

EDS

Engineering,
GM DAEWOO Auto & Technology
Standards

HARDNESS COMPARATIVE TABLES FOR STEEL & CAST STEEL

EDS-T-7165

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1. PURPOSE

Hardness comparative tables in this standard help reevaluate hardness values determined by various measuring methods and specify hardness-tensile strength values.

2. SCOPE

These comparative tables apply limitedly to hot rolled or heat treated non-metallic alloy, low alloy steel and cast steel. In case of high alloy steel and cold formed steel, deviations between measured and converted values shall be calculated. In this case, it is not important to use the conversion table.

Because reevaluating different hardness value or hardness values from tensile strength values can cause errors, which shall be duly considered. Comprehensive test shows it is impossible to formulate hardness values, which are very carefully measured in different methods, to convert them, which applies to all metallic materials or all kinds of steel. It comes to the conclusion that the Penetration Behavior of materials is ruled by the very complicated method of the Stress-Deformation-Behavior. The more similar the Stress-Deformation-Behavior of measured materials is to that of diagrammatized materials, the more suitable the given conversion formula is.

3. PROCEDURE

3.1. The technical delivery conditions and basic characteristic values specified in drawings shall be determined along with necessary test conditions for this method.

3.2. When specific test methods can be used: adequate test apparatus is not provided or required test samples can not be obtained from test parts, conversion of hardness values or conversion of hardness values to tensile strength values shall be performed.

3.3. The characteristic values acquired directly from this test specification can be made for a basis of the comparison except the above-mentioned deviations.

3.4. All hardness determinations applies only to the range of indentation. As hardness change, that is, the distance grows on the surface, the mere difference in the indentation range will cause the values from the methods of Brinell and Vickers hardness test to be nonidentical to the converted values.

3.5. Individual hardness value shall not be used for conversion. When converting hardness values, at least three hardness values shall be averaged.

3.6. If hardness values are reevaluated according to the table, the values shall be specified in a report and other documents.

3.7. The tensile strength values, which are determined from the Table 1, using the method of Brinell hardness test, shall be specified in a report or other documents as follows :

"Converted by the method of Brinell hardness test according to EDS-T-7165"

3.8. In determining characteristic values compared from the table, the following test specifications can apply.

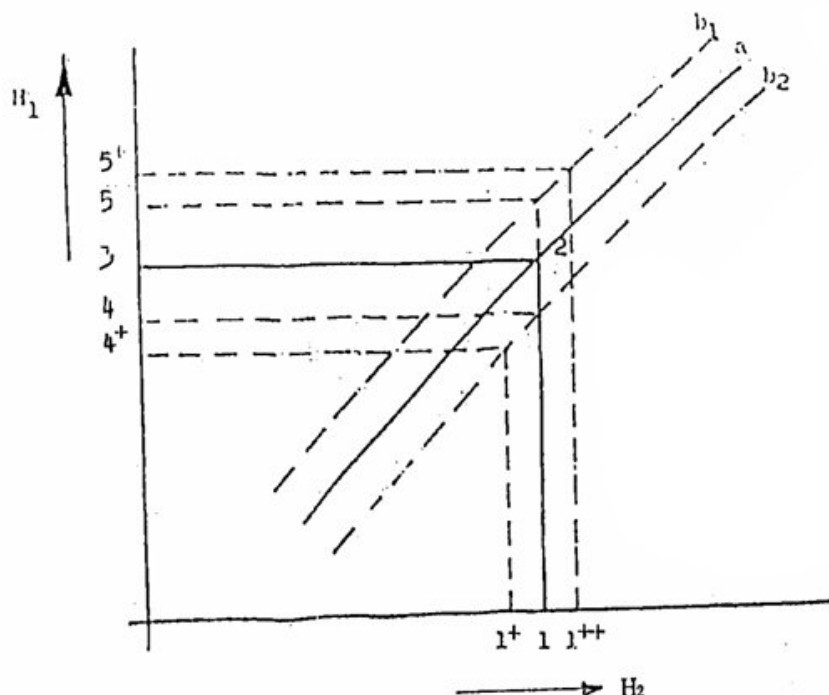
EDS-T-7118 Method of hardness test (Brinell)

EDS-T-7120 Method of hardness test (Vickers)

EDS-T-7117 Method of hardness test (Rockwell Scale A, B & C, Super Rockwell N(T))

EDS-T-7113 Method of tensile test

4. DISPERSION IN HARDNESS CONVERSION



In estimating the reliability of the converted hardness values, the correctness of a used method of hardness test and the scale of reevaluation shall be taken into account. the curve "a" indicates average revaluation formula for steel which has a similar Stress-Deformation-Behavior in the measurement according to this test specification. Curve "b1" and "b2", which define both ranges of the curve "a", is acquired by considering steel which has a different Stress-Deformation-Behavior.

Ideal conversion of hardness $H^2/1$ shall comply with curve 1-2-3 and by doing this, the correct converted value $H^{1/3}$ will be acquired. By considering the spread "from b1 to b2", $H^{1/4}$ and $H^{1/5}$ between all hardness values can be acquired.

In addition, it shall also be taken into account that $H^2/1$ can be affected by the uncertainty of the related measurement method. For this reason the hardness can be changed from $H^{2/1+}$ to $H^{2/1++}$, bringing converted value between $H^{1/4+}$ and $H^{1/5+}$.

5. RELATION OF HARDNESS TO TENSILE STRENGTH

When the reevaluation of hardness value can be accompanied by a large dispersion and systematic deviation, a larger dispersion can be acquired by converting hardness into tensile strength, which is because Stress-Deformation-Behavior of many steel does not correspond to that of the steel which made the conversion formula.