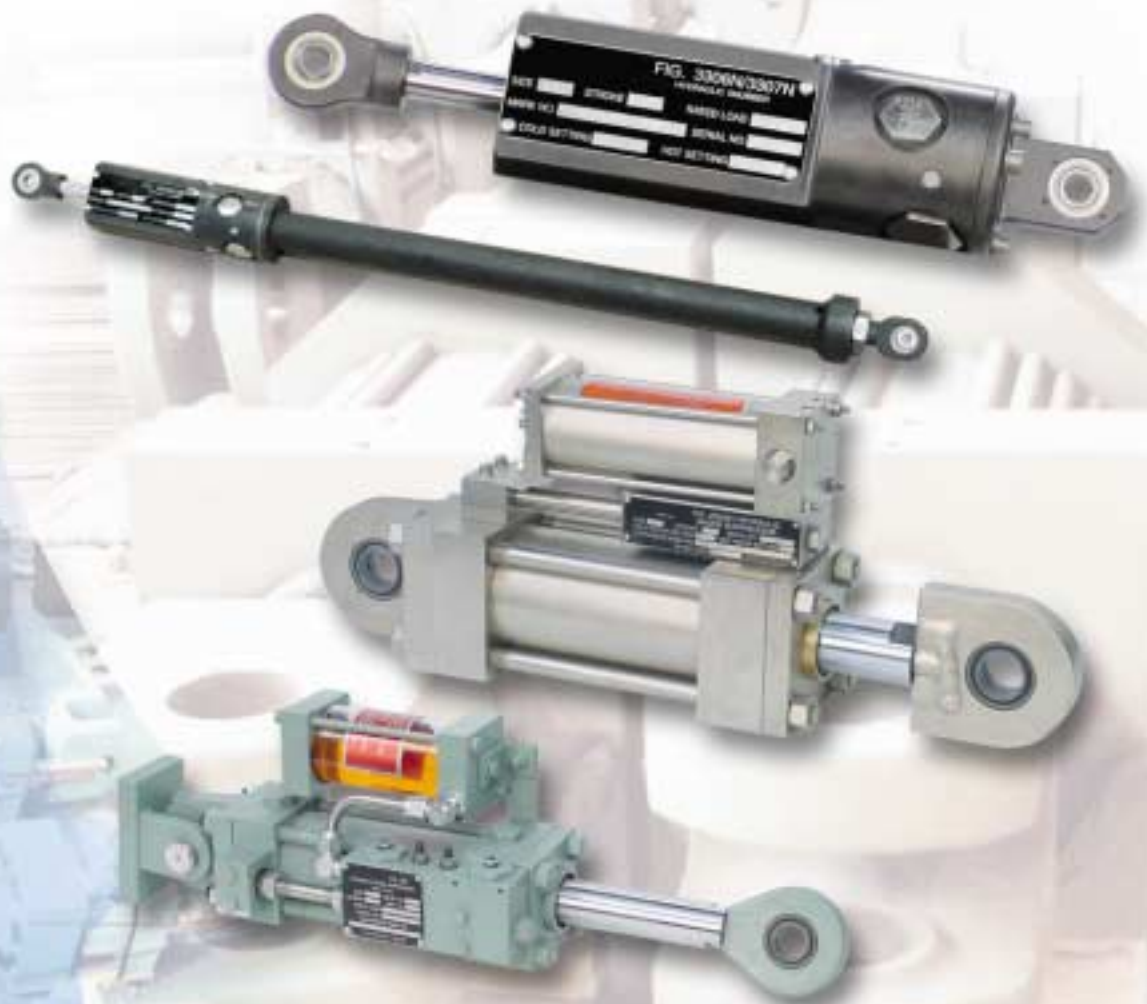




ANVIL[®]
INTERNATIONAL, INC.

(Formerly Grinnell)



HYDRAULIC SNUBBERS

ANVIL INTERNATIONAL

ENGINEERED HANGERS PRODUCT LINE

- Variable Springs
- Constant Supports
- Hydraulic Snubbers
- Vibration Sway Braces
- Sway Struts
- Limit Stops

We also provide:

- Special Fabrication/ Miscellaneous Structural Steel Fabrication
- Special Design Products Per Customer Specifications
- Domestically Manufactured Product Line

ANVIL MARKETS

- Nuclear Power
- Fossil Power
- Co-generation
- Petro Chemical
- Refinery
- Pulp & Paper
- Marine
- Waste Water, Water Treatment
- Industrial
- Mechanical HVAC/ Plumbing
- Fire Protection

DESIGN SERVICES

Either on or off-site, Anvil Design Services helps you maximize the efficiency of your pipe support systems. These services include:

- Pipe Hanger Design & Engineering
- Manual & Computer-Aided Drafting
- System Analysis
- Pipe Stress Analysis
- Product Qualification Testing (environmental, static and cycling loads, flow & leak)
- Supervision of Client Design Personnel

MANUFACTURING EXCELLENCE

Anvil Pipe Hangers and Supports are manufactured in three primary U.S. locations, North Kingstown, Rhode Island, Henderson, Tennessee and Columbia, Pennsylvania, each with their own unique capabilities.

At 122,000 square feet, our pipe support design and fabrication facility in North Kingstown, Rhode Island is the industry leader in the engineered hanger market for experience and in-house manufacturing capability. Our equipment can accommodate any project since we have the capability to machine, saw and flame cut up to 3" thick carbon and alloy steel and plasma cut stainless steel. We thread rod through 4" in diameter and we hot-form small to large diameter clamps. Our facility also has complete in-house blasting and painting capability and we perform complete in-house Non-Destructive Examination including X-Ray, PT, UT and magnetic particle testing. This expertise is supported by our total quality programs including our ASME "NPT" and "NS" Nuclear Certificates of Authorization, ISO 9001 certification and audited by NUPIC.

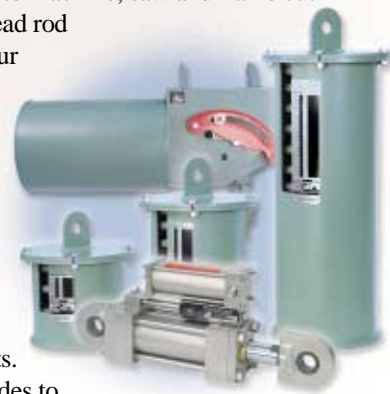
Our manufacturing facility in Henderson, Tennessee has over 175,000 square feet of manufacturing capability dedicated to producing a complete line of commercial, light industrial and industrial pipe hangers and supports. These include clamps, braces, inserts, rods and attachments, slides and guides to exacting industry standards and certified to ISO 9000 quality. The products manufactured in Henderson are designed for use in a wide variety of rigid pipe hanger or support applications, in markets including fire protection, electrical, water and waste water treatment, petrochemical, seismic, industrial and commercial. Special fabrication is available from our Henderson facility as well.

At our Columbia, Pennsylvania foundry, where we manufacture malleable fittings, cast iron fittings and our Gruvlok® products, we also manufacture our malleable and ductile iron hanger products such as beam clamps, numerous types of pipe clamps, concrete inserts, ceiling flanges and different types of rod attachments. With over 600,000 square feet of manufacturing floor space under one roof, our foundry has an annual pouring capacity of 100,000 tons. Columbia is ISO 9000 certified and is a quality manufacturer of malleable, ductile and cast iron products.

In addition to these three facilities, Anvil also has hanger fabrication facilities in Houston, Texas to service the Gulf Coast Engineered Hanger requirements.

Customer Service

With five key stocking locations throughout North America, you can count on getting all of the products you need - when you need it. When you have installation questions our solid customer service personnel are there to answer all of your questions, backed by our designers and engineers, we are there for you - on site, if needed.



ANVIL INTERNATIONAL

Anvil International (formerly Grinnell Corporation) is a recognized world leader in the field of pipe support and restraint design and manufacture. Anvil International has over 35 years of experience in the design and manufacture of hydraulic shock and sway suppressors (snubbers). Since 1969, our manufacturing plants have produced over 35,000 hydraulic shock and sway suppressors for projects throughout the world.

LARGE BORE HYDRAULIC SNUBBER
401-886-3032

Call for Information and Client Referrals

SNUBBER CAPABILITIES

All Anvil snubbers are velocity sensitive restraints for minimizing the movement of equipment and piping subject to disturbing forces. They prevent damage due to earthquake, flow pulsation, sway or the thrust resulting from pipe rupture. Unlike a simple viscous damper, snubbers do not restrain normal thermal movement, but provide controlled restraint during disturbances.

Our small bore snubbers are provided in sizes from 1" to 6" bores with normal load ratings from 350 to 72,000 pounds. Large bore snubbers are typically special designs and have been supplied in sizes from 8" to 20" bores. Individual units have been supplied with load ratings up to 1,950,000 pounds per snubber and up to 3,000,000 pounds per snubber assembly. All snubbers are available with various strokes, lockup velocities and bleed rates. A variety of finishes are available.

For nuclear applications, GE SF 1154 silicone fluid is used as it is the only known snubber fluid that will not gel at 1.0×10^7 rads radiation.

Our standard Figure 200 snubbers are available with control valves which are either field adjustable or temperature compensating. This minimizes the effects of temperature on lockup and bleed. Reservoir types are also optional and include: transparent (polycarbonate), metal, pressurized or remote.

Our Figure 3306 hydraulic snubber has been designed as a drop-in replacement for equivalent size PSA mechanical snubbers. When used as a replacement, the existing attachment hardware from the PSA mechanical snubber is reused. This attachment hardware normally consists of a pipe clamp or equipment attachment bracket, structural attachment bracket, load stud, pivot pin, and spacer washers. The extension piece from the existing PSA mechanical snubber may also be reused.

Our field service department is available for on-site snubber rebuilds or in-house in our snubber shop. Anvil has provided testing and rebuilding services for over 35 years.



HYDRAULIC SNUBBERS

Fig. 3306
Fig. 3307: With Extension Piece

For use on piping systems or equipment when unrestrained thermal movement must be allowed, but which must be restrained during impulsive or cyclic disturbance. The unit is not effective against low amplitude, high frequency movement. Use with standard settings to prevent destructive response to earthquakes, flow transients or wind load. Special settings are available to absorb the continuous thrust resulting from safety valve blow-off or pipe rupture.



FEATURES:

- Temperature compensating valves minimize the effects of temperature on lockup and bleed
- Pressurized reservoirs
- Continuous operation at 150° F with brief transients to 350° F
- Factory calibrated valves
- Rapid, positive valve closure
- Special design minimizes the “lost motion“ which results from the shifting and seating of piston seals
- Unlocked resisting force is less than 17¹/₂ pounds for sizes ¹/₄ and ¹/₂ and less than 2% of rated load for larger sizes
- Stable non-flammable, long life hydraulic fluid
- Self-aligning bushings permit ± 5° misalignment or angular motion.
- Bushings are coated with a dry lubricant.
- Choice of coating (paint, primer, carbo zinc, epoxy, plating or other) for attachments.

SIZE RANGE: Six standard sizes with load ratings from 350 to 50,000 pounds.

FINISH: Basic unit is corrosion resistant salt bath nitrided. Attachments are painted with semi gloss primer, carbo zinc or other.

STANDARD SETTINGS:

Locking (activation) velocity 8 ± 2 in/min. Bleed rate (post activation) at normal rated load 4 ± 1 in/min. (Special settings are available). The valves are calibrated at the factory within the tolerances indicated at room temperature. Locking velocity and bleed rate will vary with temperature. Testing has indicated that there is little effect of these changes on dynamic operation.

APPLICATIONS:

- Direct replacement for Pacific Scientific (PSA) mechanical snubbers (Anvil Fig.306/307): Exact load ratings, exact pin sizes, exact stroke lengths and exact pin-to-pin dimensions. The cross sectional dimensions of the Fig. 3306 are based on those of PSA to facilitate non-interference one-to-one replacement. Pins, clamps, pivot mounts, extension pieces, and rear brackets used with PSA snubbers are compatible with the Fig. 3306 and can be utilized.
- **NEW INSTALLATIONS:** For new installations, the Fig. 3306 is available with a complete line of pipe clamps and rear brackets.

LOADS (LBS)

Size	Stroke (in)	Max Load *
¹ / ₄	4	350
¹ / ₂	2 ¹ / ₂	650
1	4, 8	1,500
3	5, 10	6,000
10	6, 12	15,000
35	6	50,000

* Loads must not be applied outside a 10° included angle cone of action to the pipe clamp axis without special authorization.

HOW TO SIZE:

Size: Use table on the previous page to select size large enough to restrain expected load.

Stroke: Define expected movement of the pivot joining the snubber with the equipment to be protected (cold to hot plus any abnormal movements). Determine maximum and minimum distances between this curve and the fixed pivot pin of the snubber. The minimum recommended stroke is 20% greater than the difference between these lengths. Make sure that all normal movement of equipment will be accommodated without the snubber entering the last 1/4" (preferably 1/2") of the stroke at either end.

Note: If erected position at the snubber's location on the equipment is outside of the range of normal cold-to-hot movement (e.g cold pull of pipe), the snubber should not be installed until after the equipment is in its cold position. This eliminates the need of providing for the extra travel in the snubber's stroke.

Piston position: To aid in measuring the piston position, we have shown a dimension, "Z". This dimension represents the distance between the cylinder head and the end of the rod when the rod is fully retracted. Whenever specifying the position at which the piston rod is to be set, the total dimension from the cylinder head to the end of the rod should be given. Thus, piston setting = piston position + Z.

Assembly Length: Determine the installed "C" dimension by adding the installed piston position (not setting) to C minimum. Lay in takeout dimensions E and/or B, and find required pin-to-pin snubber length. If a pin-to-pin length adjustment is desired, use Fig. 3307. Calculate the required "W" dimension by subtracting (C installed + F) from the required pin-to-pin length. If this is less than W minimum, only a Fig. 3306 can be used, and one of the attachments will have to be moved or shimmed to suit. If a Fig. 3306 is to be used, make sure that the required pin-to-pin length is at least as great as (C installed + B). If neither a Fig. 3306 nor a Fig. 3307 can be accommodated, and the installation cannot be modified, consult your Anvil representative about designing a special or modified unit.

Installed piston setting: As indicated previously, the snubber should be installed at its cold piston position if possible. From the installed position, take extension (outward movement) of the piston rod as positive (+) and retraction as negative (-).

Installed piston position =

$$\left(\frac{\text{Stroke} - (\text{Algebraic Sum of Movements})}{2} \right)$$

2



FIG. 3306 & FIG. 3307 ORDERING OPTIONS

Option	Consists of...
0	Fig 3306: Basic unit (snubber) with pivot mount & one rear bracket. Fig. 3307: Basic unit with extension piece & one rear bracket.
1	Option 0 plus cylinder eye.
2	Option 0 plus cylinder eye & additional rear bracket.
3	Option 0 plus cylinder eye and pipe clamp.

HYDRAULIC SNUBBERS

**Fig. 200, Fig. C-200
Fig. 201, Fig. C-201: With Extension Piece**

For use on piping systems or equipment when unrestrained thermal movement must be allowed, but which must be restrained during impulsive or cyclic disturbance. The unit is not effective against low amplitude, high frequency movement. Use with standard settings to prevent destructive response to earthquakes, flow transients or wind load. Special settings are available to absorb the continuous thrust resulting from safety valve blow-off or pipe rupture.



FEATURES:

■ Choice of valve type

- Adjustable – permits field adjustments
- Temperature compensating – minimizes the effects of temperature on lockup and bleed

■ Choice of reservoir type

- **Transparent** – continuous operation at 200° F with brief transients to 250° F
- **Pressurized** – eliminates the concern of reservoir orientation relative to valve and cylinder; minimizes internal contamination; allows brief transients to 340° F
- **Metal** – limited applications
- **Remote**

■ Factory calibrated valves

■ Rapid, positive valve closure

■ Special design minimizes the “lost motion” which results from the shifting and seating of piston seals

■ Unlocked resisting force is less than 1% of rated load

■ Stable, non-flammable, long life hydraulic fluid made highly visible for ease of inspection

■ Self-aligning bushings permit $\pm 5^\circ$ misalignment or angular motion. Bushings are coated with a dry lubricant.

■ Choice of coating (paint, primer, carbo zinc, epoxy, plating or other)

SIZE RANGE: Seven standard sizes with cylinder bores of 1½" to 8" and with normal load ratings from 3,000 pounds to 128,000 pounds. All are available with 5", 10", 15", or 20" strokes except the 1½" size which is offered with 5" and 10" strokes only. Snubbers are available with integral or remote reservoirs.

FINISH: Fig. 200/201 painted with semi gloss primer.

Fig. C-200/C-201 corrosion resistant; painted with carbon zinc.

STANDARD SETTINGS:

Locking (activation) velocity 8 ± 2 in/min.

Bleed rate (post activation) at normal rated load 4 ± 1 in/min. (Special settings are available).

The valves are calibrated at the factory within the tolerances indicated at room temperature. Locking velocity and bleed rate will vary with temperature. Testing has indicated that there is little effect of these changes on dynamic operation.

LOADS (LBS)

Cylinder Size (in)	Max Load *
1½ (5" stroke)	3,000
1½ (10" stroke)	1,250
2½ (5", 10", 15" stroke)	12,500
2½ (20" stroke)	10,500
3¼	21,000
4	32,000
5	50,000
6	72,000
8	128,000

* Loads must not be applied outside a 10° included angle cone of action to the pipe clamp axis without special authorization.

UPGRADE KIT

Kits are available to upgrade existing snubbers with temperature compensating valves and/or pressurized reservoir.

HOW TO SIZE:

Cylinder size: Use table on previous page to select cylinder bore size large enough to restrain expected load.

Stroke: Define expected movement of the pivot joining the suppressor with the equipment to be protected (cold to hot plus any abnormal movements). Determine maximum and minimum distances between this curve and the fixed pivot pin of the snubber. The minimum recommended stroke is 20% greater than the difference between these lengths.

Note: If erected position at the snubber's location on the equipment is outside of the range of normal cold-to-hot movement (e.g. cold pull of pipe), the snubber should not be installed until after the equipment is in its cold position. This eliminates the need of providing for the extra travel in the snubber's stroke. For 2½" through 8" snubbers, standard strokes are 5", 10", 15", and 20". For the 11½" snubber, 5" and 10" are the only standard strokes.

Installed piston setting: As indicated previously, the snubber should be installed at its cold piston position if possible. From the installed position, take extension (outward movement) of the piston rod as positive (+) and retraction as negative (-).

Installed piston position =

$$\left(\frac{\text{Stroke} - (\text{Algebraic Sum of Movements})}{2} \right)$$

To aid in measuring the piston position, we have shown a dimension, "Z". This dimension represents the distance between the cylinder head and the end of the rod when the rod is fully retracted. Whenever specifying the position at which the piston rod is to be set, the total dimension from the cylinder head to the end of the rod should be given.

Thus, Piston Setting = Piston Position + Z.

Assembly Length: Determine the installed "C" dimension by adding the installed piston position (not setting) to C minimum. Lay in take out dimensions E and/or B, and find required pin-to-pin snubber length. If a pin-to-pin length adjustment is desired, use Fig. 201. Calculate the required "W" dimension by subtracting (C installed + F) from the required pin-to-pin length. If this is less than W minimum, only a Fig. 200 can be used, and one of the attachments will have to be moved or shimmed to suit. If a Fig. 200 is to be used, make sure that the required pin-to-pin

Ordering: Specify part number as follows:						
XXX	X	XX	X	X	X	X
						Reservoir Orientation O=Does not apply for pressurized or remote U=Rod up D=Rod down or horizontal
						Reservoir Type L=Transparent (Polycarbonate) M=Metal (limited applications) P=Pressurized R=Remote
						Valve Type A=Adjustable T=Temperature Compensating
						Option (0, 1, 2, or 3), See Option Table Below
						Stroke (5, 10, 15, 20)
						Cylinder Size: 1 (1½ Cyl.) 2 (2½ Cyl.) 3 (3¼ Cyl.) 4 (4Cyl.) 5 (5Cyl.) 6 (6Cyl.) 8 (8 Cyl.)
						Figure No. (200 or 201), Also Specify: W Dimension when Specifying Fig 201 Pipe Clamp Size when Specifying Option 3 Surface Coating Cold and Hot Piston Settings.

length is at least as great as (C installed + B). If neither a Fig. 200 nor a Fig. 201 can be accommodated, and the installation cannot be modified, consult your Anvil representative about designing a special or modified unit.

FIG. 200 & FIG. 201 ORDERING OPTIONS

Option	Consists of...
0	Fig 200: Basic unit (snubber) with pivot mount & one rear bracket. Fig. 201: Basic unit with extension piece & one rear bracket.
1	Option 0 plus cylinder eye.
2	Option 0 plus cylinder eye & additional rear bracket.
3	Option 0 plus cylinder eye and pipe clamp.

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