FAT Procedure for OPGW -Vibration Dampers

VISUAL MATERIAL VERIFICATION AND DIMENSIONAL CHECKS FOR VIBRATION DAMPER

Test Location:

Manufacturer:

Test Standard: IEC61284:1997, Approved DRS/Drawings in cat-I

Test Sample: Vibration Damper & associated hardware fittings

Objective : This test determines the factory acceptance of the batch quantity of fittings that they confirm to the relevant drawings and where appropriate/ have a sufficient galvanized coating.

Test Procedure:

1. Physical/Visual Verification for the part no. of all the materials as per approved DRS & drawings.
2. It shall be verified that the sample are in accordance with their relevant drawings, particularly as regards any dimensions to which special tolerance apply and indicated in the corresponding approved DRS/Drawings.
3. The following tolerance shall be allowed/on all dimensions to which special tolerance do not apply.

Appearance: To check all and ascertain to be appropriate as per DRS & Drawings.

Dimensions:

(A) Forgings:

i) Dimensions up to and including 30mm…. ±1.5mm.

ii) Dimensions greater than 30 mm…..±5% upto max. of ±5 mm.

(B) Helical Fittings:

i) Dimensions up to and including 30mm….. ±1.5mm.

ii) Dimensions greater than 30 mm……±5% upto max. of ±5 mm.

Galvanizing (Vibration dampers, all nuts & bolts components as per approved DRS & Drawings):

i) Galvanized coatings shall be tested in accordance with as appropriate.

ii) All measurements shall be made after galvanizing where galvanizing is the normal finish. Galvanized coatings shall be tested and galvanized coating shall be minimum 85µm.

Acceptance Criteria:

Fittings shall be accordance with their relevant drawings within the tolerance Specified. Galvanized coatings on general articles shall be minimum thickness of 85µm.

Observation, if any;

Test Results: The Hardware fittings, as tested met / did not meet the requirement as per approved DRS & Drawings.

Tested by:
(Sign with date)

Witnessed by:
(Sign with date)

GALVANISING TEST FOR VIBRATION DAMPER

Test Location:

Manufacturer:

Test Sample : 4D-20 Stockbridge Type Vibration Dampers

(Messenger Cable, Damper Weights & Clamp Body)

Test Procedure:

One strand of each of the fittings is subjected to a gravimetric test to determine the coating mass of the galvanizing.

Acceptance Criteria: The minimum coating mass as determined by the above method shall be greater than 85µm.

Test Results:

Damper No.	Coating Mass (µm)

The vibration dampers and its associated hardware fittings, as tested met /did not meet the requirement specified in the technical specification.

Observations, if any:

Tested by:
(Sign with date)

Witnessed by:
(Sign with date)

CLAMP SLIP TEST OF THE VIBRATION DAMPER

Test Location:

Manufacturer:

Test Standard: Technical Specification, IEC61897:1999

Test Sample: Vibration Damper
OPGW Cable
} As per approved DRS/Drawings

Objective: To demonstrate the ability of the vibration damper grip the conductor .

Test set up:

The test shall be performed using the conductor for which the clamp is intended. The conductor shall be "as new" (free of deterioration or damage). The minimum free length of test conductor between its terminating fittings shall be 2 meters. The conductor can be tensioned to 20% of its Ultimate tensile strength (the conductor is free that is accepted). Precautions shall be taken to avoid bird caging of the conductor.

The clamp shall be installed in accordance with their recommended instructions on a different portion of the conductor for each test.

Test Procedure:

The load shall be gradually increased (no faster than 100 N/s) until it reaches 2.5kN (specified minimum slip load). This load shall be kept constant for 60 seconds. Then the load value shall be gradually increased until slippage of the clamp occurs. The value of slip load shall be recorded. Clamp slip shall be considered as having occurred when a slip distance of 1mm is measured.

Acceptance Criteria:

1) No movement of the clamp relative to the conductor greater than 1mm shall occur at or before the end of application of 2.5kN for 60 seconds.
2) Surface flattening of the outer strands of the conductor is acceptable.

Observation, if any;

Test Results: The vibration damper tested, met / did not meet the requirement specified in technical specification.

Tested by:
(Sign with date)

Witnessed by:
(Sign with date)

VIBRATION DAMPER RESPONSE (RESONANT FREQUENCIES) TEST AND DYNAMIC CHARACTERISTIC TEST

Test Location:

Manufacturer:

Test Sample: Vibration Damper (As per approved DRS/Drawings)

Objective: To analyze the vibration damper response at Resonant frequencies

Test procedure

The damper was mounted with its clamp tightened with torque recommended by the manufacturer on shaker table capable of simulating sinusoidal vibrations for Critical Aeolian Vibration frequency band ranging from 0.18/d to 1.4/d - where d is the OPGW cable diameter in meters. The damper assembly was vibrated vertically with a ±1mm amplitude from 5 to 15 Hz frequency and beyond 15 Hz at 0.5 mm to determine following characteristics with the help of suitable recording instruments.

(a) Force Vs frequency

(b) Phase angle Vs frequency

(c) Power dissipation Vs frequency

Acceptance criteria:

The Force Vs frequency curve shall not show steep peaks at resonance frequencies and deep troughs between the resonance frequencies. The resonance frequencies were suitably spread within the Aeolian vibration frequency-band between the lower and upper dangerous frequency limits determined by the vibration analysis of fibre optic cable without dampers.

I. The above dynamic characteristics test on five damper shall be conducted.

II. The mean reactance and phase angle vs frequency curves shall be drawn with the criteria of best fit method.

III. The above mean reactance response curve should lie within following limits:

V.D for OPGW - 0.060 f to 0.357 f kgf/mm*

Where f is frequency in Hz.

IV. The above mean phase angle response curve shall be between 25 to 130 within the frequency range of interest.

V. If the above curve lies within the envelope, the damper design shall be considered to have successfully met the requirement.

VI. Visual resonance frequencies of each mass of damper is to be recorded and to be compared with the guaranteed values. A tolerance of ±1 hz at a frequency lower than 15 Hz and ±2 hz at a frequency higher than 15 Hz only shall be allowed.

Observations, if any:

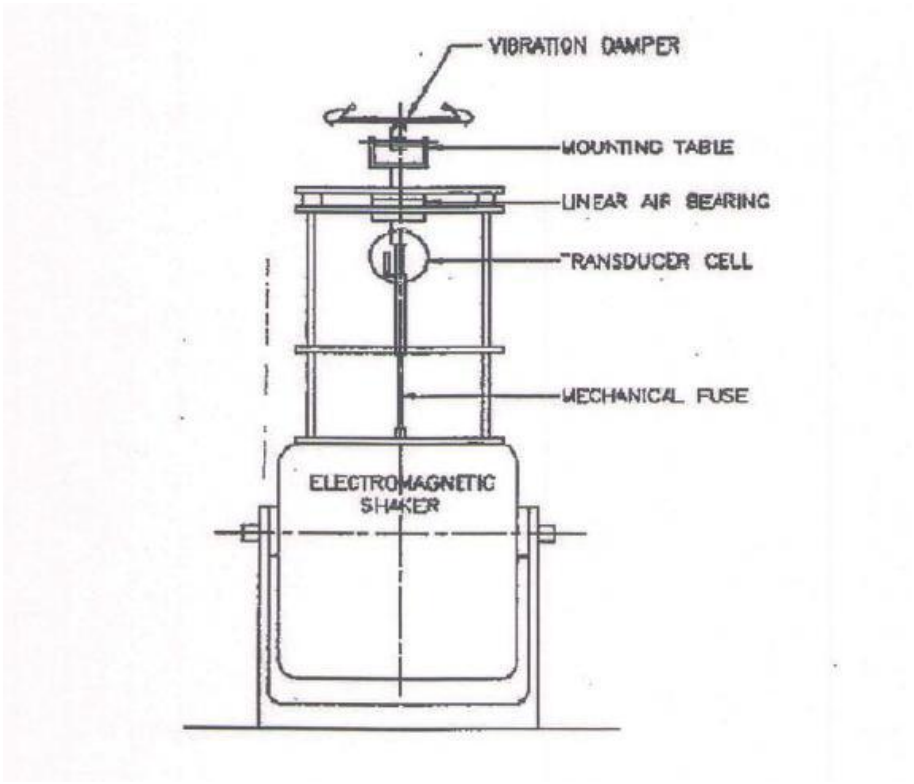


Fig.1 Schematic of Vibration Damper Characteristics

Test Results: The Vibration Damper has met/ did not meet the acceptance criteria for Vibration Damper response at resonant frequencies.

Tested by:
(Sign with date)

Witnessed by:
(Sign with date)

STRENGTH OF MESSENGER WIRE TEST FOR VIBRATION DAMPER

Test Location:

Manufacturer:

Test Sample : Messenger Cable (As per approved DRS & Drawings)

Objective: To determine the strength of the damper messenger wire.

Test Procedure:

The messenger cable shall be fixed in a suitable tensile testing machine and the tensile load shall be gradually applied until yield point is reached. Alternatively, each strand of messenger cable may be fixed in a suitable tensile testing machine and the tensile load shall be gradually applied until yield point is reached. In such a case, the 95% of yield strength of each wire shall be added to get the total strength of the cable. The load shall be not less than the value guaranteed by the contractor.

Acceptance Criteria: The minimum tensile stress of the messenger cable shall be 42

KN **Test Results:**

Sampler No.	Tested up to Rated Strength /UTS (KN)	Acceptance Criteria	Pass/Fail
		No Deformation/Breakage	
		No Deformation/Breakage	
		No Deformation/Breakage	

The above as tested met / did not meet the requirement specified in technical specification.

Tested by:
(Sign with date)

Witnessed by:
(Sign with date)

ATTACHMENTS OF WEIGHTS TO MESSENGER CABLE

Test Location:

Manufacturer:

Test Standard: Technical Specification, IEC61897:1999

Test Sample: Vibration Damper (As per approved DRS/Drawings)

Objective: To demonstrate the ability of the weight grips the messenger.

Test Procedure:

On an assembled damper a tensile load shall be applied between the weights coaxial with the messenger cable. The load shall be gradually increased (100N/s maximum) until it reaches 5kN (or specified minimum slip load as per DRS). This load shall be constant for 60 seconds.

The load shall be increased slowly until one weight has been pulled free of the messenger cable. The maximum load obtained during this process shall be recorded, for information purposes only.

Acceptance Criteria:

No relative movement greater than 1 mm between each weight and the messenger cable shall occur at or before the end of the application of 5kN(or specified minimum slip load as per DRS) for 60 seconds.

Observation, if any;

Test Results:

Damper No.	Tensile Strength (KN)	Breaking Stress (KN/mm^2)

The vibration damper tested, met / did not meet the requirement specified in technical specification.

Tested by:
(Sign with date)

Witnessed by:
(Sign with date)

ATTACHMENTS OF CLAMP TO MESSENGER CABLE

Test Location:

Manufacturer:

Test Standard : Technical Specification, IEC61897:1999

Test Sample : Vibration Damper As per approved DRS/Drawings

Objective : To demonstrate the ability of the clamp grips the messenger.

Test Procedure:

On an assembled damper a tensile load shall be applied between messenger cable and the clamp body, coaxial with the messenger cable. The load shall be gradually increased (100N/s maximum) until it reaches 1.5kN (or specified minimum slip load as per DRS). This load shall be constant for 60 seconds.

The load shall be increased slowly until the clamp has been pulled free of the messenger cable. The maximum load obtained during this process shall be recorded, for information purposes only.

Acceptance Criteria:

No relative movement greater than 1 mm between the clamp relative to the messenger cable shall occur at or before the end of the application of 1.5kN(or specified minimum slip load as per DRS) for 60 seconds.

Observation, if any;

Test Results:

Damper No.	Tensile Strength (KN)	Breaking Stress (KN/mm^2)

The vibration damper tested, met / did not meet the requirement specified in technical specification.

Tested by:
(Sign with date)

Witnessed by:
(Sign with date)

FAT Procedure for OPGW -Vibration Dampers

CLAMP BOLT TIGHTENING AND TORQUE TEST

Test Location:

Manufacturer:

Test Standard: Technical Specification, IEC61897:1999

Test Sample : Vibration Damper (As per approved DRS/Drawings)

Objective : To demonstrate the ability of the tighten bolt.

Test set up:

The test shall be performed by installing the clamp on a length of conductor for which the damper is intended.

Test procedure:

The bolts or nuts shall be tightened to a torque 10% above the specified installation torque. Lastly, the torque should be increased to either twice the specified installation value or the maximum torque value recommended by the bolt supplier whichever is lower.

Acceptance Criteria:

1) The threaded connection shall remain serviceable for any number of subsequent installations or removals and components of the clamp shall be undamaged.
2) No unacceptable damage shall occur to the conductor inside the clamp. (Unacceptable damage shall be agreed between the purchaser and supplier)
3) The increase to either twice should not result in any breakage of threaded parts or other components.

Observation, if any;

Test Results:

Damper No.	1.1 times torque Comment on condition of components	2 times torque Comment on condition of components

The vibration damper tested, met / did not meet the requirement specified in technical specification.

Tested by:
(Sign with date)

Witnessed by:
(Sign with date)