Abridged version

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Formable Hard and Soft Tempered Ultra-thin Sheet Steels for Can Use

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Synopsis :
A method which uses a highly efficient continuous annealing process for manufacturing hard- or soft-tempered ultra-thin steel sheets (in mill black plates) having excellent formability, for cans, has been developed. It has become clear that soft-tempered black plates of T1 toT2 grades, having excellent formability, can be manufactured by the use of an ultra-low carbon steel, even with a rapid heating-and-cooling continuous annealing process, whereas, a rather harder T2.5 to T3 grade black plates are similarly manufactured by adding a small amount of a solid-solution strengthening element, Mn, to the same ultra-low carbon steel. These newly developed black plates are superior in deep-drawing formability, elongation and flanging property and are expected to contribute to the lessening of material sheet thickness. Stable production of hard tempered black plates of T5 or greater grade can be conducted by adding N. The added N, by its solid-solution hardening and strain-aging hardening phenomena, effectively contributes to the increase of can-body strength and this enables the reduction of material plate thickness. Fluting (bending pattern), occurring during cylinder-shape forming, has been found to be avoided by effectively using the history of the working conditions of canmaking process.

The body can be viewed from the next page.

Formable Hard and Soft Tempered Ultra-thin Sheet Steels for Can Use*

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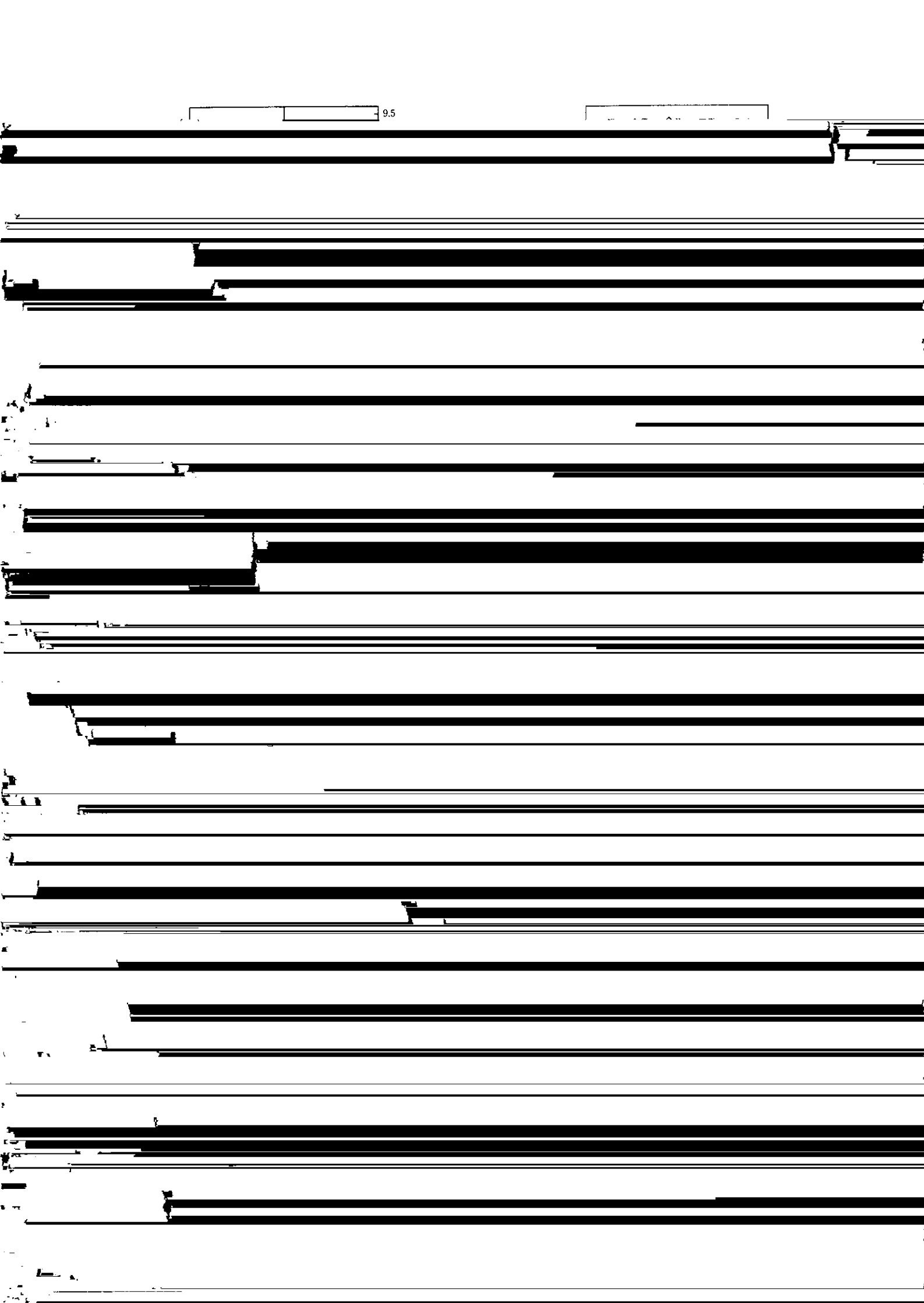
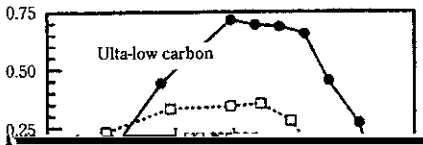
A method which uses a highly efficient continuous annealing process for manufacturing hard- or soft-tem-

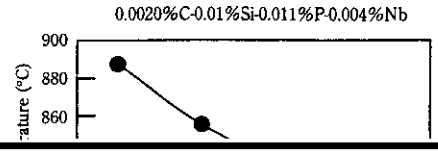
or cementing method after the material is formed into a cylindrical shape, using sheet steel which has been

cans, 3 piece can products using sheet steel laminated with a PET film have been mass produced recently. In the field of beverage cans, which are used in large quan-

Fancy can







50 60 70 80 90 100

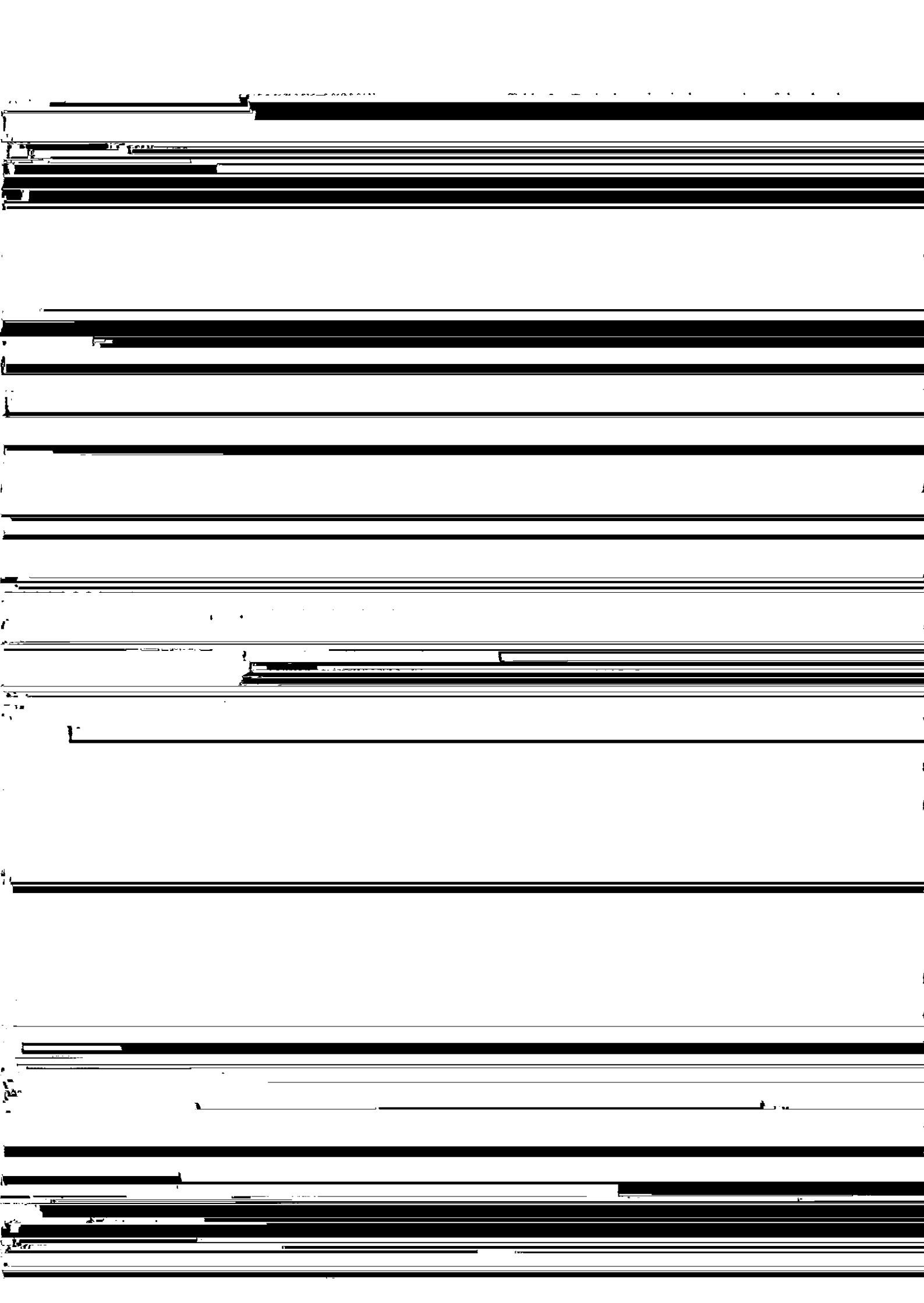
Cold rolled reduction (%)

Fig. 3 Effect of primary cold-rolling reduction rate on the average *r*-value and planar anisotropy

Mn content (mass%)

Fig. 5 Effect on Mn addition on the Ar_3 transformation temperature after hot-rolling


JIS No. 5 specimen -2 mm V-notched
10 mmφ punched hold←60° conical punch
240
Ultra-low C steel
%)
Thickness: 0.18 mm
500
400
300
S (MPa)



little effect weld hardness.

(6) At levels of up to approximately 100 ppm, N addi-

tion hardening and strain age hardening by N addition has the following advantages as a material for use in 3 piece cans

References