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# Understanding and refurbishing an Inbal Valve

## Disclaimer:

Information contained in this document includes images and instructions from Mil Inbal and the Service Department of Incos Engineering. This document is used as a guide to assist the Incos Engineering team and others wishing for additional information to support their own activities. Technical advice contained in this document does not replace any formal documentation received by the manufacturer or technical authorities within individual organisations.

## Section 1.

### A better understanding of an Inbal Elastomeric Valve example from 700 series (799D)

An Inbal elastomeric sleeve or “squeeze” valve uses no moving mechanical parts within the housing and is relatively compact.



Image – complete valve

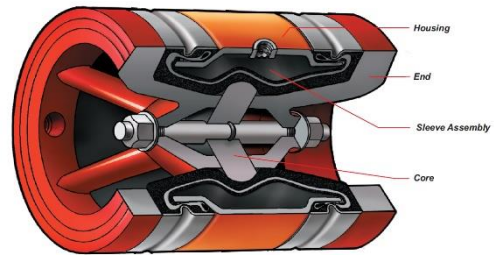


Image – cut away view

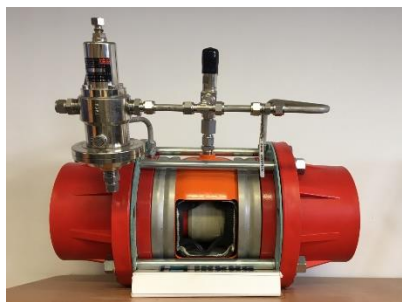
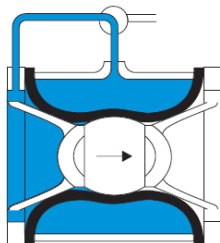
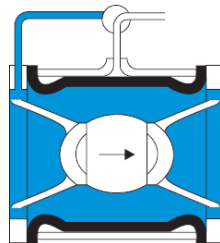


Image – valve model, cut away with PB4 pilot and speed control (367-08)

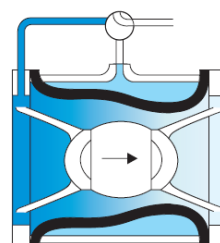
## Operation:



**Tight closing operation**  
When pressure from the valve inlet (or an equivalent independent operating pressure) is applied to the Control Chamber, the Inbal Valve closes drip tight. The fabric sleeve safely envelopes the resilient sleeve giving full support.



**Full open operation**  
When pressure in the Control Chamber is relieved to the atmosphere, the Inbal Valve opens wide. The sleeve assembly is safely enveloped by the housing.



**Modulating action**  
A stable throttling position is obtained when a quantity of pressurized fluid is held in the Control Chamber. It is the amount of fluid in the Control Chamber that determines the position of the sleeve assembly. The Control Chamber can be alternately filled or exhausted to achieve the desired operating condition.

## Operation, continued:

- From Inbal and further information can be obtained at [http://www.inbalvalves.com/english/s\\_deluge.htm](http://www.inbalvalves.com/english/s_deluge.htm)

### Operation

The Control Chamber of the **Inbal** Automatic Water Control Valve is the annular space between the valve Housing and the Sleeve. The valve is held in a closed position as long as inlet pressure is maintained in the Control Chamber.

In the set position, the water pressure is transmitted from the upstream through the valve trim to the Control Chamber, and the **Inbal** Valve stays closed. Actuation of the valve by a manual, hydraulic, pneumatic, or electric release system allows venting of the pressure in the **Inbal** Valve Control Chamber, and the valve opens wide, permitting a flow of water to the piping system. When a pressure or flow control is added, the Control Chamber is monitored to modulate a preset delivery pressure, maximum inlet pressure, or flow rate.

The principle of operation is illustrated in Figures (1) through (3). The nominal pressure losses are shown in Graph (1).

### Installation

Refer to the Trim Chart applicable to the specific **Inbal** Valve model in use.

1. When the **Inbal** Valve is delivered, carefully unpack and visually check that there has been no damage to the operating components, piping, and fittings.
2. The **Inbal** Valve must be installed in an area not subject to freezing conditions.
3. Always flush the pipelines before installing the valve.
4. Place the **Inbal** Valve in the piping in the outlet of the Water Supply Valve. Verify that the arrow on the valve housing matches the actual flow direction. The **Inbal** Valve may be installed in any position. Determine which side the valve will be accessed from and locate all the components accordingly.
5. Install the **Inbal** Valve in the piping system. Refer also to the applicable Installation Guide.

*Threaded End Valve* - connect the female threaded ends of the **Inbal** Valve to the male threads of the piping. Use the pipe joint compound sparingly on the male threads only.

*Flanged End Valve* - connect with bolts and nuts, the valve flanges to the existing flanges in the piping system, using gaskets in between. Complete bolting with uniform tightening.

*Wafer End Valve* - Install the **Inbal** Valve between the piping flanges. Place gaskets between the valve ends and the pipe flanges. Insert four of the stud bolts, 90° apart around the valve, through the bolt sleeves and the pipe's flanges, and tighten with nuts. Complete bolting with uniform tightening.

6. Complete the trim assembly by connecting the preassembled sections, or assemble the trim if ordered in loose component form. Refer to the applicable Trim Chart and Installation Guide.
7. The pressure supply to the trim must always be sourced from either inlet of Water Supply Valve or **Inbal** Valve upstream, through a ½" pipe.
8. Exhaust tube must be free of any back pressure. Provide an air gap between the exhaust tube and drain facility.
9. Set the **Inbal** Valve by following the applicable Resetting procedure.
10. Test the **Inbal** Valve, the trim, and alarms according to the applicable Testing procedure.

### Resetting

The **Inbal** Automatic Water Control Valve system must be reset and restored to service as soon as possible after automatic, emergency, or manual actuation. Refer to the relevant bulletin for detailed procedure.

## Section 2 - Refurbishing

Tip – allow **four (4) hours** for a refurbishment (cleaning and new sleeves). If you want to garnet blast, repaint etc you will need longer.

Disclaimer : The instructions and images provided in this overview are for use as a guide and do not replace any formal training or user manuals already in use. If any part of this overview contradicts the operator's instructions please seek clarification before commencing.

### Disassembly

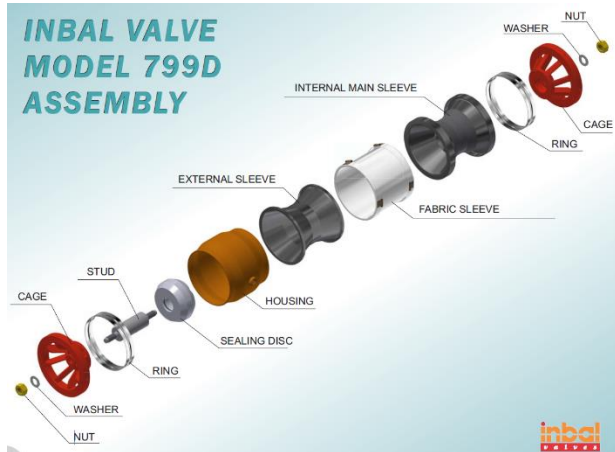


Image – breakdown of components

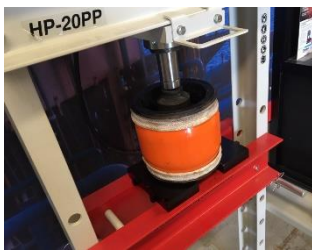


Image – disassembled and on the bench

### Based in Inbal instructions and our experience

Disassembly procedure:

1. Measure end to end length and note
2. Check serial numbers – the age of the valve is important as some components have changed over time for this series.
3. Mark (with a sharpie) the cages, rings and housing to ensure identical assembly later
4. Open the central stud nut and remove studs nuts and washers. Remove the cages. Remove the stud from the sealing disc in a swivelling action (counter clockwise) to eliminate any damage to the o-ring inside the sealing disc
5. Remove the two stainless rings from housing
6. Remove the sealing disc (this is where watching the video helps). We found the use of a press works very well.



Images – removal of the seal

7. Remove the internal rubber sleeves

### Cleaning/Checking, Painting process

1. A visual inspection of parts is needed to identify damage, corrosion etc.
2. Clean and repaint as needed.



Image – cage surface corrosion can be sanded or blasted off before reassembly

## Assembly

Tip: search the internet for Inbal valve videos to help understand the assembly process instructions. We found this particular video helpful:

<https://www.youtube.com/watch?v=4EPVgtJ1XAA&list=PLZhBI53Wkw5fRQIN9YkdC4Kyr08Vb0IkA&index=1>

1. Match up all the parts
2. Bend and fold the external sleeve to narrow it and use a cable tie to hold together and slide into the housing. Cut cable ties once the sleeve is aligned

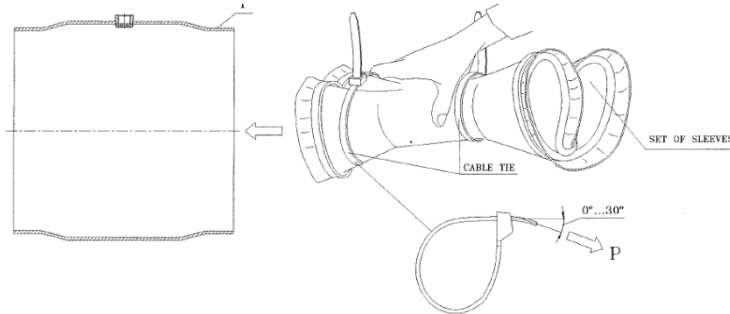
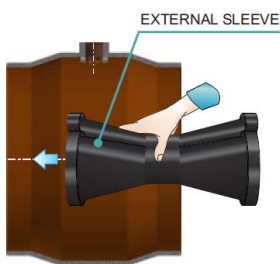
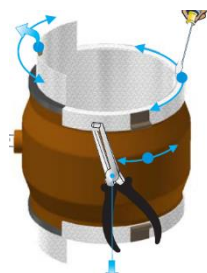


Image – (taken from Inbal manual) showing cable ties to insert sleeve

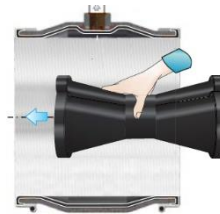
3. Verifying that the shoulders of the external (thin) sleeve envelope both sides of the housing ends.
4. Fold out the mesh sleeve ends on the thin sleeve ends and on the housing ends (symmetrically)
5. Stretch out the wrinkles in the mesh sleeve to make sure there are no wrinkles
6. Insert the internal rubber sleeve



Fold, insert and release the External rubber Sleeve into the Valve housing.



Straighten wrinkles and fix appropriately the fabric edges over the neck of the Valve housing.

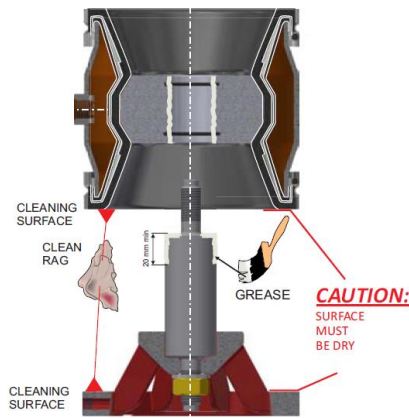


Fold, insert and release the Internal rubber Sleeve into the Valve housing Fold the Internal rubber Sleeve edges over the neck of the Valve housing

Images showing sleeves and mesh being inserted (extracts taken from Inbal manual)

7. Before pressing in the sealing disc use a non oil based lubricant on the sleeve
8. Incos Engineering use a small hydraulic press to insert the sealing disc but there are other ways if you don't have a press (hammer and wooden block).
9. Pull the ends of the mesh rug sleeve outwards and stretch them firmly (a plastic head hammer can be used). Then place the shoulders of the inner sleeve on the housing ends.
10. Once everything looks neat and symmetrical on the housing place the two rings on both sides of the housing. Verify that the mesh rug stretched by the ring is pushed inwards. A plastic head hammer can be used for pushing the rings over the sleeve ends.

Assembly continued:

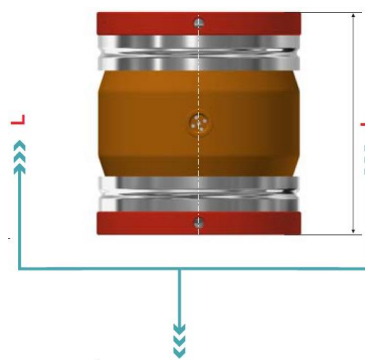


Clean and dry all the contact surfaces.

Apply Lubricant on the Disc inner side and the central Clamping Stud contact area to restrain friction

Image – inserting cage and centre stud (extract taken from Inbal manual)

11. Place the housing on top of one cage. Line up the port and insert the centre stud through the sealing disc and the bottom of the cage, and install the nut and washer in the bottom side. Lining up the port, place the other cage on the housing top. Verify that the cage ports are levelled with the housing port and install the other nut and washer (9B-1 OB) on the center stud and start to close them, but not tighten them. **Note: Incos Engineering do not use a rattle gun for this.**
12. **Protecting the centre stud thread is needed for this stage.** Place a protective cone (can be supplied by Inbal) on top of the tight nut. Use a hook to stretch and place the sleeve set on the housing ends (using the cone as a support to the hook, gently pushing to stretch the sleeve out). Once again watching the video really helps understand this part. The sleeve needs to be installed properly on the neck end of the housing on both sides of the housing. The end shoulders of the sleeve need to be parallel to the cage ends.
13. Tighten the centre stud nuts Tighten the centre stud bolts until the valve dimension reaches the length based on your measurements prior to disassembly and cross reference with the chart below. Torque settings are set by Inbal and if there is a discrepancy with company standard torque settings for studs and nuts you should seek clarification or use the Inbal setting. We have found too much torque can crack some of the smaller cages.



VALVE SIZE	L	TOLERANCE
6"	9 3/4"	±1/16"
150 mm	238	±2
8"	11 1/4"	±1/16"
200 mm	302	±2
10"	13 3/4"	±1/16"
250 mm	350	±2
12"	17 1/2"	±1/8"
300 mm	443	±3

Image - valve length and alignment of ports (extracted from Inbal manual)

Final step is leak testing before sending the valve back in to service.