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**Testing method for coefficient of
linear expansion of thermal barrier
coatings**

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law.

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Testing method for coefficient of linear expansion of thermal barrier coatings

1 Scope

This Japanese Industrial Standard specifies the method of testing the coefficient of linear expansion and sintering characteristics (sintering starting temperature, sintering shrinkage ratio, etc.) of a top coat constituting thermal barrier coatings which are intended for covering hot parts of power generating gas turbines used in a thermal power plant, etc. such as a combustion chamber, rotating blade and stationary blade.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 0621 *Definitions and designations of geometrical deviations*

JIS B 7502 *Micrometer callipers*

JIS H 8451 *Testing methods for thermal cycle and thermal shock resistance of thermal barrier coatings*

JIS Z 2285 *Measuring method of coefficient of linear thermal expansion of metallic materials*

JIS Z 8401 *Guide to the rounding of numbers*

JIS Z 8402-6 *Accuracy (trueness and precision) of measurement methods and results—Part 6: Use in practice of accuracy values*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in **JIS H 8451**, **JIS Z 2285** and the following apply:

3.1 thermal barrier coating

multilayer coating applied for the purpose of suppressing the temperature rise of hot parts caused by gas combustion, which is composed of a bond coat on the surface of a highly heat resistant base material such as of super alloy constituting the hot part, and a top coat of high emissivity in which ceramics of high melting point and low heat conductivity is applied on the thermally grown oxide by methods of physical vapour deposition, chemical vapour deposition, thermal spraying and the like (see **JIS H 8451**)

3.2 linear expansion curve

a curve drawn with the temperature T plotted on the axis of abscissa and the linear expansion (ε_{th}) on the axis of ordinate, to a maximum measured temperature, T_{max}

The schematic diagram of the linear expansion curve of thermal barrier coating is shown in figure 1.

3.3 coefficient of linear expansion (α)

rate of change of linear expansion ε_{th} to temperature at temperature T in **3.2** ($\alpha = d\varepsilon_{th}/dT$)