**Bharat Heavy Electricals Limited**
**Piping Centre Chennai-17**

| Specification Number | Rev.no. | Sheet Number |
|---|---|---|
| PC: TSP: BARH: SNUBBER | 00 | 1 of 3 |

# TECHNICAL SPECIFICATION FOR HYDRAULIC SNUBBERS

**NTPC BARH SUPER THERMAL POWER PROJECT**

**STAGE I (3 x 660 MW)-UNIT NOS. 1, 2 &3**

**CONTENTS**



| | | | | | |
|---|---|---|---|---|---|
| 00 | 17.07.2015 | Fresh Issue | Sd/- | Sd/- | Sd/- |
| | | | S.KAVITA | S.KAVITA | C SARAVANAN |
| Rev | Date | Alteration | Prepared | Checked | Approved (Mech.) |

## I. General Requirements

The Snubbers shall be mounted in between a piping system and the supporting structure. The purpose is to protect the piping/components against Dynamic movements arising from sudden changes in steam flow, safety valve reactions, earthquake etc.
The snubber shall allow free movement of the piping with minimum frictional resistance when subjected to non-dynamic movements such as thermal expansion and contraction.
The snubber shall limit motion, when the component is subjected to dynamic or impulse loads. The snubber shall be “locked up” and form a rigid connection when the piping is subjected to dynamic/seismic motion thereby protecting the piping by limiting their relative displacement. The Snubbers shall be of double acting type so that it can lock the motion of component and resist inertial forces of highly oscillatory nature, in both directions along longitudinal axis of the snubber.

## II. Technical requirements

### a) Stroke Length

The Snubber stroke length shall be decided based on the thermal movement of the pipe as given in the data sheet with a cushion of 25 mm on the either side.

The arrangement should permit swiveling motion not less than 6deg in all directions.

### b) Mechanical

End Connection: Each end of the snubber shall be provided with self-aligning bearing. One end of the snubber shall be connected to the pipe clamp and the other end to a weld on bracket attached to the supporting structure. The weld on bracket are to be supplied by the snubber supplier.

### Materials & construction

Materials & construction shall conform to be as per MSS 58, 69, 89 and 90.

## III. Specific requirements/Data

**a)** Application: For pipe support
**b)** The Snubbers may be of hydraulic type.
**c)** The distance between the structural member and the pipe to be supported as indicated in the data sheet.
**d)** Recommended spares list to be furnished by supplier.
**e)** Supplier to furnish reference list, relevant catalogues and maintenance procedures.
**f)** For hydraulic snubber, the recommended Indian equivalent oil. If not, furnish the quantity of oil to be stocked as spare along with price particulars.

**g)** Filling instruction of oil to the shock absorber.
**h)** For data sheet refer Annexure-A.
**i)** Clamp Type is Yoke Restraint type Clamp. Refer Drawing no:4-00-301-40763 for details.

## IV. Scope of Supply

**a)** The length 'L' indicated in the data sheet is the actual length required based on arrangement in cold condition.
**b)** The supplier has to select the shock absorber type, extension tube and weld on bracket assembly.
**c)** Dimension "A" and "E" are to be selected by the supplier.
**d)** Snubber with necessary accessories as required.
**e)** Weld on brackets with pins etc.
**f)** Yoke type restraint clamps as per datasheets.
**g)** Painting of the supplied equipment.
**h)** Any special tools as required for erection and maintenance.
**i)** Commissioning/recommended spares.

## V. Documents to be submitted along with the offer:

**a)** Dimensional drawings of the snubber and weld on bracket(s)
**b)** Details of materials for the above
**c)** Quality plan
**d)** Reference list, relevant catalogues and maintenance procedures..
**e)** Recommended spares list.
**f)** Detailed equipment specification

## VI. Documents to be submitted along with supply of material

**a)** Detailed dimensional drawings of the snubber and weld on bracket.
**b)** Details of materials for the above.
**c)** Quality plan.
**d)** Recommended spares list.
**e)** Special tools (if any).
a. Erection instructions.
b. Technical Data sheets.
c. Maintenance instructions.

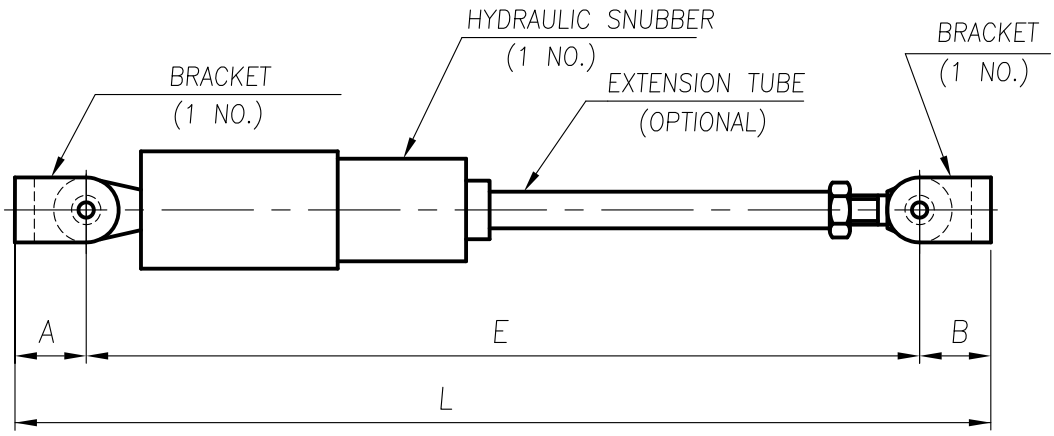
PIPING CENTRE

# DATA SHEET FOR HYDRAULIC SNUBBER

PROJECT : BARH STPP STAGE–1 (3x660 MW)

CUSTOMER : NTPC

CUST No. : 7285, 7286 & 7287




## NOTES :–

1. REFER TECHNICAL SPECIFICATION ENCLOSED HEREWITH.
2. SCOPE OF EACH SNUBBER ASSEMBLY INCLUDES HYDRAULIC SNUBBER(WITH OR WITHOUT EXTENSION TUBE) & BRACKET ASSEMBLIES.
3. STROKE LENGTHS INDICATED IN THE BELOW TABLE ARE INCLUSIVE OF CUSHION OF 25mm ON EITHER SIDE, AS SPECIFIED IN THE TECHNICAL SPECIFICATION.
4. $L_{max}$ & $L_{min}$ CAN BE VARIED BASED ON SELECTED STROKE LENGTH. EXCESS STROKE LENGTH OF SELECTED SNUBBER MAY BE ADDED TO $L_{max}$ IN CASE OF EXPANSION & SUBTRACTED FROM $L_{min}$ IN CASE OF COMPRESSION FOR DERIVING FINAL $L_{max}$ & $L_{min}$. INDICATED $L_{max}$ & $L_{min}$ DENOTES LENGTH OF SNUBBER AT FULLY EXTENDED AND FULLY COMPRESSED CONDITION RESPECTIVELY.
5. DIMENSIONS A,B & E SHALL BE FIXED BY VENDOR WITH REF TO SELECTED $L_{max}$ & $L_{min}$ AND STROKE LENGTH.
01 6. NO ADDITIONAL STRUCTURAL BEAM IS PERMITTED TO ACHIEVE THE TOTAL LENGTH 'L'.

| SL No. | TAG No. | DESIGN LOAD ± KN | MINIMUM STROKE LENGTH IN mm | $L_{max}$ IN mm | $L_{min}$ IN mm | REMARKS |
|---|---|---|---|---|---|---|
| 01 | 01 | LBA21BQ011–A | 230 | 265 (EXPANSION) | 2310 | 2045 | TAG No. REVISED |
| 01 | 02 | LBA21BQ011–B | 230 | 265 (EXPANSION) | 2650 | 2385 | TAG No. REVISED |
| | 03 | LBA21BQ020 | 495 | 190 (EXPANSION) | 5505 | 5315 | |
| | 04 | LBA21BQ021 | 495 | 225 (COMPRESSION) | 3780 | 3555 | |
| | 05 | LBA21BQ022 | 194 | 195 (COMPRESSION) | 3140 | 2945 | |
| | 06 | LBA32BQ049–A | 152 | 200 (EXPANSION) | 2015 | 1815 | |
| | 07 | LBA32BQ049–B | 145 | 165 (COMPRESSION) | 2035 | 1870 | |

| PREPARED | APPROVED | DATE | DRG. No. | REV. |
|---|---|---|---|---|
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# DATA SHEET FOR HYDRAULIC SNUBBER

PROJECT : BARH STPP STAGE–1 (3x660 MW)

CUSTOMER : NTPC

CUST No. : 7285, 7286 & 7287

| SL No. | TAG No. | DESIGN LOAD ± KN | MINIMUM STROKE LENGTH IN mm | $L_{max}$ IN mm | $L_{min}$ IN mm | REMARKS |
|---|---|---|---|---|---|---|
| 08 | LBA12BQ061 | 66 | 210 (EXPANSION) | 1335 | 1125 | |
| 09 | LBA11BQ069 | 65 | 215 (EXPANSION) | 1340 | 1125 | |
| 10 | LBA41BQ084 | 160 | 100 (COMPRESSION) | 1695 | 1595 | |
| 11 | LBA32BQ102 | 170 | 135 (COMPRESSION) | 2220 | 2085 | |
| 12 | LBA44BQ105 | 44 | 140 (EXPANSION) | 1120 | 980 | |
| 13 | LBA44BQ106 | 45 | 105 (EXPANSION) | 1055 | 950 | |
| 14 | LBA41BQ107 | 48 | 140 (EXPANSION) | 1085 | 945 | |
| 15 | LBC11BQ005–A | 60 | 110 (COMPRESSION) | 1845 | 1735 | |
| 16 | LBC11BQ005–B | 60 | 80 (EXPANSION) | 1870 | 1790 | |
| 17 | LBC11BQ008 | 40 | 110 (EXPANSION) | 2985 | 2875 | |
| 18 | LBC21BQ015 | 105 | 110 (COMPRESSION) | 2055 | 1945 | |
| 19 | LBC21BQ017 | 245 | 245 (COMPRESSION) | 5685 | 5440 | |
| 20 | LBC32BQ028 | 47 | 130 (EXPANSION) | 1265 | 1135 | |
| 21 | LBC32BQ042 | 53 | 280 (COMPRESSION) | 1180 | 900 | |
| 22 | LBC12BQ043–A | 105 | 115 (EXPANSION) | 1890 | 1775 | |
| 23 | LBC12BQ043–B | 105 | 110 (COMPRESSION) | 1825 | 1715 | |
| 24 | LBC12BQ045 | 78 | 120 (COMPRESSION) | 1055 | 935 | |
| 25 | LBC31BQ049 | 48 | 145 (EXPANSION) | 1280 | 1135 | |
| 26 | LBC31BQ065 | 178 | 80 (COMPRESSION) | 1920 | 1840 | |
| 27 | LBC32BQ073 | 175 | 80 (COMPRESSION) | 1920 | 1840 | |
| 28 | LBC31BQ090 | 52 | 275 (COMPRESSION) | 1180 | 905 | |

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# DATA SHEET FOR HYDRAULIC SNUBBER

PROJECT : BARH STPP STAGE–1 (3x660 MW)

CUSTOMER : NTPC

CUST No. : 7285, 7286 & 7287

| SL No. | TAG No. | DESIGN LOAD ± KN | MINIMUM STROKE LENGTH IN mm | $L_{max}$ IN mm | $L_{min}$ IN mm | REMARKS |
|---|---|---|---|---|---|---|
| 29 | LBB11BQ005 | 105 | 140 (EXPANSION) | 2810 | 2670 | |
| 30 | LBB11BQ021 | 120 | 240 (COMPRESSION) | 3265 | 3025 | |
| 31 | LBB12BQ023 | 112 | 200 (EXPANSION) | 2455 | 2255 | |
| 32 | LBB12BQ036 | 85 | 245 (COMPRESSION) | 3265 | 3020 | |
| 33 | LBB21BQ039 | 170 | 305 (EXPANSION) | 2925 | 2620 | |
| 34 | LBB21BQ040 | 135 | 165 (COMPRESSION) | 3560 | 3395 | |
| 35 | LBB32BQ060 | 95 | 165 (EXPANSION) | 2200 | 2035 | |
| 36 | LBB21BQ073 | 142 | 100 (COMPRESSION) | 2705 | 2605 | |
| 37 | LBB12BQ075 | 80 | 265 (EXPANSION) | 4975 | 4710 | |
| 38 | LBB11BQ076 | 95 | 230 (EXPANSION) | 2425 | 2195 | |
| 39 | LBB11BQ081 | 105 | 120 (COMPRESSION) | 1670 | 1550 | |
| 40 | LBB11BQ100 | 25 | 150 (EXPANSION) | 1625 | 1475 | |
| 41 | LBA51BQ096–A | 120 | 150 (EXPANSION) | 1625 | 1475 | LOAD REVISED |
| 42 | LBA52BQ110–A | 45 | 180 (EXPANSION) | 1655 | 1475 | LOAD REVISED |
| 43 | LBA52BQ111–A | 25 | 180 (EXPANSION) | 1655 | 1475 | |
| 44 | LBA52BQ111–B | 25 | 180 (EXPANSION) | 1655 | 1475 | |
| | | | | | | |
| | | | | | | |
| | 01 SNUBBER TAGS LBA51BQ096–B AND LBA52BQ110–B DELETED | | | | | |
| | | | | | | |
| | | | | | | |

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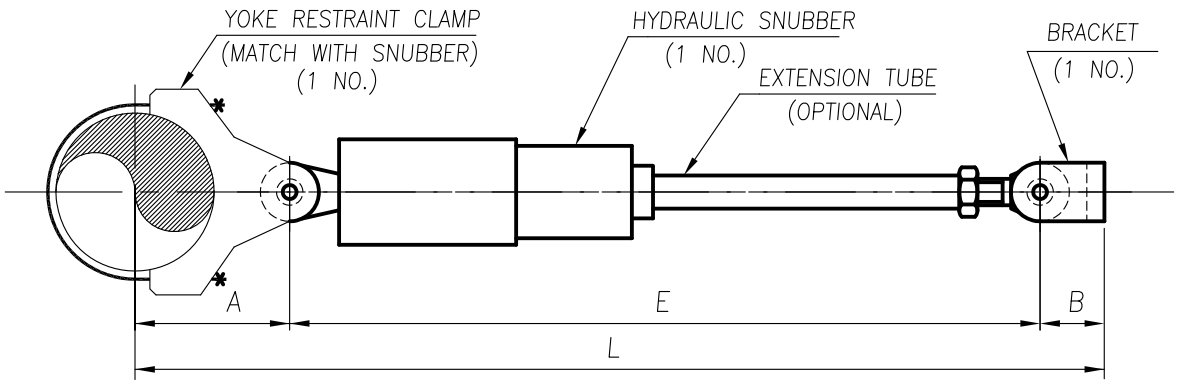
# DATA SHEET FOR HYDRAULIC SNUBBER ASSEMBLY

PROJECT : BARH STPP STAGE-1 (3x660 MW)

CUSTOMER : NTPC

CUST No. : 7285, 7286 & 7287




## NOTES :-

1. REFER TECHNICAL SPECIFICATION ENCLOSED HEREWITH.
2. SCOPE OF EACH SNUBBER ASSEMBLY INCLUDES HYDRAULIC SNUBBER(WITH OR WITHOUT EXTENSION TUBE), BRACKET ASSEMBLY & YOKE RESTRAINT CLAMP MATCHING WITH SNUBBER.
3. STROKE LENGTHS INDICATED IN THE BELOW TABLE ARE INCLUSIVE OF CUSHION OF 25mm ON EITHER SIDE, AS SPECIFIED IN THE TECHNICAL SPECIFICATION.
4. $L_{max}$ & $L_{min}$ CAN BE VARIED BASED ON SELECTED STROKE LENGTH. EXCESS STROKE LENGTH OF SELECTED SNUBBER MAY BE ADDED TO $L_{max}$ IN CASE OF EXPANSION & SUBTRACTED FROM $L_{min}$ IN CASE OF COMPRESSION FOR DERIVING FINAL $L_{max}$ & $L_{min}$. INDICATED $L_{max}$ & $L_{min}$ DENOTES LENGTH OF SNUBBER AT FULLY EXTENDED AND FULLY COMPRESSED CONDITION RESPECTIVELY.
5. DIMENSIONS A,B & E SHALL BE FIXED BY VENDOR WITH REF TO SELECTED $L_{max}$ & $L_{min}$ AND STROKE LENGTH.
6. WIDTH OF DESIGNED YOKE RESTRAINT CLAMPS SHALL BE LESS THAN 200mm FOR THE SPECIFIED LOAD.
7. CLAMP WITH PROVISION OF WELDING BRACKET ASSEMBLY IS ALSO ACCEPTABLE.
8. CLAMP 'A' DIMENSION CAN BE REDUCED BY 20% ONLY.
9. NO ADDITIONAL STRUCTURAL BEAM IS PERMITTED TO ACHIEVE THE TOTAL LENGTH 'L'.

| SL No. | TAG No. / PIPE SIZE | DESIGN LOAD ± KN | MINIMUM STROKE LENGTH IN mm | $L_{max}$ IN mm | $L_{min}$ IN mm | 01 YOKE RESTRAINT CLAMP | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ID (Min) IN mm | ID (Max) IN mm | A IN mm | MATERIAL | DESIGN TEMP IN °C |
| 01 | LBA12BQ010 / ID345X64.09 | 140 | 160 (COMPRESSION) | 3025 | 2865 | 483 | 495 | 650 | ALLOY STEEL | 546 |
| 02 | LBA21BQ015 / ID448X82.11 | 260 | 135 (EXPANSION) | 4350 | 4215 | 625 | 632 | 700 | ALLOY STEEL | 546 |
| 03 | LBA21BQ018 / ID448X82.11 | 150 | 330 (COMPRESSION) | 2475 | 2145 | 625 | 632 | 700 | ALLOY STEEL | 546 |
| 04 | LBA21BQ028 / ID448X82.11 | 230 | 425 (COMPRESSION) | 2525 | 2100 | 625 | 632 | 700 | ALLOY STEEL | 546 |
| 05 | LBA21BQ029 / ID448X82.11 | 153 | 235 (COMPRESSION) | 2525 | 2290 | 625 | 632 | 700 | ALLOY STEEL | 546 |
| 06 | LBA31BQ034 / ID345X64.09 | 152 | 210 (EXPANSION) | 2585 | 2375 | 483 | 495 | 650 | ALLOY STEEL | 546 |
| 07 | LBA11BQ048 / ID345X64.09 | 130 | 165 (COMPRESSION) | 3025 | 2860 | 483 | 495 | 650 | ALLOY STEEL | 546 |
| 08 | LBA31BQ100 / ID345X64.09 | 75 | 195 (EXPANSION) | 2660 | 2465 | 483 | 495 | 650 | ALLOY STEEL | 546 |
| 09 | LBA32BQ104 / ID345X64.09 | 112 | 120 (COMPRESSION) | 2975 | 2855 | 483 | 495 | 650 | ALLOY STEEL | 546 |

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# DATA SHEET FOR HYDRAULIC SNUBBER

PROJECT : BARH STPP STAGE–1 (3x660 MW)

CUSTOMER : NTPC

CUST No. : 7285, 7286 & 7287

| SL No. | TAG No. / PIPE SIZE | DESIGN LOAD ± KN | MINIMUM STROKE LENGTH IN mm | $L_{max}$ IN mm | $L_{min}$ IN mm | 01 YOKE RESTRAINT CLAMP | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ID (Min) IN mm | ID (Max) IN mm | A IN mm | MATERIAL | DESIGN TEMP IN °C |
| 10 | LBC11BQ003 / ID622X17.89 | 40 | 90 (COMPRESSION) | 1775 | 1685 | 660 | 675 | 560 | CARBON STEEL | 331 |
| 11 | LBC11BQ004 / ID622X17.89 | 65 | 120 (EXPANSION) | 3745 | 3625 | 660 | 675 | 560 | CARBON STEEL | 331 |
| 12 | LBC11BQ010 / ID622X17.89 | 95 | 160 (EXPANSION) | 2285 | 2125 | 660 | 675 | 560 | CARBON STEEL | 331 |
| 13 | LBC32BQ033 / ID622X17.89 | 73 | 270 (EXPANSION) | 2840 | 2570 | 660 | 675 | 560 | CARBON STEEL | 331 |
| 14 | LBC32BQ037 / ID622X17.89 | 73 | 335 (EXPANSION) | 2185 | 1850 | 660 | 675 | 560 | CARBON STEEL | 331 |
| 15 | LBC12BQ041 / ID622X17.89 | 31 | 75 (COMPRESSION) | 1775 | 1700 | 660 | 675 | 560 | CARBON STEEL | 331 |
| 16 | LBC31BQ054 / ID622X17.89 | 72 | 270 (EXPANSION) | 3090 | 2820 | 660 | 675 | 560 | CARBON STEEL | 331 |
| 17 | LBC31BQ058 / ID622X17.89 | 72 | 335 (EXPANSION) | 2185 | 1850 | 660 | 675 | 560 | CARBON STEEL | 331 |
| 18 | LBC21BQ085 / ID863X24.09 | 93 | 180 (COMPRESSION) | 4085 | 3905 | 915 | 930 | 690 | CARBON STEEL | 331 |
| 19 | LBC32BQ086 / ID622X17.89 | 77 | 165 (EXPANSION) | 1945 | 1780 | 660 | 675 | 560 | CARBON STEEL | 331 |
| 20 | LBC32BQ087 / ID622X17.89 | 73 | 150 (EXPANSION) | 2420 | 2270 | 660 | 675 | 560 | CARBON STEEL | 331 |
| 21 | LBC31BQ088 / ID622X17.89 | 75 | 170 (EXPANSION) | 1950 | 1780 | 660 | 675 | 560 | CARBON STEEL | 331 |
| 22 | LBC31BQ089 / ID622X17.89 | 70 | 140 (EXPANSION) | 2410 | 2270 | 660 | 675 | 560 | CARBON STEEL | 331 |
| 23 | LBB11BQ007 / ID660X24.78 | 120 | 365 (COMPRESSION) | 2645 | 2280 | 713 | 726 | 775 | ALLOY STEEL | 574 |
| 24 | LBB11BQ011 / ID660X24.78 | 120 | 420 (EXPANSION) | 4240 | 3820 | 713 | 726 | 775 | ALLOY STEEL | 574 |
| 24 | LBB11BQ012 / ID660X24.78 | 250 | 420 (EXPANSION) | 5505 | 5085 | 713 | 726 | 775 | ALLOY STEEL | 574 |
| 26 | LBB11BQ015 / ID660X24.78 | 150 | 120 (COMPRESSION) | 6200 | 6080 | 713 | 726 | 775 | ALLOY STEEL | 574 |
| 27 | LBB11BQ019 / ID660X24.78 | 150 | 185 (COMPRESSION) | 4705 | 4520 | 713 | 726 | 775 | ALLOY STEEL | 574 |
| 28 | LBB12BQ028 / ID660X24.78 | 86 | 230 (COMPRESSION) | 3385 | 3155 | 713 | 726 | 775 | ALLOY STEEL | 574 |
| 29 | LBB12BQ029 / ID660X24.78 | 82 | 245 (COMPRESSION) | 3870 | 3625 | 713 | 726 | 775 | ALLOY STEEL | 574 |
| 30 | LBB12BQ030 / ID660X24.78 | 212 | 325 (EXPANSION) | 5380 | 5055 | 713 | 726 | 775 | ALLOY STEEL | 574 |

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# DATA SHEET FOR HYDRAULIC SNUBBER

PROJECT : BARH STPP STAGE–1 (3x660 MW)

CUSTOMER : NTPC

CUST No. : 7285, 7286 & 7287

| SL No. | TAG No. / PIPE SIZE | DESIGN LOAD ± KN | MINIMUM STROKE LENGTH IN mm | $L_{max}$ IN mm | $L_{min}$ IN mm | 01 YOKE RESTRAINT CLAMP | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ID (Min) IN mm | ID (Max) IN mm | A IN mm | MATERIAL | DESIGN TEMP IN °C |
| 31 | LBB31BQ045 / ID660X24.78 | 95 | 265 (EXPANSION) | 2295 | 2030 | 713 | 726 | 775 | ALLOY STEEL | 574 |
| 32 | LBB11BQ072 / ID660X24.78 | 118 | 250 (EXPANSION) | 2840 | 2590 | 713 | 726 | 775 | ALLOY STEEL | 574 |
| 33 | LBB12BQ074 / ID660X24.78 | 55 | 155 (COMPRESSION) | 2725 | 2570 | 713 | 726 | 775 | ALLOY STEEL | 574 |
| 34 | LBB11BQ077 / ID609X22.84 | 95 | 225 (EXPANSION) | 4900 | 4675 | 658 | 674 | 735 | ALLOY STEEL | 574 |
| 35 | LBB11BQ078 / ID609X22.84 | 48 | 150 (COMPRESSION) | 2725 | 2575 | 658 | 674 | 735 | ALLOY STEEL | 574 |
| 36 | LBB11BQ082 / OD406.4 | 52 | 170 (COMPRESSION) | 2790 | 2620 | 410 | 420 | 610 | ALLOY STEEL | 574 |
| 37 | LBB11BQ084 / ID375X13.72 | 22 | 140 (EXPANSION) | 1915 | 1775 | 404 | 415 | 600 | ALLOY STEEL | 574 |
| 38 | LBB11BQ086 / ID375X13.72 | 22 | 215 (COMPRESSION) | 1970 | 1755 | 404 | 415 | 600 | ALLOY STEEL | 574 |
| 39 | LBB12BQ088 / ID609X22.84 | 55 | 140 (COMPRESSION) | 2725 | 2585 | 658 | 674 | 735 | ALLOY STEEL | 574 |
| 40 | LBB12BQ091 / OD508 | 55 | 200 (COMPRESSION) | 2805 | 2605 | 512 | 520 | 660 | ALLOY STEEL | 574 |
| 41 | LBB12BQ093 / ID375X13.72 | 25 | 205 (EXPANSION) | 1980 | 1775 | 404 | 415 | 600 | ALLOY STEEL | 574 |
| 42 | LBB12BQ095 / ID375X13.72 | 28 | 95 (EXPANSION) | 1790 | 1775 | 404 | 415 | 600 | ALLOY STEEL | 574 |
| 43 | LBB12BQ096 / ID660X24.78 | 105 | 245 (EXPANSION) | 4050 | 3805 | 713 | 726 | 775 | ALLOY STEEL | 574 |
| 44 | LBB12BQ034 / ID660X24.78 | 100 | 300 (COMPRESSION) | 4405 | 4105 | 713 | 726 | 775 | ALLOY STEEL | 574 |
| 45 | LBB11BQ099 / OD88.9 | 25 | 130 (EXPANSION) | 1605 | 1475 | 90 | 100 | 340 | ALLOY STEEL | 574 |
| 46 | LBB11BQ114 / OD219.1 | 25 | 140 (EXPANSION) | 1615 | 1475 | 221 | 230 | 490 | ALLOY STEEL | 574 |
| 47 | LBB11BQ122 / ID375X13.72 | 25 | 150 (EXPANSION) | 1625 | 1475 | 404 | 415 | 600 | ALLOY STEEL | 574 |
| 48 | LBB12BQ108 / OD88.9 | 25 | 140 (EXPANSION) | 1615 | 1475 | 90 | 100 | 340 | ALLOY STEEL | 574 |
| 49 | LBB12BQ125 / ID375X13.72 | 25 | 200 (EXPANSION) | 1675 | 1475 | 404 | 415 | 600 | ALLOY STEEL | 574 |
| 50 | LBB12BQ127 / OD219.1 | 25 | 150 (EXPANSION) | 1625 | 1475 | 221 | 230 | 490 | ALLOY STEEL | 574 |
| 51 | LBB12BQ134 / OD88.9 | 25 | 120 (EXPANSION) | 1595 | 1475 | 90 | 100 | 340 | ALLOY STEEL | 574 |

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# DATA SHEET FOR HYDRAULIC SNUBBER

PROJECT : BARH STPP STAGE–1 (3x660 MW)

CUSTOMER : NTPC

CUST No. : 7285, 7286 & 7287

| | SL No. | TAG No. / PIPE SIZE | DESIGN LOAD ± KN | MINIMUM STROKE LENGTH IN mm | $L_{max}$ IN mm | $L_{min}$ IN mm | △01 YOKE RESTRAINT CLAMP | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | ID (Min) IN mm | ID (Max) IN mm | A IN mm | MATERIAL | DESIGN TEMP IN °C |
| | 52 | LBA51BQ093 / ID231.2X43.39 | 25 | 200 (EXPANSION) | 1675 | 1475 | 324 | 335 | 450 | ALLOY STEEL | 546 |
| | 53 | LBA51BQ095 / ID231.2X43.39 | 50 | 200 (EXPANSION) | 1675 | 1475 | 324 | 335 | 450 | ALLOY STEEL | 546 |
| △01 | 54 | LBA52BQ099 / ID231.2X43.39 | 45 | 160 (EXPANSION) | 1635 | 1475 | 324 | 335 | 450 | ALLOY STEEL | 546 |
| △01 | 55 | LBA52BQ108 / ID231.2X43.39 | 45 | 160 (EXPANSION) | 1635 | 1475 | 324 | 335 | 450 | ALLOY STEEL | 546 |
| △01 | 56 | LBC41BQ091 / OD610 | 45 | 150 (EXPANSION) | 1625 | 1475 | 616 | 630 | 535 | ALLOY STEEL | 331 |
| | 57 | LBC42BQ093 / OD610 | 45 | 170 (EXPANSION) | 1645 | 1475 | 616 | 630 | 535 | ALLOY STEEL | 331 |
| △01 | 58 | LBB51BQ144 / ID609X22.84 | 25 | 120 (EXPANSION) | 2220 | 2100 | 658 | 674 | 670 | ALLOY STEEL | 574 |

| PREPARED | APPROVED | DATE | DRG. No. | REV. |
|---|---|---|---|---|
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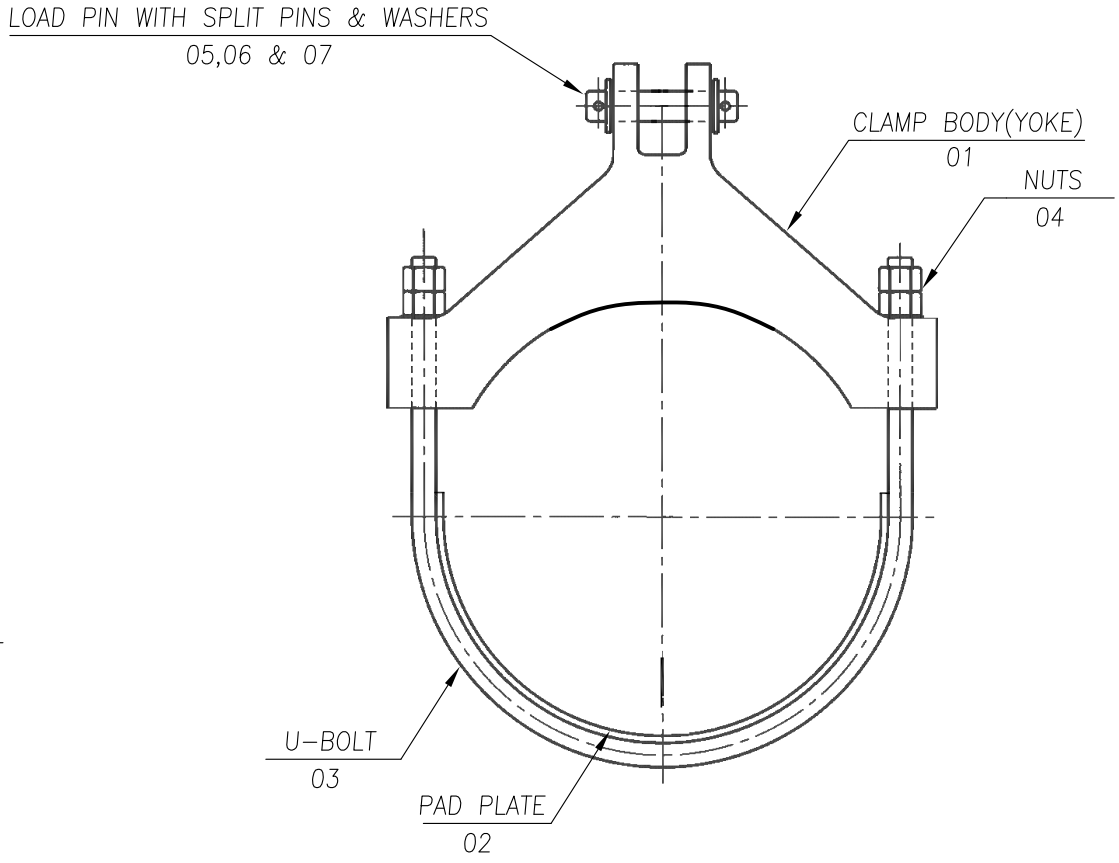
# SKETCH OF YOKE RESTRAINT CLAMP

PROJECT : BARH STPP STAGE-1 (3x660 MW)
CUSTOMER : NTPC
CUST No. : 7285, 7286 & 7287




## NOTES :-

1. VENDOR SHALL BE RESPONSIBLE FOR THE DESIGN OF CLAMP FOR THE DESIGN PARAMETERS SPECIFIED IN THE DATA SHEET.
2. DESIGN CALCULATION SHALL BE SUBMITTED FOR APPROVAL.
3. MATERIAL SELECTION SHALL BE AS PER BELOW TABLE OR ITS EQUIVALENT:

| 01 | SL. NO. | ITEM | CS CLAMP | AS CLAMP |
|---|---|---|---|---|
| | 1. | CLAMP BODY(YOKE) | ASTM A515 Grade 70 | ASTM A387 Grade 22 Class 2 |
| | 2. | PAD PLATE | ASTM A515 Grade 70 | ASTM A387 Grade 22 Class 2 |
| | 3. | U-BOLT | ASTM A105 | ASTM A182 Grade F12 Class 2 |
| | 4. | NUTS | ASTM A194 Grade 2H | ASTM A194 Grade 7 |
| | 5. | LOAD PIN | ASTM A105 | ASTM A182 Grade F12 Class 2 |
| | 6. | WASHERS | – | – |
| | 7. | SPLIT PINS | – | – |

4. ALL SHARP CORNERS ARE TO BE ROUNDED OFF.
5. CLAMP SHALL BE SUPPLIED IN ASSEMBLED CONDITION WITH FASTENERS PROPERLY TIGHTENED.
6. HIGH TEMPERATURE PAINT FINISH IS REQUIRED.

| PREPARED | APPROVED | DATE | DRG. No. | REV. |
|---|---|---|---|---|
| SOURAV | M.MANO | 16.07.15 | 4-00-301-40763 | 01 |

Size A4

BHARAT HEAVY ELECTRICALS LTD
PIPING CENTRE, CHENNAI – 17
QUALITY ASSURANCE & CONTROL DEPT.

# STANDARD QUALITY PLAN FOR SNUBBERS

QP NO : QPG 84
REV.NO : 00
DATE : 18.02.2014

| S.No | COMPONENT & OPERATIONS | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORDS | | AGENCY | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | D* | P | V | W | H | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **1.0** | **Raw Material** | | | | | | | | | | | | | |
| 1.1 | Plates,bars,pipes, Forgings,springs, roller bearings, screws, nuts and other purchases parts | Material Conditions | Major | Visual and dimensional | 100% | Purchase order and material standards | | Inward inspection records & MTC | ✓ | 3 | 2 | - | - | MTC = Mill Certificate |
| 1.2 | | Chemical Analysis Mechanical Properties | Major | Verification of MTC | 100% | Purchase order and material standards | | | ✓ | 3 | 2 | - | - | |
| **2.0** | **Inprocess Inspection** | | | | | | | | | | | | | |
| 2.1 | Surfaces after flame cutting, bending and/or mechanical machining | Surface Condition | Major | Visual and dimensional | 100% | Drawings and Manufacturers inspection procedures | | Inspection Report | ✓ | 3 | 2 | -- | -- | |
| 2.2 | Welders & Welding Qualification | WPS&PQR | Major | Verification | 100% | ASME Section-IX Welding Standards for the different | | Inspection Report | ✓ | 3 | 2 | -- | -- | |
| 2.3 | Welding | Quality of Weld | Major | Visual and dimensional of weld seam | 100% | Manufacturer's Drawings | | Inspection Report | ✓ | 3 | 2 | -- | -- | |
| 2.4 | NDE for Load Bearing welds | MPI | Major | MPI | 100% | Manufacture's Procedure and as per ASME Section-V | | MPI Report | ✓ | 3 | 2 | -- | -- | |
| 2.5 | Assembled supports | Quality of Assembly | Major | Execution of supports with visual and dimension check | 100% | Manufacturer's Drawings | | Inspection Report | ✓ | 3 | 2 | -- | -- | |
| **3.0** | **Tests** | | | | | | | | | | | | | |
| 3.1 | Load Testing | Load Check test | Major | Load check test | 100% | Manufacturer's Drawings | | Inspection Report | ✓ | 3 | 2 | -- | -- | |
| 3.2 | Completed Shock Absorber | Caliberation & Performance | Critical | Calibration Function control including load test, visual and dimensional check | 100% | As per Manufacturers Calibration Procedure | | Calibration chart & Test diagrams | ✓ | 3 | 2 | -- | -- | * All Calibration Reports shall be sent for Approval before despatch |

LEGEND:
1-Customer, 2-BHEL/BHEL Nominated Agency, 3-BHEL Vendor, 4-Subvendor
P-Perform, V-Verification / Review, W-Witness, H-Hold
* RECORDS, INDENTIFIED WITH "TICK" ( ∨ ) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.

PREPARED BY
M.MANOJ PANDI , ENGR/QA
SIGNATURE

APPROVED BY
M.S. MURALIDHARAN , MGR / QA

| BHARAT HEAVY ELECTRICALS LTD<br>PIPING CENTRE, CHENNAI – 17<br>QUALITY ASSURANCE & CONTROL DEPT. | STANDARD QUALITY PLAN FOR SNUBBERS | QP NO : QPG 84<br>REV.NO : 00<br>DATE : 18.02.2014 |
|---|---|---|

| S.No | COMPONENT & OPERATIONS | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORDS | AGENCY | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | D* | P | V | W | H | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **4.0** | **Final Inspection** | | | | | | | | | | | | | |
| 4.1 | Completed Shock absorber | Size, Overall dimension & Travel | Major | Visual and Measurement | 100% | As per Drawing | | Dimensional Report | ✓ | 3 | 2 | -- | -- | |
| 4.2 | Painting | Visual , DFT | Major | Coating thickness check | 100% | Manufacturer's Procedure | | Inspection Report | ✓ | 3 | 2 | -- | -- | |
| 4.3 | Identification & Marking | Verification | Major | Visual | 100% | Specification, Approved Drg.& Data Sheet / P.O. | | Inspection Report | -- | 3 | 2 | -- | -- | |
| 4.4 | Packing | Transit worthy | Major | Visual | 100% | Manufacturer's Procedure | | Inspection Report | -- | 3 | 2 | -- | -- | |
| 4.5 | Inspection clearance | Document control and release for dispatch | Major | Verification | 100% | All Documents as per this QP | | Final IR | ✓ | 3 | 2 | -- | -- | |

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