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BASIC-PSA, INC
Home of the Original
Mechanical Snubber

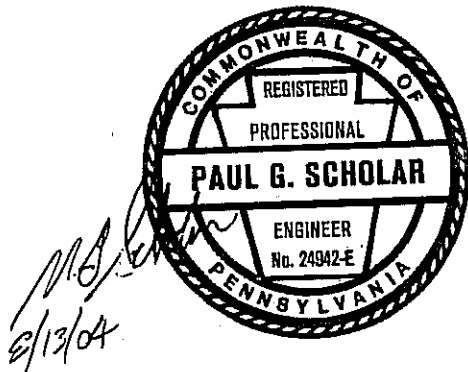
CERTIFICATION

I, the undersigned being a Registered Professional Engineer competent in the applicable field of design and related nuclear power plant requirements relative to this Design Specification, certify that to the best of my knowledge and belief it is correct and complete with respect to the Design and Service Conditions given and provides a complete basis for design, construction and inspection in accordance with NCA-3250 and other applicable requirements of ASME Boiler and Pressure Vessel Code, Section III, Division 1, 2001 Edition, with Addenda up to and including 2003.

The Specification and Revision being certified is : DR1319 Rev 2

Certified by *Paul G. Scholar* P. E.
Paul G. Scholar

Registration No. : 24942-E State : Pennsylvania
Date : 8/13/04



**WE SUPPORT THE WORLD****MECHANICAL SHOCK ARRESTORS
STANDARD DESIGN SPECIFICATION****1.0 SCOPE**

This document defines the design requirements and is the basis for construction of Standard Supports - Snubbers (mechanical shock arrestors and attachments used in the restraint of nuclear components and piping. It is in accordance with the design rules for Standard supports as described in "ASME Boiler and Pressure Vessel Code", Section III, Division 1, Subsection NF and will be revised to comply with applicable code revisions and addenda within six (6) months after their issue.

Applicable code revision and addenda shall be reviewed and this specification revised if necessary for compliance. Whether this specification is revised or not, a certification will be prepared indicating compliance with the current code.

2.0 DOCUMENTS AND STANDARDS

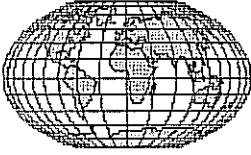
- 2.1 The design of mechanical shock arrestors and attachments shall be in conformance with the applicable requirements of the following ASME Boiler and Pressure Vessel Code standards.
 - 2.1.1 Section III, "Nuclear Power Plant Components"
 - 2.1.2 Subsection NCA 3800 - Material Supplier or
NCA 4000 - NPT or NS Certificate Holder
 - 2.1.3 Subsection NF, "Component Supports"
 - 2.1.4 Division 1 Appendices
 - 2.1.5 Material Code Cases

**WE SUPPORT THE WORLD****MECHANICAL SHOCK ARRESTORS
STANDARD DESIGN SPECIFICATION****2.0 DOCUMENTS AND STANDARDS (cont'd...)**

- 2.1.6 Section II, "Material Specifications"
- 2.1.7 ANSI/ASME N45.2.2 "Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants".

3.0 FUNCTION AND BOUNDARY OF JURISDICTION

- 3.1 The mechanical shock arrestor and attachments shall be designed to be mounted between a piping system, valve, pump, motor, or other suspended component and the building structure including appurtenances solidly attached to the building. Its purpose is to protect the suspended component against dynamic loading.
- 3.2 The snubber shall allow essentially free movement of the component when the component is subjected to non-dynamic loads such as that imposed by thermal expansion and contraction. The snubber shall limit motion when the component is subjected to an impulse (dynamic load) such as a seismic disturbance.
- 3.3 The Boundary of Jurisdiction will vary from installation to installation depending on the component being protected and the structure to which it is attached as well as the presence or absence of intervening elements. Therefore, the boundary of jurisdiction shall be the responsibility of the component support owner.

**WE SUPPORT THE WORLD****MECHANICAL SHOCK ARRESTORS
STANDARD DESIGN SPECIFICATION****4.0 CODE CLASSIFICATION**

The mechanical shock arrestor and attachments shall be designed as a Class 1 Linear Standard Supports, and shall further be classified as Material in accordance with NF-1214.

5.0 DESIGN REQUIREMENTS

5.1 Code Compliance - The design of snubbers and attachments, covered by this specification, shall be in accordance with ASME B&PV Code, Section III, Division 1, Subsection NF, Sub-article 3200 or 3300.

5.2 Life - The snubber shall be designed for 40 years effective service life with appropriate maintenance and operation within the rated load and environmental limits specified below.

5.3 Operation

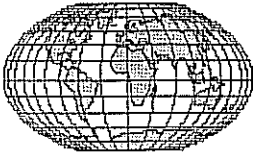
5.3.1 Load - The rated load of a snubber and attachments shall be determined by analysis in accordance with NF-3220 of Section III of the code. Concurrent application of loads as indicated in NF-3111 shall be considered in snubber and attachments selection. Service loading of the snubber and attachments must not exceed the rated loads for Service Levels A, B, C or D Service Limits.



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MECHANICAL SHOCK ARRESTORS
STANDARD DESIGN SPECIFICATION**5.0 DESIGN REQUIREMENTS** (cont'd...)

- 5.3.2 Breakaway/Drag Force - The force required for axial movement of the snubber shall not exceed two percent (2%) of the rated load.
- 5.3.3 Sensitivity - The snubber shall limit telescoping acceleration to .02g maximum.
- 5.3.4 Displacement Under Load - The peak to peak displacement across the unit, excluding end attachments, shall not exceed 0.12 inches when the input frequency is in the 3 to 33 Hertz range at level A and B load.
- 5.3.5 Stroke - The total axial extension and retraction of the snubber shall be as specified on the Certified Design Report Summary.
- 5.3.6 Misalignment Provision - The snubber and attachments shall be fitted at each end with a self aligning ball joint which will allow installation and/or displacement misalignment to ± 6 Deg.
- 5.3.7 Lost Motion - The lost motion (axial movement of the snubber required to activate the restraint function in both directions) shall not exceed .040" when measured across the snubber excluding end fittings.



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**MECHANICAL SHOCK ARRESTORS
 STANDARD DESIGN SPECIFICATION**

5.0 DESIGN REQUIREMENTS (cont'd...)

5.4 Environment - The snubber shall meet all the requirements of 5.3 above when operated under the following conditions:

Temperature -

normal conditions	-20 to 300 °F
abnormal conditions	(up to 12 hrs) to 350 °F

Relative Humidity -	0 to 100%
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Radiation -	3×10^9 rads
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integrated gamma and
 neutron accumulated over 40 years

Pressure - (snubber function is not affected by pressure)	No limits
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Corrosive Atmosphere	Max Exposure direct salt spray 48 Hrs.
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Airborne Particles	Max Exposure .1 gram per cu ft 12 Hrs.
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5.5 Finish Requirements

5.5.1 Snubber - All exposed carbon steel surfaces shall be treated with Diffused Nickel-Cadmium or Electro-deposited Zinc plating.

5.5.2 Appurtenances - All parts that require field welding, except pipe, shall be painted with Carbo Weld-11, Carbo-zinc-11, or Deoxaluminite. Other surface treatments may be specified by the customer.



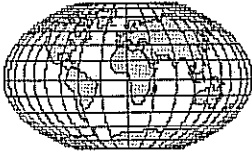
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MECHANICAL SHOCK ARRESTORS
STANDARD DESIGN SPECIFICATION**6.0 MATERIALS****6.1 Code Material**

- 6.1.1 Except as provide in paragraphs 6.2 below, all materials shall conform to the requirements of the specifications for materials listed in approved Code Cases and in the tables of Section II, applicable to Class 1 Standard supports, as indicated in Table NF-2121(a)-1.
- 6.1.2 A Certified Material Test Report shall be provided for all items covered by Paragraph 6.1.1 above.

6.2 Exempt Material

- 6.2.1 The requirements of Section 6.1 do not apply to such items as seals, springs, wear shoes, lubricants, retaining rings, bearings, etc. in accordance with NF-2121(b).
- 6.2.2 Such exempt items shall not be adversely affected by the operating environments specified in paragraph 5.4 above.
- 6.2.3 Consideration of material characteristics, such as compatibility, stability, fire resistance, wear and aging shall be given consideration.
- 6.2.4 Materials covered in this section, 6.2, do not require Material manufacturer's Certificates of Compliance, but a list of such items is provided on the as-built drawing.
- 6.3 Impact Testing - All code materials for which impact test properties are specified in their respective material specifications will be impact tested in accordance with NF-2300 at room temperature.



7.0 IDENTIFICATION OF UNITS

7.1 Each snubber shall have a nameplate per NCA-8200 bearing the following information:

Customer Mark Number (if required)

Manufacturer's Name

Serial Number

Design Load

Stroke

Year of Manufacture

Part Number and/or Model Number

7.2 Items that require NPT Stamping shall be stamped in accordance with NCA-8200.

8.0 PRODUCTION TESTS

8.1 Each production snubber shall be subjected to acceptance tests to verify functional compliance with applicable drawings and specification requirements.

8.2 An approved acceptance test procedure shall be prepared for each model to indicate specific tests and measurements, and identify acceptance criteria. As a minimum, the test procedure will require the following:

8.2.1 Dimensions - Check assembly for compliance with dimensional criteria of the applicable as built drawing.



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MECHANICAL SHOCK ARRESTORS
STANDARD DESIGN SPECIFICATION**8.0 PRODUCTION TESTS**(cont'd. . .)

8.2.2 Stroke - Check assembly to confirm that it operates freely over the entire stroke range.

8.2.3 Breakaway/Drag Force - Measure and record the force required for axial extension and retraction.

8.2.4 Lost Motion - Measure and record the maximum axial displacement required to activate the restraint function.

8.2.5 Sensitivity - Determine that the actuating sensitivity requirements are met.

9.0 QUALITY ASSURANCE PROGRAM

The quality of work performed in the design, procurement, manufacture, inspection, handling, testing, storage and shipping of snubbers, attachments and their components shall be controlled in accordance with the program described in the Basic-PSA, Inc. "Quality Assurance Manual for ASME Section III, Division 1, Section XI and 10 CFR 50 Appendix B".

**WE SUPPORT THE WORLD****MECHANICAL SHOCK ARRESTORS
STANDARD DESIGN SPECIFICATION****10.0 DOCUMENTATION**

- 10.1 A Certificate of Conformance shall be provided for each snubber supplied to certify that it is in accordance with this specification, Basic-PSA, Inc. QA Manual and NPT or NS Certificates, if required, and will identify customer purchase order, snubber serial numbers and part numbers, applicable code cases and signature of the responsible Quality Assurance Personnel.
- 10.2 A Design Report Summary Sheet, certified by a Registered Professional Engineer competent in the field of Component Support design, stating that a Certified Design Report has been prepared and is on file with the manufacturer, in accordance with Subsection NF.
- 10.3 Engineering drawings (Parts List Identification Drawings) shall be provided as requested which include outline dimensions and materials part list.
- 10.4 Other reports and information as required by the purchase order.

11.0 PACKING AND SHIPPING

- 11.1 Packaging of the mechanical snubber shall be in accordance with the requirements of ANSI/ASME N45.2.2, Level C and shall protect the snubber and accessory parts against external damage during normal shipping and handling.

**WE SUPPORT THE WORLD****MECHANICAL SHOCK ARRESTORS
STANDARD DESIGN SPECIFICATION****11.0 PACKING AND SHIPPING** (cont'd)

- 11.2 Packaging of the attachments shall be in accordance with the requirements of ANSI/ASME N45.2.2, Level D and shall protect the attachments against external damage during normal shipping and handling.
- 11.3 All exposed threads, flanges and critical surfaces shall be protected with an appropriate covering.
- 11.4 Packaging shall be clearly marked for identification, contents, destination, consignee and degrees of handling care.