Overhead transmission lines
Vibration dampers
Appendix to TR 05-09-1E

Introduction
This document in English shall be regarded as a translation of the corresponding
guidelines in Swedish. The aim of the translation is to provide support to foreign
manufacturers. The wording in Swedish and the interpretation thereof shall govern
contract and legal relations between the parties of the purchasing process.

This appendix deals with special requirements for dampers, especially designed for use
on Earth Wires but also OPGW, connected to the earth wire or OPGW by preformed
helical aluminium clad steel rods.

In this appendix only clauses which are added or changed in the content are included.
For other requirements, tests or dimensions see the main Technical Guideline for
Vibration Dampers TR 05-09-1E.
Revisions

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<td>2</td>
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9.5.2 Material

9.5.2.6 Preformed helical rods
The preformed helical rods shall be manufactured from wires made of aluminium clad steel.

9.5.3 Design

9.5.3.1 Damper
The requirements for possibility of hot-line tool installation are not valid.

9.5.3.10 Preformed helical rods
The preformed helical rods shall have smoothed ends in order to not give any damage on the conductor outer layer at installation.

9.5.4 Mechanical requirements

9.5.4.2 Clamp
The preformed helical rods shall be so designed that the clamp will be tighten sufficiently to the conductor in order to secure the dampers position without damaging or causing premature fatigue damage to the conductor under the clamp.

9.6 Type test

9.6.4 Dynamic characteristics
The intention of this test is to verify the dynamic characteristics for each type of damper.

The damper shall be installed, in the same position as when installed on the conductor, on a shaker table capable of being vibrated with constant velocities of 0.05 m/s and 0.1 m/s within the frequency range 165/D to 1480/D Hz, where D is the conductor diameter in mm. The preformed helical rods shall be marked in order to be able to be installed in exactly the same position in the following tests in accordance with Clauses 9.6.5 and 9.6.6. The frequency shall be varied either continuously with a maximum of 0.2 decades/minute or stepwise with a maximum interval of 1 Hz. The vibration shall be stable at each step when using stepwise measurement.

9.6.5 Damping efficiency
The damper shall be installed with the preformed helical rods in exactly the same position as in the test made in accordance with Clauses 9.6.4. Strain gauges shall be attached to the conductor at three positions in the span, in the vicinity of the measurement clamp and at both side of the damper clamp. The strain gauges, with a minimum of two at each position, shall be installed on the two uppermost strands of the conductor to monitor the highest tension at each position. For this reason the strain gauges shall be installed with a maximum of 2 mm from the end of each clamp.
9.6.6 Dynamic characteristics after fatigue

9.6.6.1 Fatigue
The same damper which has been subjected to testing in accordance with clauses 9.6.2 and 9.6.3 shall be used and be installed in the same manner as stated in Clause 9.6.4 with the preformed helical rods in installed in exactly the same position as used in test in accordance with Clauses 9.6.4 and 9.6.5.

The damper shall be installed on a shaker table capable of being vibrated vertically in 10⁷ cycles at the tuneable frequency which is closest to the frequency 555/D Hz, where D is the conductor diameter in mm.

The minimum peak-to-peak amplitude at the damper clamp shall be equal to the conductor amplitude peak-to-peak recorded at the equivalent tuneable frequency.

9.6.6.2 Dynamic characteristics after fatigue
After the fatigue test has been performed in accordance with clause 9.6.6.1 the same damper shall be subjected to a repeated dynamic characteristic test to verify that the dynamic characteristics are sustained.

This repeated test shall be performed and the results presented in accordance with clause 9.6.4. The graph shall have the same scale as for dynamic characteristics before fatigue. It should be noted that the position of the preformed helical rods shall be identical with that used in the previous tests.

The dynamic characteristics of the damper shall fulfil the requirements of clause 9.5.6.3

9.6.9 Clamp slip test
The intention of this test is to verify that slippage does not occur between the clamp and the conductor.

The damper shall be installed on the same type of conductor as used for tests in accordance with clauses 9.6.1 – 9.6.12. The installation shall be made with the use of new preformed helical rods.

9.6.9.1 Longitudinal slip test
By means of a suitable device a load coaxial to the conductor shall be applied to the clamp.

The load shall be gradually increased (not faster than 100 N/s) until it reaches 1 kN (specified minimum slip load). This load shall be kept constant for 60 s. Then the load shall be gradually increased until slippage of the clamp occurs. The slip load value shall be recorded.

For clamps using helical rods, slip shall be considered as having occurred when a movement of the clamp on the conductor of 12,0 mm is measured.

• Acceptance criteria

No slippage shall occur at or below the minimum specified value. Surface flattening of the outer strands of the conductor is acceptable.
9.6.9.2  **Torsional slip test**  
A torque shall be applied to the clamps in order to rotate it around the axis of the conductor.

The torque shall be gradually increased until it reaches a torque of 7 Nm (specified minimum slip torque). This torque shall be kept constant for 60 s. Then the torque shall be gradually increased until slippage of the clamp by torsion occurs. The slip torque value shall be recorded.

The test shall be carried out applying the torque in the direction of lay of the outer conductor strands. The test shall be repeated by applying the torque in the opposite direction.

Clamp slip shall be considered as having occurred when a slip value greater than one strand diameter is measured after the release of load.

-  **Acceptance criteria**

No slippage shall occur at or below the minimum specified value.