

# Database of Steel and Alloy (Marochnik)

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## Characteristics for grade BrA9ZH3L ( БpA9Ж3Л ).

|                           |                                   |
|---------------------------|-----------------------------------|
| <b>Grade :</b>            | BrA9ZH3L ( БpA9Ж3Л ) ( БpAЖ9-4Л ) |
| <b>Classification :</b>   | Tin-free foundry bronzes          |
| <b>Equivalent grades:</b> | <a href="#">Go here</a>           |

## Chemical composition in % for grade BrA9ZH3L ( БpA9Ж3Л )

| Fe    | Si      | Mn      | Ni    | P       | Al       | Cu        | As       | Pb      | Zn    | Sb       | Sn      | Impurity |
|-------|---------|---------|-------|---------|----------|-----------|----------|---------|-------|----------|---------|----------|
| 2 - 4 | max 0.2 | max 0.5 | max 1 | max 0.1 | 8 - 10.5 | 82.8 - 90 | max 0.05 | max 0.1 | max 1 | max 0.05 | max 0.2 | all 2.7  |

Comment: **Cu** is a basis; the percentage of **Cu** is given approximately.

## Mechanical properties under T=20°C for grade BrA9ZH3L ( БpA9Ж3Л )

| Assortment                         | Dimension | Direct. | $\sigma_B$ | $\sigma_T$ | $\delta_5$ | $\psi$ | KCU                 | Heat treatment |
|------------------------------------|-----------|---------|------------|------------|------------|--------|---------------------|----------------|
| -                                  | mm        | -       | MPa        | MPa        | %          | %      | kJ / m <sup>2</sup> | -              |
| cast in a metal mould, GOST 493-79 |           |         | 490        |            | 12         |        |                     |                |
| sand (mould) casting, GOST 493-79  |           |         | 392        |            | 10         |        |                     |                |

|                                                                                   |                                     |
|-----------------------------------------------------------------------------------|-------------------------------------|
| <b>Brinell hardness for BrA9ZH3L ( БpA9Ж3Л ) , cast in a metal mould GOST 493</b> | <b>HB 10<sup>-1</sup> = 100 MPa</b> |
| <b>Brinell hardness for BrA9ZH3L ( БpA9Ж3Л ) , sand (mould) casting GOST 493</b>  | <b>HB 10<sup>-1</sup> = 100 MPa</b> |

## Friction coefficient of the material BrA9ZH3L ( БpA9Ж3Л ) .

|                                           |              |
|-------------------------------------------|--------------|
| <b>Friction coefficient with oil :</b>    | <b>0.004</b> |
| <b>Friction coefficient without oil :</b> | <b>0.18</b>  |

## Physical properties for grade BrA9ZH3L ( БpA9Ж3Л )

| T     | E 10 <sup>-5</sup> | $\alpha$ 10 <sup>6</sup> | $\lambda$      | $\rho$            | C            | R 10 <sup>9</sup> |
|-------|--------------------|--------------------------|----------------|-------------------|--------------|-------------------|
| Grade | MPa                | 1/Grade                  | Watt/(m·Grade) | kg/m <sup>3</sup> | J/(kg·Grade) | Ohm·m             |
| 20    | 1.2                | 16                       | 58.6           | 7600              |              | 110               |

## Equivalent steels for grade BrA9ZH3L ( БpA9Ж3Л )

Warning! Indicated both exact and nearest equivalents.

| USA | Germany  | Japan | France | England | European | Italy | Sweden | Poland | Czechia |
|-----|----------|-------|--------|---------|----------|-------|--------|--------|---------|
| -   | DIN, WNr | JIS   | AFNOR  | BS      | EN       | UNI   | SS     | PN     | CSN     |

|                  |                               |                       |           |     |             |            |           |           |        |
|------------------|-------------------------------|-----------------------|-----------|-----|-------------|------------|-----------|-----------|--------|
| C95200<br>C95400 | 2.0941<br>FeAlBz<br>GCuAl10Fe | AlBC1<br>H5114/class1 | CuAl10Fe3 | AB1 | CuAl10Fe2-C | GCuAl10Fe3 | CuAl10Fe3 | CuAl10Fe3 | 423145 |
|------------------|-------------------------------|-----------------------|-----------|-----|-------------|------------|-----------|-----------|--------|

**Specification :****Mechanical properties :**

- $\sigma_B$  - Tensile strength , [MPa]  
 $\sigma_T$  - Yield stress , [MPa]  
 $\delta_5$  - Specific elongation at fracture , [ % ]  
 $\psi$  - Reduction of area , [ % ]  
**KCU** - Impact strength , [ kJ / m<sup>2</sup> ]  
**HB** - Brinell hardness , [MPa]

**Physical properties :**

- T** - Test temperature , [Grade]  
**E** - Young modulus , [MPa]  
 $\alpha$  - Coefficient of linear expansion ( range 20° - T ) , [1/Grade]  
 $\lambda$  - Thermal (heat) condition coefficient , [Watt/(m·Grade)]  
 $\rho$  - Density , [kg/m<sup>3</sup>]  
**C** - Specific heat ( range 20° - T ) , [J/(kg·Grade)]  
**R** - Electrical resistance , [Ohm·m]

Database of steels and alloys (Marochnik) contains information about chemical composition and properties more then 2500 steels and alloys (stainless steel, alloy steel, carbone steel, structural steel, tool steel, cast iron, aluminum alloy, titanium alloy, copper alloy, nickel alloy, magnesium alloy and others).  
 Helpfull for specialists in grade technology, structural engineer, mechanical engineer, metallurgy and metal trader

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