KAWASAKI STEEL TECHNICAL REPORT

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Civil and Architectural Engineering

Development of Highway Light Pole with Resistance to Wind Vortex-Induced Oscillations

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Synopsis :

Basic vibrational characteristics of a light pole resulting from wind vortex-induced oscillation have been studied and an impact damper which has layered cells accommodating steel balls has been developed. Steel ball movement synchronizes with the oscillation of the pole and collides against casing, and the damper reduces oscillation energy. Based on the results of basic experiments with movement of steel balls and impact force, impact dampers have been manufactured and attached to the inside of the pole. Vibration tests using a vibration machine and wind tunnel tests have been executed. The results indicate that the impact dampers are effective in reducing the 1st to 3rd inplane and out-of-plane oscillations of the pole.

The body can be viewed from the next page.

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Synopsis:

Basic vibrational characteristics of a light pole resulting from wind vortex-induced oscillation have been studied

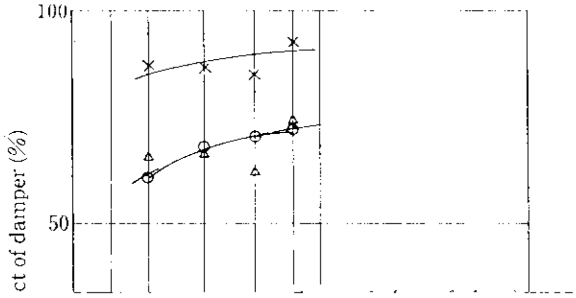
onal cross section was installed on the vibration test

tiveness of the newly developed damper was investigat-

Table 2 Basic oscillation characteristics of octagonal-cross-section light pole

	Inplane oscillation mode	Out-of-plane oscillation mode

many restrictions. For this reason, tests were conducted natural frequency of 7.2 Hz in the second out-of-plane oscillation mode. The range of clearance which permits synchronous movements is narrow, however, when the external force causing oscillation is small, and becomes very narrow, less than 3 mm, at 19.9 Hz, which corresponds to the third out-of-plane oscillation mode. It is, therefore desirable to use large steel balls and clearances for the first oscillation mode and small ones for the latter oscillation modes.



Test conditions are shown in **Table 3**. Based on the

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rithmic decrement values than when a damper was not lighting equipment and support

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tively small damping weights and clearances for eration in the design work

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oscillations caused by great external force. (although

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