Abridged version

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"Environment-friendly Steel Products" and
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Ferritic Stainless Steels and Pipes for Automotive Exhaust Systems to Meet Weight Reduction and Stricter Emission Requirements

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Synopsis :

High formability heat-resistance ferritic stainless steel and pipes for automotive exhaust system parts were developed to reduce auto weight and meet stricter emission requirements by making full use of the advanced production facilities recently constructed at Chiba Works. The average *r*-value of the newly developed stainless steel was improved by more than 1.3 times in comparison with the conventional steel while retaining the same level of heat resistance. This increase in the *r*-value lead to a remarkable improvement in various forming properties which are important for automotive exhaust system parts, including (1) limit drawing ratio, (2) stretch flanging ratio, (3) limit expansion ratio of pipe, and (4) thickness reduction ration of pipe after bending. In particular, the formability of the newly developed stainless steel pipes was nearly equal to that of conventional stainless steel pipes after stress relief annealing.

The body can be viewed from the next page.

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3.2 Experimental Procedure

90° bending was performed at a bending radius of 50 mm. The thickness of the material was then measured by an ultrasonic method, and the bending property was

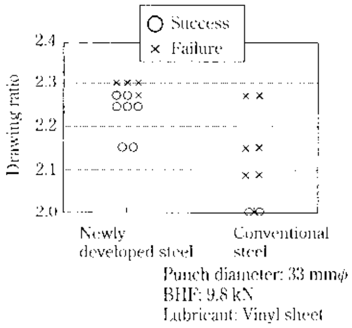


Fig. 2 Comparison of deep drawing property between newly developed and conventional steels

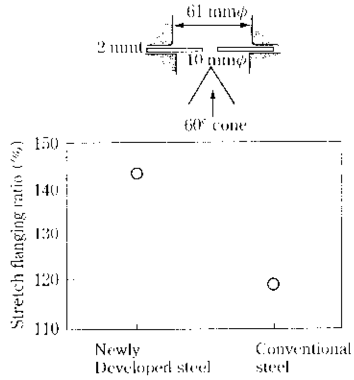
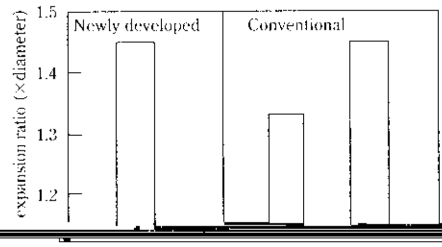
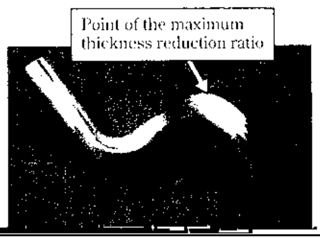


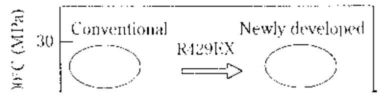
Fig. 3 Comparison of stretch flanging ratio between newly developed and conventional stainless steels

Table 4 Mechanical properties of ERW pipes according to JIS 11

	Plate	Pipe			
	1.5 mmt	1.5 mmt × 42.7 mmϕ			
	$\bar{r}$-value (JIS 13 B)		YS (MPa)	TS (MPa)	El (%)
Newly developed steel	1.6	As rolled	465	511	49
Conventional steel	1.2	As rolled	438	488	50







Therefore, for applications in high temperature environments, as represented particularly by the exhaust manifold, front pipe, and outer shell material for the catalytic