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STOCK BRIDGE VIBRATION DAMPERS

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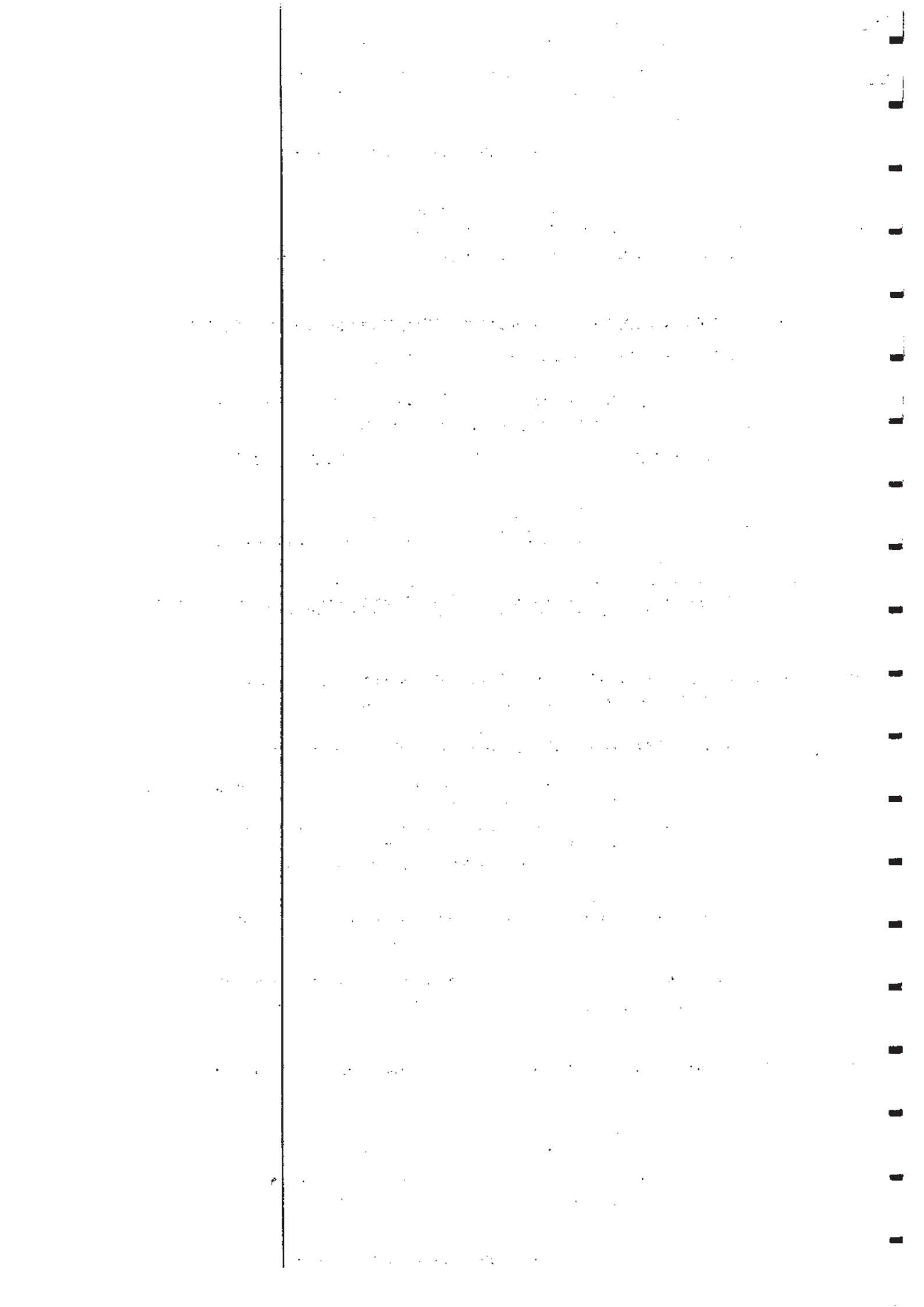
PAKISTAN  
WATER AND POWER DEVELOPMENT AUTHORITY  
DESIGN DEPARTMENT (POWER)

## C O N T E N T S

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## PRINTING HISTORY

First approved on 21st September, 1980.  
2nd edition in June 1983.



## STOCK BRIDGE VIBRATION DAMPERS

## 0 FOREWORD

0.1 This standard has been introduced by WAPDA and has been prepared by the Transmission Line Section of the Office of the Chief Engineer (Designs).

0.2 This standard is intended only for the purpose of technical specification to facilitate procurement of materials and does not include provision of contract.

0.3 This Specification is subject to periodic revision as and when required.

## 1 SCOPE

This Specification covers the Stock Bridge Vibration Dampers intended for installation on the 220 kV, 132 kV and 66 kV Lines.

## 2 TYPE OF STOCK BRIDGE DAMPERS

The stock bridge dampers described in this Specification are of the following types:

TABLE - I

| Description                                    | Designation | Conductor or<br>E/W O-D(mm) |
|------------------------------------------------|-------------|-----------------------------|
| a) Stock Bridge Dampers for DOG                | SB-D        | 14.2                        |
| b) Stock Bridge Dampers for LYNX               | SB-L        | 19.5                        |
| c) Stock Bridge Dampers for CUCKOO             | SB-C        | 27.7                        |
| d) Stock Bridge Dampers for RAIL               | SB-R        | 29.6                        |
| e) Stock Bridge Dampers for CARDINAL           | SB-CA       | 30.4                        |
| f) Stock Bridge Dampers for<br>9mm E/W Strand  | SB-9        | 9.0                         |
| g) Stock Bridge Dampers for<br>12mm E/W Strand | SB-12       | 12.0                        |

The hardware described above has been designated by the code Nos. These codes have been assigned in the following manners.

1. The first 2 letters stand for the type of fitting i.e. 'SB' for Stock Bridge Dampers.
2. The succeeding letters indicate the name of conductor whereas numbers indicate the size of E/W i.e. 'D' for DOG conductor and 9 for Earthwire strand of 9mm dia.

### 3 GENERAL REQUIREMENTS

- 3.1 Vibration dampers shall be of the Stock Bridge Design and shall effectively suppress aeolian vibration to within 200/400 micro inches per inch peak to peak strain measured for ACSR conductor and earthwire.
- 3.2 The damper shall be suitable to work in following conditions. No armour rod will be used.

TABLE II

| Name of Wire | O.D dia in mm | Unit wt. kg/m | Rated U.T.S Kg. | E. D Stress (at 23°C) | Average Span length m | Vibra- tion Fre- quency range, Hz | No. o Dampe- per S |
|--------------|---------------|---------------|-----------------|-----------------------|-----------------------|-----------------------------------|--------------------|
| ACSR DOG     | 14.2          | 0.394         | 3225            | 22%                   | 320                   | 12-90                             | 1                  |
| " LYNX       | 19.5          | 0.842         | 8192            | 22%                   | 320                   | 8.5-65                            | 1                  |
| " CUCKOO     | 27.7          | 1.52          | 12385           | 22%                   | 400                   | 6-45                              | 1                  |
| " RAIL       | 29.6          | 1.60          | 11874           | 17%                   | 400                   | 6-45                              | 1                  |
| " CARDINAL   | 30.4          | 1.83          | 15262           | 17%                   | 700                   | 6-45                              | 2                  |
| E/W 9mm      | 9.0           | 0.39          | 5050            | 17%                   | 320                   | 15-140                            | 1                  |
| " 12mm       | 12.0          | 0.69          | 10300           | 17%                   | 400                   | 12-90                             |                    |

Note: The contractor can propose two dampers per span also, in which case the quantities of dampers to be procured will be double.

### 4 CONSTRUCTION AND DESIGN

- 4.1 The dampers shall generally comply with the weight and dimensional requirements of the approved drawing. Each damper shall consist of two weights resiliently suspended from the conductor through a suitable clamp conforming to conductor size. The clamp shall be made of high strength anti corrosion aluminium alloy and shall be suitable for hot line maintenance operations. The end of the clamp face shall be smoothly blended to avoid damage to or chafing of conductor when the clamp is

applied. The areas of the clamps and weights exposed to high electric stress shall be rounded and smoothly finished to minimise corona emission and radio interference.

- 4.2 The damper weights shall be made of cast iron and permanently attached to the messenger wire at its two ends in a manner that mounting remains equidistant from the clamp. The weights, clamp bolts and lock washers shall be galvanised by hot dip process. The messenger wire shall consist of seven strands of high tensile steel wire similar to that used for the steel reinforcement of ACSR Conductors. This wire shall hold the weight firmly and be galvanised, by hot dip process. A drain hole shall be provided in the damper weights to keep the assembly free from any water.

## 5 TEST

### 5.1 Type Test

- 5.1.1 The Contractor shall perform the bending amplitude test for each conductor and Earthwire for the frequency range, span, length and every day stress as given in Table-II both for with and without damper/dampers. A curve shall be plotted to establish the relationship between frequency of vibration versus bending amplitude in mils.
- 5.1.2 A curve shall be furnished for each type of damper proposed showing the power dissipated by damper versus vibration frequency range for the conditions as indicated in Table-II.
- 5.1.3 5 certified copies of each curve shall be supplied with the bid.

### 5.2 Sample Test

- i) Visual Examination
- ii) Verification of Dimensions
- iii) Galvanising Test on ferrous parts

## 6 TEST METHODS

### 6.1 Visual Examination

The test samples shall be examined visually for the following defects:

#### Examination

#### Defects

Material

Not as specified in relevant clauses.

| Examination  | Defects                                                                                                                                       |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Construction | Not of the shape given in relevant Dwg. Any part missed.                                                                                      |
| Finish       | Galvanising not proper. Presence of burrs, black and bare spots, dross and projections, which will interfere with proper use of the articles. |

## 6.2 Verification of Dimensions

The binding dimensions of the hardware shall be measured and shall be as shown on the relevant approved drawing.

## 6.3 Galvanising Tests

This test shall be carried out on all ferrous parts complying with the following requirements.

- i) Weight of zinc coating
- ii) Uniformity of zinc coating
- iii) Adherence of zinc coating

This test shall be performed in accordance with WAPDA Specification P-82.(latest revision)

## 7 SAMPLING PLAN - ACCEPTANCE AND REJECTION

- I. Sampling sizes are designated by code letters. Table III shall be used to find the applicable code letter for the particular lot or batch size for various tests specified in this Specification. While the number of units of product from each lot or batch which are to be inspected (sample size) and the criteria for determining the acceptability of the lot or batch (acceptance & rejection numbers) for different code letters can be obtained from the table-IV given below.
- II. The number of sample units inspected shall be equal to the first sample size given in Table-IV. If the number of defective units in the first sample is equal to or less than the first acceptance number, the lot shall be acceptable. If the number of defectives found in the first sample is equal to or greater than the first rejection number, the lot shall be rejected. If the number of defectives found in the first sample is between

the first acceptance and rejection number, a second sample of the size given by the plan shall be inspected. The no. of defectives found in the first and the second samples shall be accumulated. If the cumulative no. of defectives is equal to or less than the second acceptance number, the lot shall be acceptable. If the cumulative number of defectives is equal to or greater than the second rejection number, the lot shall be rejected.

TABLE - III

| Lot of Batch Size | Sample size for Test specified in Clause 6.3. | Sample size for dimensional and finish defects |
|-------------------|-----------------------------------------------|------------------------------------------------|
| 2 to 8            | A                                             | A                                              |
| 9 to 15           | A                                             | B                                              |
| 16 to 25          | A                                             | C                                              |
| 26 to 50          | A                                             | D                                              |
| 51 to 90          | B                                             | E                                              |
| 91 to 150         | B                                             | F                                              |
| 151 to 280        | B                                             | G                                              |
| 281 to 500        | B                                             | H                                              |
| 501 to 1200       | C                                             | J                                              |

TABLE - IV

| Sample size code letters | Sample | Sample size | Cumulative sample size | Acceptance Number | Rejection Number |
|--------------------------|--------|-------------|------------------------|-------------------|------------------|
| A                        | First  | 1           | 1                      | 0                 | 1                |
|                          | Second | -           | -                      | -                 | -                |
| B                        | First  | 2           | 2                      | 0                 | 2                |
|                          | Second | 2           | 4                      | 1                 | 2                |
| C                        | First  | 3           | 3                      | 0                 | 2                |
|                          | Second | 3           | 6                      | 1                 | 2                |
| D                        | First  | 5           | 5                      | 0                 | 2                |
|                          | Second | 5           | 10                     | 1                 | 2                |
| E                        | First  | 8           | 8                      | 0                 | 2                |
|                          | Second | 8           | 16                     | 1                 | 2                |
| F                        | First  | 13          | 13                     | 0                 | 3                |
|                          | Second | 13          | 26                     | 3                 | 4                |
| G                        | First  | 20          | 20                     | 1                 | 4                |
|                          | Second | 20          | 40                     | 4                 | 5                |

|   |        |    |     |   |   |
|---|--------|----|-----|---|---|
| H | First  | 32 | 32  | 2 | 5 |
|   | Second | 32 | 64  | 6 | 7 |
| J | First  | 50 | 50  | 3 | 7 |
|   | Second | 50 | 100 | 8 | 9 |

8

**MARKING AND PACKING**

The material shall be packed in wooden crates for export shipment to permit convenient handling and to protect against loss or damage to final destination. Containers (wooden crates) shall be designed for handling by fork-lift, truck and by slings around the container. The weight of each package should be between 100 and 150 K.

Packages shall be designed for rough handling. All wooden crates shall be clearly marked to indicate.

1. Quantity
2. Name of hardware item
3. Manufacturer's Name

All packages shall be numbered consecutively so that total shipment can be readily determined.

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**INFORMATION TO BE SUPPLIED**

The following information shall be supplied with the bid and failure to supply the same may subject the bid to disqualifications:

- i) Detailed fully dimensioned drawings of Stock Bridge Dampers.
- ii) Specification giving material grade & composition of all parts of Stock Bridge Dampers.
- iii) Catalogues/literature of standardised items.
- iv) Test Certificates.
- v) One complete sample of                      for all types Stock Bridge Dampers
- vi) Detail of manufacturing & testing facilities available with manufacturers.

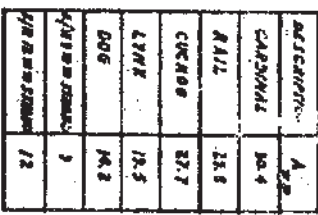
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**DRAWING**

The following drawing form the part of this specification.

- a) Stock Bridge Vibration Dampers

PDW/DF-322



INDICATES MISSING DIMENSION.

### DIAMETER FACTOR BY MICROMETRES

| DEFINITION             | AGE  |
|------------------------|------|
| CARDINAL               | 50.4 |
| RAIL                   | 35.8 |
| CORNER                 | 27.7 |
| LYNK                   | 15.5 |
| DOG                    | 14.2 |
| 4/10 10 10 10 10 10 10 | 9    |
| 4/10 10 10 10 10 10 10 | 12   |

[illegible]

