



JAPANESE
INDUSTRIAL
STANDARD

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JIS E 4501 : 1995
(Reaffirmed : 2001)

**Railway rolling stock — Design
methods for strength of axles**

ICS 45.060.01

Descriptors : Railway rolling stock in general

Reference number : JIS E 4501 : 1995 (E)

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Transportation through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS E 4501:1989** is replaced with **JIS E 4501:1995**.

Date of Establishment: 1972-02-01

Date of Revision: 1995-06-28

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Divisional Council on Railways and
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In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

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Railway rolling stock — Design methods for strength of axles

1 Scope This Japanese Industrial Standard specifies the design methods for strength of wheel fit of axle specified in **JIS E 4502**.

Remarks 1 The normative reference to this Standards is as follows:

JIS E 4502 *Axles for railway rolling stock.*

2 The units and numerical values given in { } in this Standard are based on the traditional unit system and are appended for information only.

2 Quantity symbols, meanings of quantity symbols and units The quantity symbols, meanings of quantity symbols and units used in this Standard are as shown in table 1.

Table 1 Quantity symbols, meanings of quantity symbols and units

Quantity Symbol	Meaning of quantity symbol	Unit
a	Distance from the centre of journal to the end surface of outside of wheel boss	mm
d	Diameter of wheel fit	mm
g	Distance between wheel treads	mm
h	Height from centre line of wheel to gravity centre of wheel	mm
j	Distance between journal centres	mm
l	Length of wheel boss ($x+y$)	mm
r	Radius of wheel tread	mm
Z	Section modulus of wheel fit	mm ³
P	Horizontal force	N {kgf}
Q_0	Vertical component of the horizontal force applied to journal	N {kgf}
R_0	Vertical component of the horizontal force applied to wheel tread	N {kgf}
W	Load on one axle from the mass	N {kgf}
M_1	Bending moment generated at wheel fit by the load on one axle from the mass	mN·m {kgf·mm}
M_2	Bending moment applied to wheel fit by the force applied upward and downward	mN·m {kgf·mm}
M_3	Bending moment generated at the inside of wheel fit boss by the horizontal force	mN·m {kgf·mm}
σ_b	Stress generated at the wheel fit inside of wheel boss	N/mm ² {kgf/mm ² }
σ_{wb}	Permissible stress against the fatigue of wheel fit	N/mm ² {kgf/mm ² }