

Fermilab

**Particle Physics Division
Mechanical Department Calibration
Standards/Procedures**

Number: MD-CALPROC-002

Date: 6/26/2009

Manufacturer: Tyco

Model: Anderson Greenwood Type 86 SOSRV

Reviewer(s): *James E. Tweed*

This Procedure is used for:

Calibration of Anderson Greenwood relief valves.

ANDERSON GREENWOOD

Before installation these instructions must be fully read and understood.

1.0 General

The Anderson Greenwood Type 86 Relief Valve is a direct acting spring loaded pressure relief valve for steam service and uses plastic seat and seals.

The intent of these instructions is to acquaint the user with the maintenance of this product. Please read these instructions carefully. This product should only be used in accordance with the applicable operating instructions and within the application specifications of the original purchase order. The Installation and Operational Safety Instructions (available at www.tycoflowcontrol.com) should be fully read and understood before returning this product to service after maintenance.

2.0 Valve Repair (-4, -8 Orifice) refer to Figure 1

2.1 Disassembly

- 2.1.1 Relieve spring tension and back blowdown adjusting screw out two turns.
- 2.1.2 Remove inlet bushing, bushing seal and valve internals.
- 2.1.3 Separate nozzle from guide by hitting top of spindle on soft surface.

2.2 Repair

- 2.2.1 Hold spindle by skirt O.D. in soft jaw vise and replace seat.
- 2.2.2 Examine nozzle and polish out any scratches or nicks. Replace if necessary.
- 2.2.3 To obtain a better seat seal with Teflon at low set pressures, burnish seat against nozzle by chucking spindle in lathe and holding nozzle against spindle. Burnish with small force and for short time as Teflon readily deforms.

2.3 Assembly

Assemble in reverse order of disassembly. Do not lubricate spindle or guide. Make sure nozzle is fully and evenly seated in guide. This is a press fit joint. Lubricate threads and adjusting bolt tip.

2.4 Soft Goods Repair Kit

The part numbers for soft goods repair kits are listed below. Each kit contains the seat and all seals for the pressure ranges indicated.

Orifice	Kit No.	Set Pressure (psig)		Set Pressure [kpag]	
		Teflon®	PEEK	Teflon®	PEEK
-4	04.4805.035	50 - 235	236 - 720	345 - 1620	1627 - 496
-8	04.4805.036	50 - 177	178 - 720	345 - 1220	1227 - 496

3.0 Valve Repair (G, J Orifice) refer to Figure 2

3.1 Disassembly

- 3.1.1 Relieve spring tension and back blowdown screw out two turns.
- 3.1.2 Remove spring bonnet and valve internals.
NOTE: A pipe nipple can be attached to vent holes in top of guide to facilitate removal. (1/8"-NPT: G, 1/4"-NPT: J)
- 3.1.3 Separate nozzle from guide by hitting top of spindle on soft surface.

3.2 Repair

- 3.2.1 Hold spindle by skirt O.D. in soft jaw vise and replace seat.
- 3.2.2 Examine nozzle and polish seating surface as required. Replace if necessary.

3.3 Assembly

Assemble in reverse order of disassembly. Do not lubricate spindle or guide. Make sure the guide plugs, if used, are flush or below the top guide surface. Refer to table for plug requirements. Make sure nozzle is fully and evenly seated in guide. This is a press fit joint. Lubricate threads and adjusting bolt tip.

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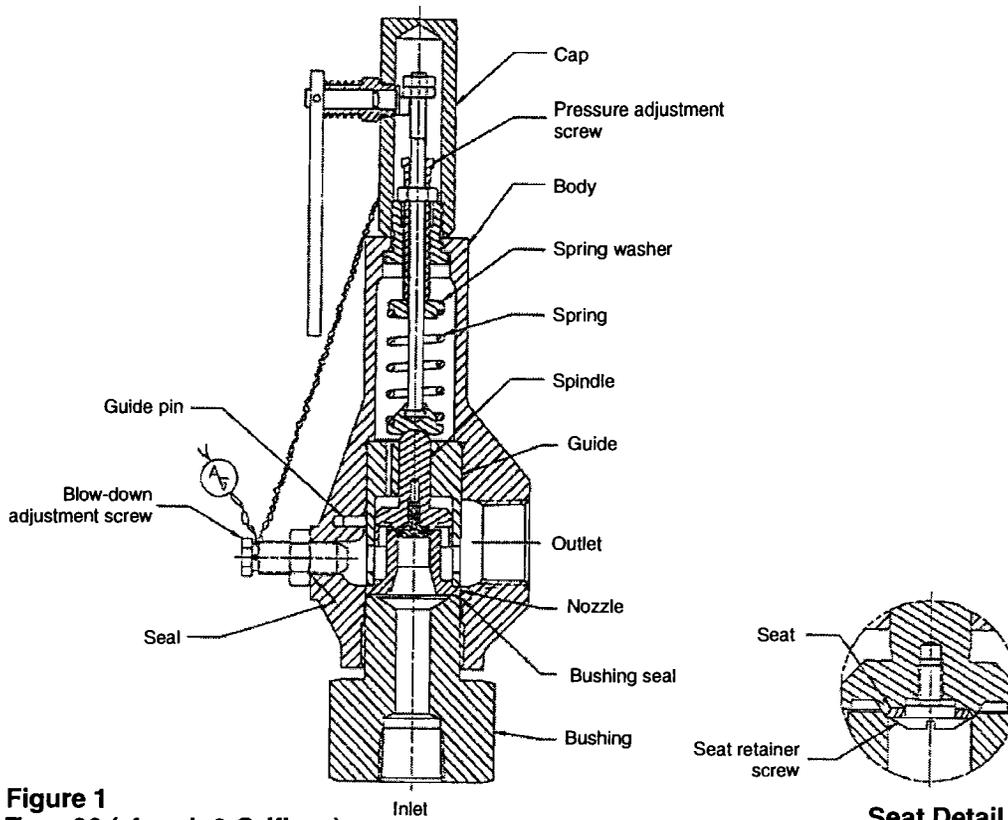


Figure 1
Type 86 (-4 and -8 Orifices)

Orifice	Set Pressure (psig)	Set Pressure [kpag]	Quantity of Guide Plugs
G	Above 223	Above 1538	2
J	Above 142	Above 970	3

3.4 Soft goods repair kit

The part numbers for soft goods repair kits are listed below. Each kit contains the seat and all seals for the pressure ranges indicated.

Orifice	Kit No.	Set Pressure (psig)		Set Pressure [kpag]	
		Teflon®	PEEK	Teflon®	PEEK
G	04.4805.037	50 - 151	152 - 720	345 - 1041	1048 - 4964
J	04.4805.036	50 - 95	96 - 220	345 - 1041	1048 - 4964

4.0 Valve Adjustment

4.1 General

Two adjustments are provided on steam service valves, one for adjusting the opening pressure and one for adjusting the closing pressure.

4.2 Set Pressure

Where practical, Type 86 valves should be set using steam. When setting the valve using steam, turn the spring adjustment screw on bonnet in most of the way. Increase pressure to desired level and back out screw until valve pops. Lock screw with jam nut and retest. Readjust as required.

If a steam source is not available, or if the specified set pressure is beyond the pressure limit of the steam facility, the valve can be set on air.

Valves for steam service that are set on air must be temperature compensated when adjusting the set pressure. Because of the high temperature of steam, the set pressure shifts downward as the spring in the valve heats up. To compensate for this shift the set pressure must be adjusted higher than the nameplate set when using air as follows:

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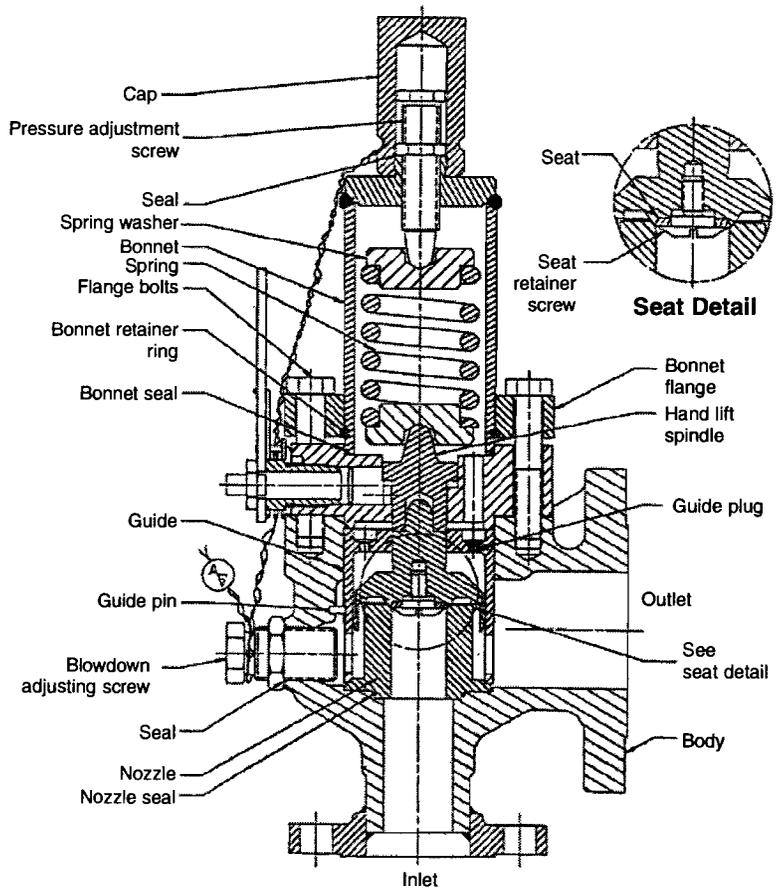


Figure 2
Type 86 (G and J Orifices)

Orifice	Nameplate Set Pressure Range (psig)	% Increase of Nameplate Set When Using Air	Nameplate Set Pressure Range [kpag]
-4	50 - 350	4.5	345 - 2414
-4	351 - 720	6	2415 - 4964
-8	50 - 720	3.4	345 - 4964
G	50 - 720	3	345 - 4964
J	50 - 720	1.7	345 - 4964

4.3 Reseat Pressure

To adjust blowdown, turn screw IN to shorten blowdown; OUT to increase blowdown.

NOTE: If volume of test set up is too small, blowdown will be set too short even though pressure gauge indicates it to be correct. Refer to Section 4.5.

4.4 Adjustments: Tolerances and Specifications

Set Pressure Range (psig)	Set Pressure Range [kpag]	Valve Operating Characteristic	Tolerance and Performance*
above 70	above 483	Set Pressure	± 3%
70 and below	483 and below	Set Pressure	± 2 psi or [± 1.4 kpag]
100 and above	689 and above	Cracking Pressure	95% of set
50 to 99	345 to 683	Cracking Pressure	90% of set
below 50	below 345	Cracking Pressure	85% of set
100 and above	689 and above	Reseat Pressure	93% of set
50 to 99	345 to 683	Reseat Pressure	90% of set
below 50	below 345	Reseat Pressure	80% of set

* Percent tolerance & performance is of specified set pressure

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4.5 Adjusting Equipment

Where practical, valves should be set using an accumulator large enough to accurately read and set blowdown. For a -4 and -8 orifice up to 600 psig [4138 kpag], a four foot accumulator is recommended. The supply pipe to the valve should be the same size as the inlet or larger and not more than 10" long.

For the G and J orifice valves, or if an accumulator is not available for the sizes listed above, the blowdown may be set using the following method.

Turn the blowdown adjusting bolt all the way in until it just touches the guide, then turn it out the number of turns listed in the table.

4.6 Blowdown Adjustment

Orifice Size	Set Pressure (psig)	Set Pressure [kpag]	Turns
-4	50 - 720	345 - 4964	1/4
G, J	50 - 720	345 - 4964	2

An optional method for adjusting blowdown is the overpressure method. To test with overpressure, the safety valve must first be set. After the valve is set, the block valve between the accumulator and safety valve should be closed. The pressure in the accumulator should be increased to at least a pressure of 110% of actual set pressure. The block valve should then be opened and actual blowdown read and recorded. The supply pipe to the safety valve should be the same size as the inlet or larger and not more than 10" long.

5.0 Seat Leakage

If the valve leaks after repair, check the following:

1. Full and even seating of nozzle and guide.
2. Foreign particles trapped between the seat and nozzle. If any are found they may have damaged the seat, making it necessary to replace it.
3. Correct seat material for the valve set pressure.

6.0 Set Pressure Change

If the set pressure is changed more than $\pm 5\%$ from the nameplate set pressure, the spring, spring washers, spring bonnet, guide plugs and seat may also have to be changed. Consult the factory or refer to the soft goods repair kit, the table in section 3.3 and spring chart 03.0079.

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