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## Relation between Transient Stress and Quenching Crack in Cylinders Generated by Quenching

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**Summary:** The correlation between the quenching crack and the tensile stress was clarified and the quantitative evaluation method of the quenching crack generated by quenching was established. First of all, the influence of the dimension of cylinders test material on the quenching crack was clarified by using the steel material which shows the martensitic transformation in quenching process. Next, it was shown that the residual stress distribution of the small cylinder test piece used for the quenching crack experiment was able to analyze accuracy good. Finally, the correlation between the transient tensile stress generated in the quenching process by numerical analysis and the quenching crack presence was examined followed by the clarification of criterion for the stress that causes the quenching crack was clarified. The quenching crack occurs on the side wall of the cylinder test piece because of circumferential stress when the ratio of the diameter size to axially length of the cylinder is adjusted to 1:3. Moreover, the quenching crack presence can be evaluated by both the quenching crack test results when the diameter size of cylinder is changed and the maximum circumferential tensile stress of the transient stress in quenching process. Thus, the stress which causes quenching crack in the martensitic structure can be clarified.

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