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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 17600.2-1998

Steel. Conversion of elongation values. Part 2: Austenitic steels

钢的伸长率换算 第2部分:奥氏体钢

(English Translation)

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Foreword

This Standard is equivalent to the International Standard ISO 2566-2:1984 "Steel - Conversion of elongation values - Part 2. Austenitic steels".

This Standard is identical to ISO 2566-1:1984 in terms of scope of application, conversion formula and conversion result. This Standard has the following differences from the ISO standard.

1. This standard gives the basic formula for elongation conversion compared with ISO 2566-2. The ISO standard only gives conversion formulas under two specific conditions between $5.65\sqrt{S}$ and $4\sqrt{S}$ gauge lengths AND the non-proportional gauge length, which can be derived from the basic formula.
2. The conversion formula given in this Standard contains the calculation formulas in all the conversion tables in the ISO standard. Therefore, the 21 conversion tables in the ISO standard are reduced to 4.
3. The symbols used in this Standard are consistent with GB/T 228-1987 "Metallic materials - Tensile testing" and GB/T 10623-1989 "Metallic materials - Terms of mechanical test", which are slightly different from the ISO standard.

GB/T 17600 consists of two parts under the general title of "Steel - Conversion of elongation values".

GB/T 17600.1-1998 Part 1: Carbon and low alloy steels

GB/T 17600.2-1998 Part 2: Austenitic steels

1 Scope

This Standard specifies a method of converting room temperature elongations after fracture obtained on various gauge lengths. It includes the conversion formula and the conversion factor table of the elongation, as well as the graphs for performing such conversions.

This Standard is applicable to the test piece of austenitic stainless steels in solution treatment condition within the tensile strength range 450 to 750 MPa, with an original gauge length not exceed $25\sqrt{S}$, and a width to thickness ratio not exceed 20.

This Standard is not applicable to cold rolled steels, quenched and tempered steels and non-austenitic steels.

In the case of plate test piece under 3 mm thickness, the index n in formula (1) of this Standard increases with decreasing thickness. The conversion value of elongation shall be the subject of agreement between the customer and the supplier.

The conversion method of this Standard is adopted internationally, and the conversions are reliable within the scope of this Standard. However, because of the various factors influencing the determination of elongations, whether to use the conversions of this Standard shall be determined by the relevant standards or agreements.

In cases of dispute or arbitration, the elongation value shall be determined on the gauge length stated in the relevant standards or agreements.

2 References

The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. At the time of publication, the editions indicated are valid. All standards are subject to revision. The parties who are using this Standard shall explore the possibility of using the latest version of the following standards.

5.5 Conversion from the elongation of a non-proportional gauge length to the elongation of another non-proportional gauge length for test pieces of different cross-sectional areas

Convert according to formula (1). It may also convert in two steps using Table 4 or Table 5. Firstly, convert the elongation of the known gauge length to the elongation of the proportional gauge length, such as $5.65\sqrt{S}$ or $4\sqrt{S}$; then convert it to the elongation of the non-proportional gauge length to be obtained.

Example: The elongation of a 40 mm x 15 mm test piece with 200 mm gauge length is 24 %, which is to be converted to a 30 mm x 10 mm test piece with 200 mm, 100 mm and 50 mm gauge lengths.

Firstly, according to Table 4, convert to the elongation of $5.65\sqrt{S}$ gauge length, that is 24

$\% \times 1/0.957 = 25.1 \%$;

convert to the elongation of 30 mm x 10 mm, 200 mm gauge length, i.e. $25.1 \% \times 0.916 = 23.0 \%$, which is rounded off to 23 %;

convert to the elongation of 30 mm x 10 mm, 100 mm gauge length, $25.1 \% \times 1.000 = 25.1 \%$, which is rounded off to 25 %;

convert to the elongation of 30 mm x 10 mm, 50 mm gauge length, $25.1 \% \times 1.093 = 27.40 \%$, which is rounded off to 27 %.

The elongation of other proportional gauge lengths may be converted according to the conversion factors given in Table 2.

6 Use of graphs

6.1

Figures 1 to 5 may be used as an alternative quick method for elongation conversions.

6.2

Figures 1 and 2 are obtained by taking the logarithm on both sides of the equation according to formula (5). Figure 1 is used for elongation conversions between $5.65\sqrt{S}$ and 50 mm gauge lengths. Figure 2 is for elongation conversions between $5.65\sqrt{S}$ and 200 mm gauge lengths.

Example: For 25 mm x 12.5 mm test piece with a cross-sectional area of 312.5 mm² and a gauge length of 200 mm, the elongation is 25 %. It is to obtain the elongation of $5.65\sqrt{S}$ gauge length.

Find 312.5 mm² on the abscissa and find 25 on the ordinate of Figure 2. The value corresponding to the oblique line passing through the intersection point is 27.2 %, which is rounded off to 27 %, that is the elongation of $5.65\sqrt{S}$ gauge length to be obtained.

6.3

Figures 3 and 4 are obtained by taking the logarithm on both sides of the equation according to formula (6). They are used for elongation conversions between $4\sqrt{S}$ and 50 mm and between $4\sqrt{S}$ and 200 mm, respectively, using the same method as 6.2.

6.4

Figure 5 is obtained by taking the logarithm of the conversion factor $\lambda = (K/K_{\tau})^{0.127}$ of formula (2), i.e..

It is used to obtain the conversion factor λ of various types of test pieces. It shall operate as follows.

a) calculate the proportionality coefficients $K = L_0/\sqrt{S}$ and $K_{\tau} = L_0_{\tau}/\sqrt{S}$ for two

test pieces;

b) read the conversion factor λ from Figure 5, that is, find K on the abscissa, find K_{τ} on the ordinate, and the value corresponding to the oblique line passing through the intersection point is the λ value;

c) the elongation obtained is $\Delta\tau = \lambda \cdot \Delta$.

Example: For 14 mm x 30 mm plate test piece with a cross-sectional area of 600 mm² and a $L_0 = 200$ mm gauge length, the measured elongation is 24 %. It is to be converted to the elongation of 30 mm x 31 mm with a cross-sectional area of 300 mm² and a $L_0 = 100$ mm gauge length.

Firstly, obtain $K = 200/\sqrt{600} = 8.16$, $K_{\tau} = 100/\sqrt{300} = 5.77$.

Then, find 8.16 on the abscissa and find 5.77 on the ordinate; the intersection point is between the oblique lines 1.00 and 1.05; $\lambda = 1.04$.

Finally, $\Delta\tau = 1.04 \times 24 \% = 25.0 \%$, which is rounded off to 25 %.