15 | 22 ± 0,15 | 20 ± 0,15 | | | | | | | | 40 |
| | 33 ± 0,20 | 32 ± 0,20 | 31 ± 0,20 | 30 ± 0,20 | 28 ± 0,20 | 26 ± 0,20 | 24 ± 0,20 | 22 ± 0,20 | | | | | | | | 42 |
| | 36 ± 0,20 | 35 ± 0,20 | 34 ± 0,20 | 33 ± 0,20 | 31 ± 0,20 | 29 ± 0,20 | 27 ± 0,20 | 25 ± 0,20 | | | | | | | | 45 |
| | 39 ± 0,20 | 38 ± 0,20 | 37 ± 0,20 | 36 ± 0,20 | 34 ± 0,20 | 32 ± 0,20 | 30 ± 0,20 | 28 ± 0,20 | | | | | | | | 48 |
| | 41 ± 0,20 | 40 ± 0,20 | 39 ± 0,20 | 38 ± 0,20 | 36 ± 0,20 | 34 ± 0,20 | 32 ± 0,20 | 30 ± 0,20 | | | | | | | | 50 |
| | 46 ± 0,25 | 45 ± 0,25 | 44 ± 0,25 | 43 ± 0,25 | 41 ± 0,25 | 39 ± 0,25 | 37 ± 0,25 | 35 ± 0,25 | 31 ± 0,25 | | | | | | | 55 |
| | 51 ± 0,25 | 50 ± 0,25 | 49 ± 0,25 | 48 ± 0,25 | 46 ± 0,25 | 44 ± 0,25 | 42 ± 0,25 | 40 ± 0,25 | 36 ± 0,25 | | | | | | | 60 |
| | 56 ± 0,30 | 55 ± 0,30 | 54 ± 0,30 | 53 ± 0,30 | 51 ± 0,30 | 49 ± 0,30 | 47 ± 0,30 | 45 ± 0,30 | 41 ± 0,30 | 37 ± 0,30 | | | | | | 65 |
| | 61 ± 0,30 | 60 ± 0,30 | 59 ± 0,30 | 58 ± 0,30 | 56 ± 0,30 | 54 ± 0,30 | 52 ± 0,30 | 50 ± 0,30 | 46 ± 0,30 | 42 ± 0,30 | | | | | | 70 |
| | 66 ± 0,35 | 65 ± 0,35 | 64 ± 0,35 | 63 ± 0,35 | 61 ± 0,35 | 59 ± 0,35 | 57 ± 0,35 | 55 ± 0,35 | 51 ± 0,35 | 47 ± 0,35 | 43 ± 0,35 | | | | | 75 |
| | 71 ± 0,35 | 70 ± 0,35 | 69 ± 0,35 | 68 ± 0,35 | 66 ± 0,35 | 64 ± 0,35 | 62 ± 0,35 | 60 ± 0,35 | 56 ± 0,35 | 52 ± 0,35 | 48 ± 0,35 | | | | | 80 |
| | 76 ± 0,40 | 75 ± 0,40 | 74 ± 0,40 | 73 ± 0,40 | 71 ± 0,40 | 69 ± 0,40 | 67 ± 0,40 | 65 ± 0,40 | 61 ± 0,40 | 57 ± 0,40 | 53 ± 0,40 | | | | | 85 |
| | 81 ± 0,40 | 80 ± 0,40 | 79 ± 0,40 | 78 ± 0,40 | 76 ± 0,40 | 74 ± 0,40 | 72 ± 0,40 | 70 ± 0,40 | 66 ± 0,40 | 62 ± 0,40 | 58 ± 0,40 | | | | | 90 |
| | 86 ± 0,45 | 85 ± 0,45 | 84 ± 0,45 | 83 ± 0,45 | 81 ± 0,45 | 79 ± 0,45 | 77 ± 0,45 | 75 ± 0,45 | 71 ± 0,45 | 67 ± 0,45 | 63 ± 0,45 | 59 ± 0,45 | | | | 95 |
| | 91 ± 0,45 | 90 ± 0,45 | 89 ± 0,45 | 88 ± 0,45 | 86 ± 0,45 | 84 ± 0,45 | 82 ± 0,45 | 80 ± 0,45 | 76 ± 0,45 | 72 ± 0,45 | 68 ± 0,45 | 64 ± 0,45 | | | | 100 |
| | 101 ± 0,50 | 100 ± 0,50 | 99 ± 0,50 | 98 ± 0,50 | 96 ± 0,50 | 94 ± 0,50 | 92 ± 0,50 | 90 ± 0,50 | 86 ± 0,50 | 82 ± 0,50 | 78 ± 0,50 | 74 ± 0,50 | | | | 110 |
| | 111 ± 0,50 | 110 ± 0,50 | 109 ± 0,50 | 108 ± 0,50 | 106 ± 0,50 | 104 ± 0,50 | 102 ± 0,50 | 100 ± 0,50 | 96 ± 0,50 | 92 ± 0,50 | 88 ± 0,50 | 84 ± 0,50 | | | | 120 |
| | 121 ± 0,70 | 120 ± 0,70 | 119 ± 0,70 | 118 ± 0,70 | 116 ± 0,70 | 114 ± 0,70 | 112 ± 0,70 | 110 ± 0,70 | 106 ± 0,70 | 102 ± 0,70 | 98 ± 0,70 | 94 ± 0,70 | | | | 130 |
| | 131 ± 0,70 | 130 ± 0,70 | 129 ± 0,70 | 128 ± 0,70 | 126 ± 0,70 | 124 ± 0,70 | 122 ± 0,70 | 120 ± 0,70 | 116 ± 0,70 | 112 ± 0,70 | 108 ± 0,70 | 104 ± 0,70 | | | | 140 |
| | 141 ± 0,80 | 140 ± 0,80 | 139 ± 0,80 | 138 ± 0,80 | 136 ± 0,80 | 134 ± 0,80 | 132 ± 0,80 | 130 ± 0,80 | 126 ± 0,80 | 122 ± 0,80 | 118 ± 0,80 | 114 ± 0,80 | 110 ± 0,80 | | | 150 |
| | 151 ± 0,80 | 150 ± 0,80 | 149 ± 0,80 | 148 ± 0,80 | 146 ± 0,80 | 144 ± 0,80 | 142 ± 0,80 | 140 ± 0,80 | 136 ± 0,80 | 132 ± 0,80 | 128 ± 0,80 | 124 ± 0,80 | 120 ± 0,80 | | | 160 |
| | 161 ± 0,90 | 160 ± 0,90 | 159 ± 0,90 | 158 ± 0,90 | 156 ± 0,90 | 154 ± 0,90 | 152 ± 0,90 | 150 ± 0,90 | 146 ± 0,90 | 142 ± 0,90 | 138 ± 0,90 | 134 ± 0,90 | 130 ± 0,90 | | | 170 |
| | 171 ± 0,90 | 170 ± 0,90 | 169 ± 0,90 | 168 ± 0,90 | 166 ± 0,90 | 164 ± 0,90 | 162 ± 0,90 | 160 ± 0,90 | 156 ± 0,90 | 152 ± 0,90 | 148 ± 0,90 | 144 ± 0,90 | 140 ± 0,90 | | | 180 |
| | 181 ± 1,0 | 180 ± 1,0 | 179 ± 1,0 | 178 ± 1,0 | 176 ± 1,0 | 174 ± 1,0 | 172 ± 1,0 | 170 ± 1,0 | 166 ± 1,0 | 162 ± 1,0 | 158 ± 1,0 | 154 ± 1,0 | 150 ± 1,0 | 146 ± 1,0 | | 190 |
| | 191 ± 1,0 | 190 ± 1,0 | 189 ± 1,0 | 188 ± 1,0 | 186 ± 1,0 | 184 ± 1,0 | 182 ± 1,0 | 180 ± 1,0 | 176 ± 1,0 | 172 ± 1,0 | 168 ± 1,0 | 164 ± 1,0 | 160 ± 1,0 | 156 ± 1,0 | | 200 |
| | 211 ± 1,2 | 210 ± 1,2 | 209 ± 1,2 | 208 ± 1,2 | 206 ± 1,2 | 204 ± 1,2 | 202 ± 1,2 | 200 ± 1,2 | 196 ± 1,2 | 192 ± 1,2 | 188 ± 1,2 | 184 ± 1,2 | 180 ± 1,2 | 176 ± 1,2 | 170 ± 1,2 | 220 |
| | 231 ± 1,2 | 230 ± 1,2 | 229 ± 1,2 | 228 ± 1,2 | 226 ± 1,2 | 224 ± 1,2 | 222 ± 1,2 | 220 ± 1,2 | 216 ± 1,2 | 212 ± 1,2 | 208 ± 1,2 | 204 ± 1,2 | 200 ± 1,2 | 196 ± 1,2 | 190 ± 1,2 | 240 |
| | | 250 ± 1,3 | 249 ± 1,3 | 248 ± 1,3 | 246 ± 1,3 | 244 ± 1,3 | 242 ± 1,3 | 240 ± 1,3 | 236 ± 1,3 | 232 ± 1,3 | 228 ± 1,3 | 224 ± 1,3 | 220 ± 1,3 | 216 ± 1,3 | 210 ± 1,3 | 260 |

$\uparrow T = 0,025 \cdot D$

$\uparrow T = 0,05 \cdot D$

Standards referred to

DIN 2391 Part 2 Seamless precision steel tubes; technical delivery conditions

DIN 17175 Seamless tubes with elevated temperature properties; technical delivery conditions

Previous editions

DIN 2385: 1993-12; DIN 2385-1: 1940-06, 1943-12, 1957-07; DIN 2391: 1932-04; DIN 2391-1: 1940-06, 1957-11, 1981-07.

Amendments

In comparison with the July 1981 edition, this standard has been restructured and the following amendments made:

- a) The limit deviations for wall thickness have been amended ($\pm 10\%$). They now include the tolerance on concentricity.
- b) The specified limit deviations only refer to two of three possible parameters, limit deviations for the third parameter being subject to agreement (cf. clause 2).
- c) In table 2, limit deviations of $\pm 0,08$ mm for the outside diameter have been specified for sizes up to 30 mm, the limit deviations for the inside diameter having been reduced for smaller nominal sizes.

International Patent Classification

F 16 L 009/02

G 01 B 021/10