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TS 780 MPa Grade Hot Rolled Sheet Steel with High Fatigue Strength

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Synopsis :

The effect of microstructure on fatigue strength has been investigated to develop 780 MPa TS grade high strength hot-rolled sheet steels applicable to automotive wheels and chassis. Even if the second phase was bainite-martensite or pearlite, precipitation strengthening of ferrite matrix suppressed initiation of fatigue cracks, and exhibited an increase in fatigue limit. The second hard phase of martensite suppressed fatigue crack propagations and exhibited a significant increase in fatigue strength. As a result, 780 MPa TS grade steel with high fatigue strength, excellent tensile strength-elongation balance and high hole expanding ratio can be developed. The newly developed steel was applied to automotive high strength and lightweight wheels for the first time in the world.

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## TS 780 MPa Grade Hot Rolled Sheet Steel

### with High Fatigue Strength\*



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The effect of microstructure on fatigue strength has been investigated to develop 780 MPa TS grade high strength hot-rolled sheet steels applicable to automotive wheels and chassis. Even if the second phase was bainite-martensite or pearlite, precipitation strengthening of ferrite matrix suppressed initiation of fatigue cracks, and exhibited an increase in fatigue limit. The second hard phase of martensite suppressed fatigue crack prop-

Table 1 Chemical composition, structure and mechanical properties of steels

Chemical composition (mass%)				Structure	Volume fraction of ferrite (%)	Grain size of ferrite ( $\mu\text{m}$ )	YS (MPa)	TS (MPa)	El (%)
C	Si	Mn	Ti						

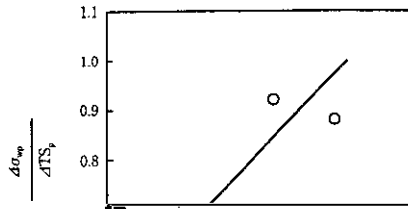
The body of the table is mostly obscured by heavy black redaction bars. Only the header information is legible. The table contains multiple rows of data, but the specific values for chemical composition, structure, and mechanical properties are not visible due to the redaction.

Steel Ti content  
(mass%)

300

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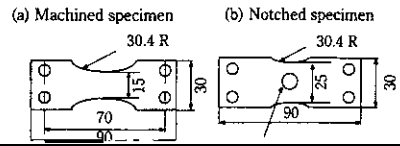
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Next, the difference in the fatigue crack propagation rates of sample steels H-I were investigated. It has been reported<sup>17-19)</sup> that the propagation of fatigue cracks is arrested by a hard minor phase in steels with a complex structure. Accordingly, it is considered that the crack propagation rate is small in the F-M steel I which, in

Table 3 Chemical composition of newly developed 780 MPa TS grade steel

							(mass%)
C	Si	Mn	Ti	P	S	Al	



Machined to 2.0 mm thickness

500

Newly developed steel

newly developed high strength hot rolled sheet steel was