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TEST REPORT

13.3.2020

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FFU SLEEPERS BENDING TESTS AT LOW TEMPERATURE

Static centre load tests

Tampere University tested Sekisui FFU sleepers at low temperatures that may occur in Finland. Initial temperature target was minimum -40 Celsius degrees, but the cooling arrangement led to even lower temperatures. All loading tests were load-controlled and performed according to European standard EN 13230-2, that describes load test for concrete sleepers. A static load was applied on center of sleeper. The distance between supports was 1600 mm and the supports were 100 mm wide. Between supports and sleeper were installed 15 mm thick resilient pads. Two vertical displacement transducers were installed directly above the support points, and two displacement transducers were installed directly below the loading point. The test arrangement is shown in Figure 1.

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Figure 1 Test arrangement.

The initial load was set to 30 kN (first load step 0 to 30 kN). After initial load phase the load was increased in steps of 5 kN. Time between the load steps was 15 seconds. The load was increased at speed of 50 kN/min. The principle of the loading curve is shown in the Figure 2. The recording frequency of the measurement results was 1 Hz.

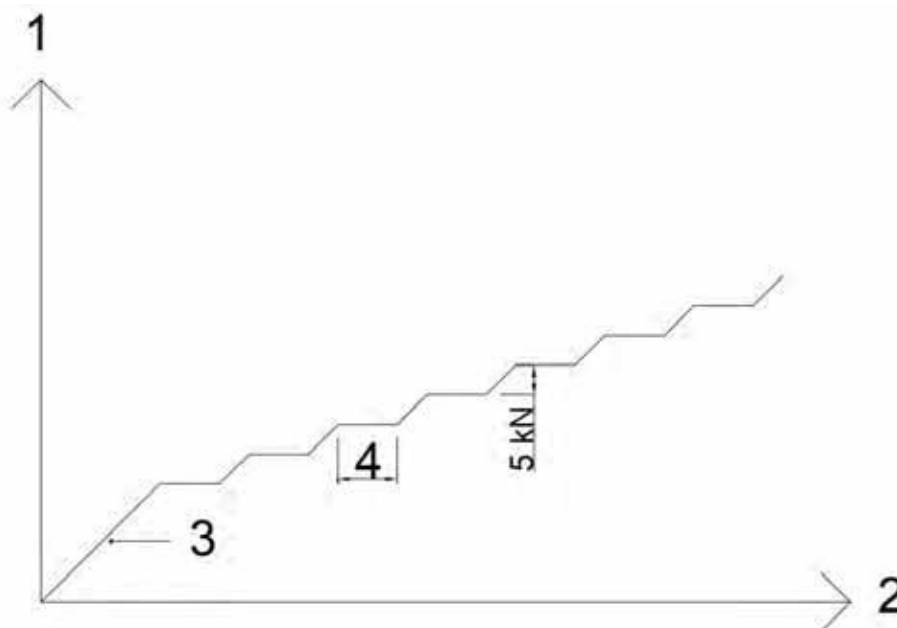


Figure 2 Principle of loading steps in the load tests. In figure: 1 = load, 2 = time, 3 = 50 kN/min and 4 = 15 s.

Force-Deflection

All force-deflection –diagrams of FFU sleepers are presented in figure 4. Bending test results showed a very high bending tensile strength. In two tests (sleeper 2 and sleeper 3) the maximum load was 230 kN and in three tests (sleeper 1, sleeper 4 and sleeper 5) 250 kN. The stiffness of the material increased slightly at low temperature. The variation between tests was negligible.

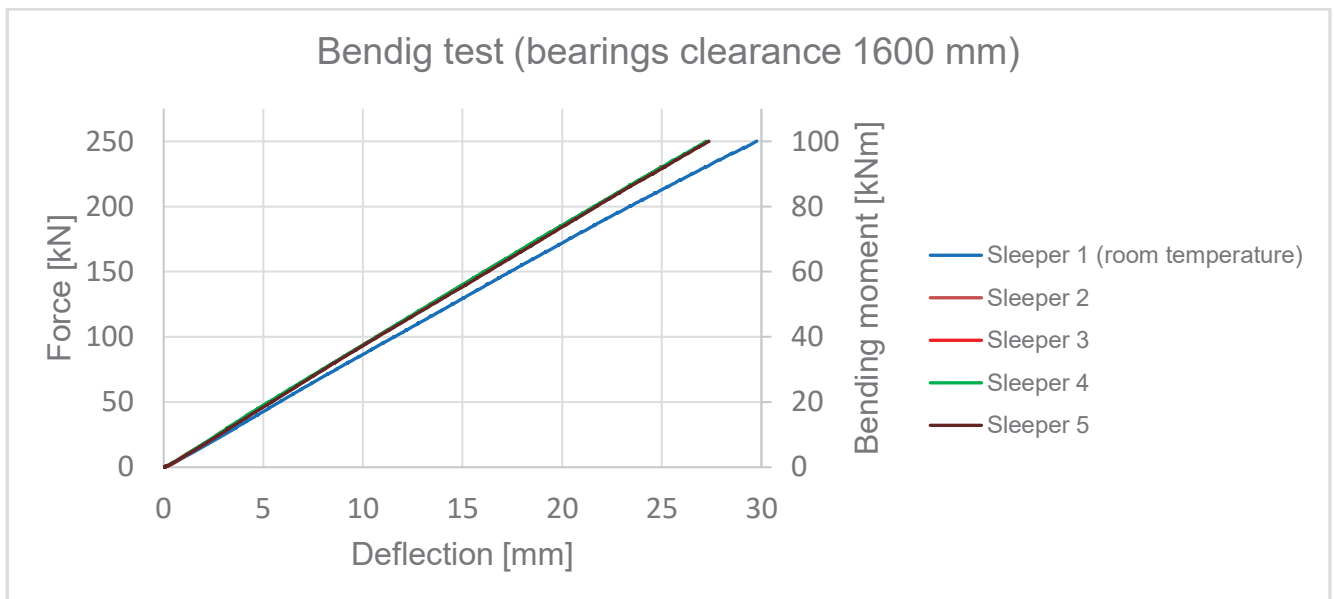


Figure 4 Force-deflection –diagrams of sleepers.

After the tests all the FFU sleepers were visually inspected. No cracks were detected within the bending tensile area or anywhere else on the surface of the sleeper.

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Sleeper 1, load 250 kN.



Sleeper 3, load 120 kN.

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Sleeper 5, load 250 kN.

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