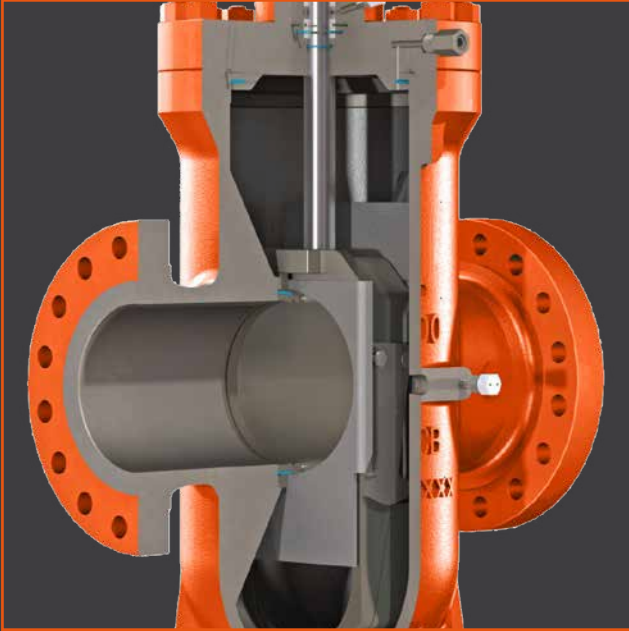


## API6D THROUGH CONDUIT EXPANDING GATE VALVE

AP400-405  
SERIES



**AUSTRALIAN  
PIPELINE VALVE®**



**AUSTRALIAN PIPELINE VALVE®**

**COMPLETE PRODUCT LINE**

*“Australian Pipeline Valve produces isolation, control and flow reversal protection products for severe and critical service media in utility, steam, pipelines, oil & gas and process industries. APV valves and pipeline products form the most competitive portfolio in the market.”*



**SUPER-CHECK®**



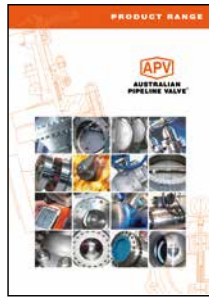
**TORQTURN®**

**TWIN-LOK®**

**UNIFLO®**



**AUSTRALIAN PIPELINE VALVE BRAND RANGE - CATALOGUES**



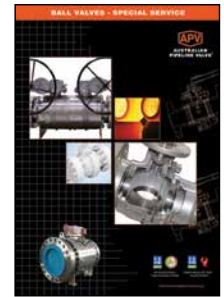
Product Brochure



Ball Valves Floating & Trunnion Mounted



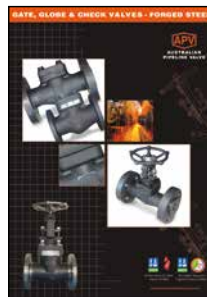
Ball Valves Floating Small Bore



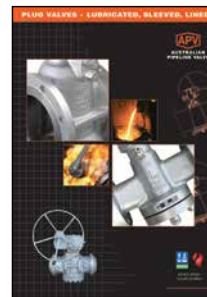
Ball Valves Special Service



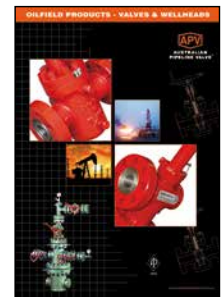
Gate, Globe & Check Valves - Cast Steel



Gate, Globe & Check Valves - Forged Steel



Plug Valves Lubricated, Sleeved & Lined



Oilfield Products Valves & Wellheads

**APV FAMILY OF BRANDS RANGE - CATALOGUES**



Diamond Gear Gearboxes



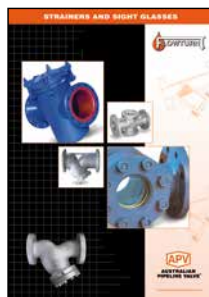
Flowturn Ball Valves Multiway & Deadman



Flowturn Gate, Globe & Check Valves



Flowturn Instrument Valves



Flowturn Strainers & Sight Glasses



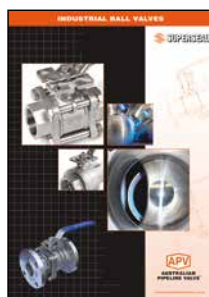
Steamco Steam Valves



Supercheck Wafer Check Valves



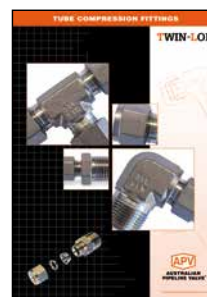
Superseal Butterfly Valves



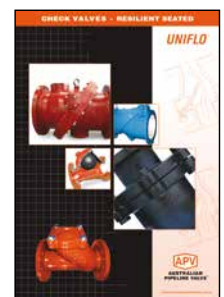
Superseal Industrial Ball Valves



Torqturn Actuators



TwinLok Tube Fittings



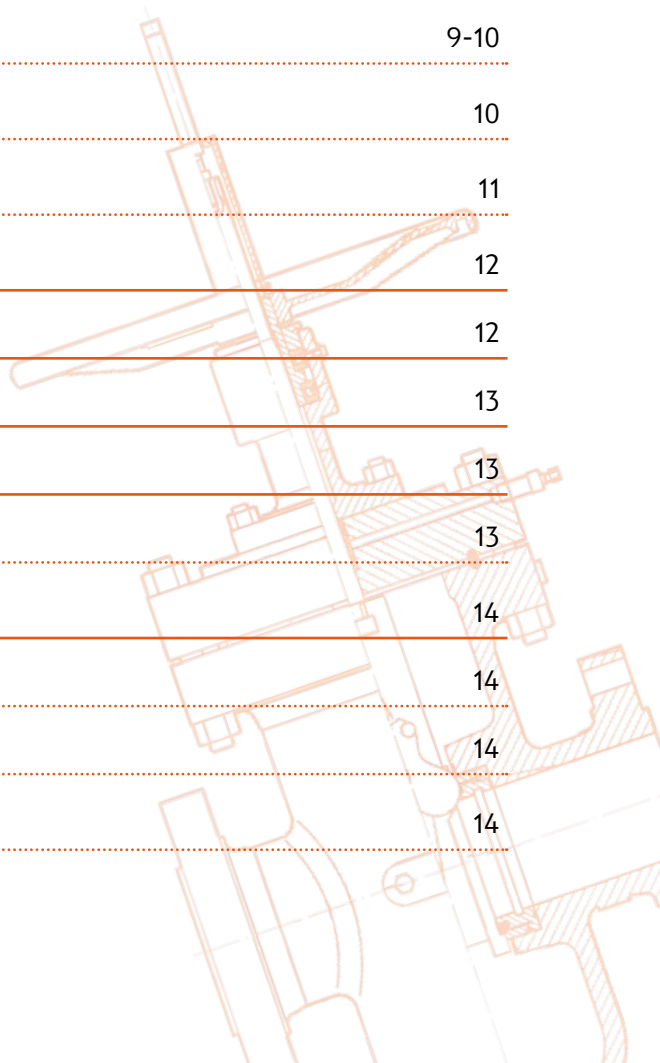
Uniflo Check Valves

Contact us for your local stockist/distributor

# INDEX



Introduction	3
Safety Information	4-5
1.0 Preservation And Storage	5-6
1.1 Storage	5
1.2 Periodic maintenance during storage	5-6
1.3 Environmental considerations	6
2.0 Installation	6-11
2.1 Valve preparation	6-7
2.2 Valve installation	7-9
2.3 Maintenance prior to flushing	9
2.4 Flushing the pipeline	9-10
2.5 Maintenance post flushing	10
2.6 Commissioning	11
3.0 Removal From Line	12
4.0 Gearbox Removal	12
5.0 Valve Disassembly	13
6.0 Inspection And Repairs	13
6.1 Bolts, nuts and threaded components	13
7.0 Valve Assembly	14
7.1 Valve lubrication	14
7.2 Gearbox mounting to valve	14
7.3 Pressure Test	14



<b>8.0</b>	<b>Operation And Maintenance Instructions</b>	<b>14-23</b>
8.1	Operation instruction	15
8.2	Maintenance	15-18
8.3	Actuation	18-19
8.4	Trouble shooting guide	19
8.5	Body bleed pressure	19-21
8.6	Emergency stem seal plastic packing injection	22
8.7	Pressure relief valve option	23
<b>9.0</b>	<b>Overview Design Features</b>	<b>24-28</b>
<b>Appendix 1 - Typical Bill of Materials</b>		<b>29</b>
<b>Appendix 2 - Bolting torques</b>		<b>29</b>
<b>Appendix 3 - Label details</b>		<b>30</b>
<b>Appendix 4 - Design features</b>		<b>30</b>



## INTRODUCTION

The majority of this information is common knowledge to experienced steel valve users. When properly installed in applications for which they were designed, APV valves will give long trouble free service. This instruction is only a guide for installation, operation and minor maintenance. A professional APV approved valve engineering facility should be utilised for reconditioning and minor repairs.



Note

*We do recommend that this entire document be read prior to proceeding with any installation or repair. Australian Pipeline Valve and its parent company take no responsibility for damage or injury to people, property or equipment. It is the sole responsibility of the user to ensure only specially trained valve repair experts perform repairs under the supervision of a qualified supervisor.*

### RESPONSIBILITY FOR VALVE APPLICATION

The User is responsible for ordering the correct valves. APV Valves are to be installed in the observance of the pressure rating and design temperature. Prior to installation, the valves and nameplates should be checked for proper identification to be sure the valve is of the proper type, material and is of a suitable pressure class and temperature limit to satisfy the applications requirements.



Caution

*Do not use any valve in applications where either the pressure or temperature is higher than the allowable working values. Also valves should not be used in service media if not compatible with the valve material of construction, as this will cause chemical attacks.*

### RECEIVING INSPECTION AND HANDLING

Valves should be inspected upon receipt to determine:

- Compliance to purchase order requirements.
- Correct type, pressure class, size, body and trim materials and end connections (this information may be found on the nameplate or may be stamped on the body of the valve).
- Any damaged caused during shipping and handling to end connections, hand wheel or stem.



Caution

*The End User is advised that misapplication of the valve may result in injuries or property damage. A selection consistent with the particular performance requirements is important for proper application and is the sole responsibility of the end user.*

## SAFETY INFORMATION

The following general safety notices supplement the specific warnings and cautions appearing elsewhere in this manual. They are recommended precautions that must be understood and applied during operation and maintenance of the equipment covered herein. This manual provides instructions for storing, general servicing, installation and removal of ball valves.



Caution

*Do not attempt to disassemble a valve while there is pressure in the line. Make sure both upstream and downstream pressures are removed. Disassemble with caution in the event all pressures are not relieved.*



Caution

*To prevent valve distortion, inefficient operation, or early maintenance problems, support piping on each side of the valve.*



Caution

- *A valve is a pressurised device containing energised fluids and should be handled with appropriate care.*
- *Valve surface temperature may be dangerously too hot or too cold for skin contact.*
- *Upon disassembly, attention should be paid to the possibility of releasing dangerous and or ignitable accumulated fluids.*
- *Adequate ventilation should be available for service*



Caution

*Do not use the gate valve in process conditions where the pressure, temperature, media and other technical conditions exceed the limitations set by the valve's specifications. When handling fluids that could cause damage to human health, the environment or property, the necessary safety precautions to prevent risk must be taken.*

APV and its resellers refuse any liability for damage to people, property or plant as well as loss of production and loss of income under any circumstances but especially if caused by: Incorrect installation or utilisation of the valve or if the valve installed is not fit for the intended purpose. It is the sole responsibility of the client to ensure the valve type and materials are correctly specified.

DURING OPERATION BEAR IN MIND THE FOLLOWING WARNINGS:

- a- The graphoil packing and body gasket is very brittle: any twisting or bending shall be avoided.
- b- The internal parts of valves (gate, stem, seats) shall be handled with care avoiding scratches or surface damage.
- c- All tools and equipment for handling and supporting internal critical sealing parts shall be coated with soft materials.
- d- Seats & seals usually include Viton, Devlon, Nylon & Teflon, hence high temperatures and some chemicals will damage sealing components.
- e- Never part open valve, valve must be fully open or fully closed or else the seats will be damaged.

For all operations make reference to position number on part list of the applicable drawing. The drawing in the Appendix is a general drawing only, for more accuracy refer to the as-built drawings supplied with the order.

### **SCOPE OF INSTALLATION ACCORDING TO THE TYPE OF FLUID**

(DANGEROUS FOR THE ENVIRONMENT OR HUMAN HEALTH)

Group 1 Classification

- Current stem packing materials should be specified by the user for the range of products included in Group 1.
- The use of valves without additional safety devices in Group 1 will be the responsibility of the user or the purchaser, as well as the advisability of installing leakage detection systems.

Group 2 Classification

- Carbon steel valves will not be used in corrosive fluid lines.

## **1.0 PRESERVATION & STORAGE**

### **1.1 STORAGE**

- a- If storage in the field for a long time before installation is necessary, it is suggested to put valves in a dry and/or covered place. In this case the packaging and end covers integrity is especially important.
- b- All the valves are supplied with special plastic ends to cover and protect the internal parts. We recommend you do not remove them during storage period.
- c- Valves should be left in the open position (unless actuated and set fail closed).

### **1.2 PERIODIC MAINTENANCE DURING STORAGE**

In case of extended storage, the valves must be inspected and maintained as follows:-

- External surfaces must be inspected to ensure no damage to flange faces, paint finish etc. In case of the presence of rust and/or damaged painting, the area must be cleaned by brushing, degreasing & repainting.

- The protection must be restored following the instruction indicated from APV in accordance with the painting cycle used.
- Without any gate movement, the internal surface of the valves must be inspected to check the complete absence of dust, rust, foreign matters and the integrity of lubricant coat. If not satisfactory then clean and lubricate the internal part using a nebulised lubricant.
- After cleaning and lubrication the gate must be operated (close/open complete stroke).
- The gate must be kept in the full open position during installation.
- The end of the valve must be protected using the same end covers.
- We recommend you tropicalise bore and ends of valves if stored in humid or salt air environment.

### 1.3 ENVIRONMENTAL CONSIDERATIONS

According to ISO 14000 regulations and the environmental policy of APV the recyclability of the components that form part of APV valves is as follows:

Recyclable components:

Metal parts, PTFE (hard), plastic plug (low-density polyethylene).

Non-recyclable components:

PTFE mixed with other compounds (glass-fiber, graphite, etc.), nylon, graphite and graphite mixed with metal.

## 2.0 INSTALLATION

### 2.1 VALVE PREPARATION

- a- Remove the ends protectors and check accurately the status of the valve as indicated in point 1.2.
- b- Prior to shipment, a preservative/corrosion inhibitor may have been applied to the inner body of the valve. This preservative/corrosion inhibitor can be removed with a solvent, provided the solvent used does not affect the seats/seals used in the valve.
- c- Do not operate the valve until the following procedures have been fully applied:
  - Clean internal conduits.
  - After cleaning the gate must be operated (one complete stroke).
  - During installation the gate must be kept in the fully open position.



**Note**

*If the valve and actuator are delivered separately, APV recommends utilising a qualified technician to mount the actuator to the valve, make all necessary adjustments, fully test and debugged the unit before installing the valve in the pipeline.*





Caution

*APV expanding gate valves in liquid service must be equipped with a thermal relief system (if the thermal relief system utilises needle valves, they must be in the OPEN position prior to the valve operation). Failure to do so may result in catastrophic malfunction. In the event the expanding gate valve body cavity needs to be depressurised, please refer to 8.5, Body Bleed Procedure.*

## 2.2 VALVE INSTALLATION

- a- To handle the valve use body lugs if applicable or suitable eyebolts. Never handle the valve by yoke or using the lever or actuator or gear box eye bolts. Never lift from bore of valve. Do not lift the valve using only one lifting lug.
- b- The end protectors must be removed only immediately before installation. If one of end is not connected to the line for a period of longer than half a day the opened end shall be securely sealed with plastic or wooden cover.
- c- For butt weld type valves take care for the following: If brushing or grinding, seal valve conduit (bore) to prevent damage. At the end of such operation clean accurately the conduit. The welding procedure and post-weld treatment shall be performed taking into account the allowable maximum temperature for seats and seals. The welding sequence shall be pre-planned in order to give an acceptable piping load to the valve. Leave valve in full open position to reduce temperature transmission to soft seats (where applicable). For valves up to 100 NB (4") use temperature measuring strips. Ensure temperature of body does not go above 180°C.
- d- At the end of installation lock the valve full open in order to avoid any movement of the gate before flushing the pipeline.
- e- Valves will operate at any angle horizontally or vertically, although it is recommended you install valves in a vertical position with stem pointing upwards for ease of operation, inspection and accessibility.



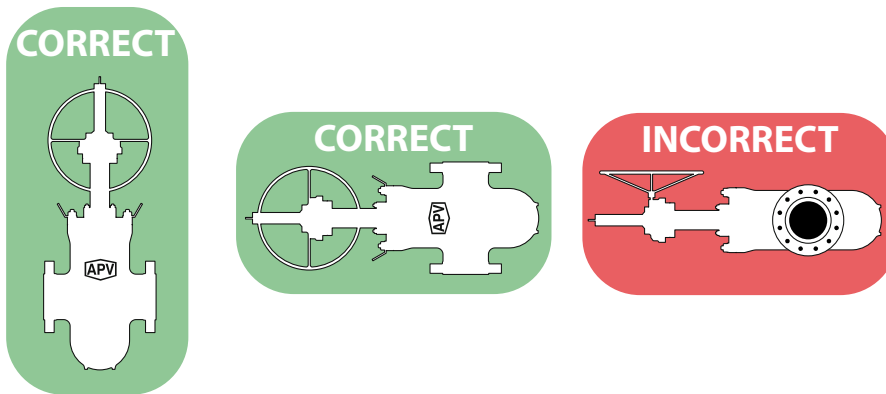
Caution

*If the gate valve is equipped with a test connection port, make sure that it is fully closed before pressurising the valve.*



Caution

*Local safety regulations must be complied with for transport to the place of installation. Make sure that the valves cannot tilt or slip in any way.*



f- APV's preference is that through conduit gate valves be installed in the vertical direction. The horizontal orientation is acceptable as shown below.



Note

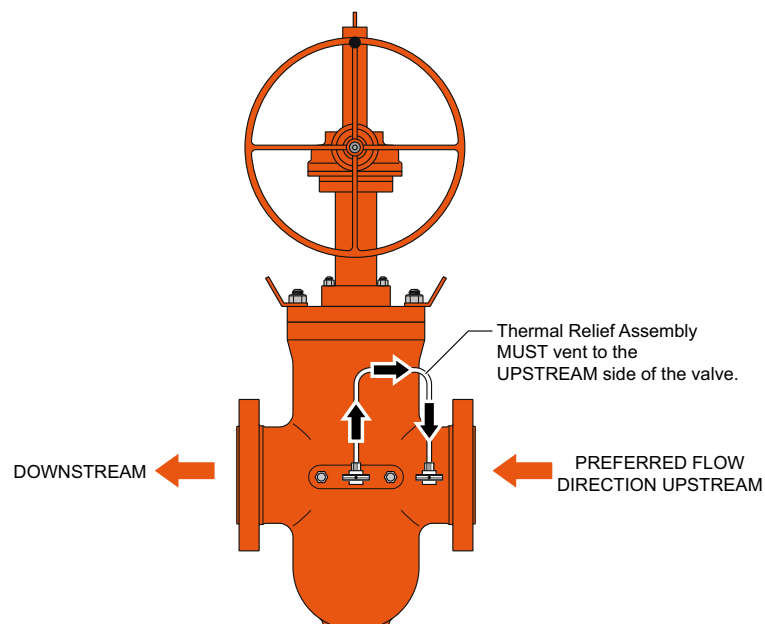
*It may be necessary to adequately support valve actuation in order to protect the valve and/or actuator from improper weight distribution and excess stress. To ensure actuation mounting and supports are adequate during operation, please contact APV before mounting and installation.*



Caution

*Install the gate valve with the gate segments in the OPEN POSITION. The preferred pressure side of the valve **MUST BE INSTALLED TO THE UPSTREAM PIPE** as shown below.*

g- During commissioning and pipeline flushing, the valve must remain in the full-OPEN position to prevent damage to the internal parts. Impurities and foreign debris entering the valve body may cause damage to sealing surfaces resulting in malfunction.





Caution

*To prevent damage to the valve, APV recommends first installing a spool piece instead of the valve whilst flushing the pipeline. If a spool piece is not an option, install strainers at critical locations upstream from the location to remove foreign debris. It is pertinent that the valve remain in the full-OPEN position during flushing.*

### 2.3 MAINTENANCE PRIOR TO FLUSHING

- a- If the period between installation and flushing of the of the pipeline is longer than six months a preventative maintenance operation is suggested.
- Lubricate the stem through the stem injector (if applicable).
  - Remove valve from line and remove any debris and reflush.

### 2.4 FLUSHING THE PIPELINE

Flushing washes away all welding slag, dirt, sand, solids and debris collected in the pipelines during construction prior to turning the valve and potentially damaging the seat. Flushing where deemed necessary is the most dangerous activity for the valve, and it happens before they are put into service.

Should it be required to flush potential debris from the seat area, (or lubricate sticky valves). We recommend the following: -

1. Find a good grease for natural gas or your service. The grease must be insoluble. It must be resistant to breakdown or shearing of the gel structure under high pressure injection and under the pressure between seating surfaces. It must be stable over a wide range of temperatures, and not freeze. It must not react chemically with the fluid and become solid, or rubber like (i.e. polymerize). Depending on the service, the best greases are fully synthetic; if you have any doubt or concern, consult a valve maintenance expert. Field experience has shown that greases and sealants may cause severe problems with the seat and seal arrangement if used regularly during preventative maintenance.

Of course, be warned any type of grease, especially synthetic grease can become hard or sticky causing torque problems and seat spring jamming in which case a line flushing agent like Clare 601 Valve Cleaner may be required. Of course, for leaking seats a heavier sealant like Clare 601 lubricant must be used for temporary emergency sealing.



Caution

*If greasing through valve sealant fitting to dislodge debris or to lubricate, beware of greases made of synthetic oil with a mineral thickener. The natural gas (or storage prior to use) washes away the oil, leaving the thickener behind. The thickener is like a powder that caulks or bakes hard on the seats, increasing the operating torque. Always wipe the seats clean as much as possible prior to installation.*



Note

*Do not operate the valve during flushing or entrained particulates could damage soft seat or enter stem or seat pocket area.*

2. The dirty grease will be pushed into the pipe by the fresh grease, and the sliding action of the gate will drag fresh grease towards the seats, not dirty grease.
3. Do not turn the valve during flushing.

## 2.5 MAINTENANCE POST FLUSHING

- a- At the end of flushing operation it may be possible to leave the line full of test fluid and in this case no intervention is required. If the line must be drained proceed as follows:
  - Make sure that the valve is in full open position.
  - Open plugs and drain it completely. Observe safety plant procedures prior to opening any body plugs in case any remaining fluid or gas is pressurised or trapped in body cavities.
  - After draining flush the cavity of valve through the vent plug. Consult an expert on use of special excavation procedures.
  - Completely tighten all drain and vent plugs. Consult your plant safety procedures and only perform work under supervision of expert valve maintenance personnel.
- b- Operate the valve at least 2 times (complete closing and opening operation).
- c- Repeat the operation every 6 months if the pipeline is not used.
- d- Always get authorisation to partially operate an in-service valve.



Caution

*Personal injury may result from sudden release of any process pressure. APV recommends the use of protective clothing, gloves and eyewear when performing any installation or maintenance. Isolate the valve from the system and relieve pressure prior to performing maintenance. Never unscrew sealant injection nipples from body, seats or stem as these outlets are exposed to full line pressure and only the in-built check valve in the sealant nipple itself isolates the pressure. Similarly, the body drain and vent valve plugs are exposed to full line pressure if opened. Disconnect any operating lines providing air pressure, control signals or electrical power to actuators.*



Caution

*Natural gas is not usually clean. Natural gas may carry condensates and dirt that gets trapped in the valves, and may damage the internal parts. Also, operation of the valves becomes more difficult. It is true that plant sites do install filters in their system, but experience has proven that no system is perfect. The internal parts of the valve can be partially protected using judicious amounts of grease to fill the cavities.*

## 2.6 COMMISSIONING

The first year of operation is crucial, because when the pipe is put into service, all debris is pushed downstream, and contaminates the valves along its travels. With time, the pipe gets cleaner and initial problems disappear. Strainers or filters should be installed upstream of all soft seated valves.



**Note**

**Remember that gate valves are like the human body; they need 'exercise'. Keep moving them and lubricating them, and you will have fewer problems. Do not let them have a sedentary life.**

The same recommendations regarding grease injection for flushing (see 2.4) apply for commissioning. By refilling the grease channels multiple times, the dirt is gradually pushed out of the seats. Provided that the grease is properly chosen (see 2.4), it will not damage the valve, and to a certain extent will shield the seats from contamination. Regular cycling is also important, for two reasons: to prevent the seats from getting stuck, and to distribute fresh lubricant over the seating surfaces of the gate and seats. Once the seat is greased, it is a good idea to pump fresh grease into the seat to expel any debris laden grease (see 2.4) before cycling the valve to avoid damage to soft seat inserts. Should you need to apply grease to seats, ensure you then inject fresh grease to dispel any grease which may have attracted contaminants and then partially stroke the valve multiple times to remove as much grease as possible from the seats. After commissioning, once you believe the service is clean you can inject a suitable grease line flushing agent and then partially stroke the valve again. You should consult a valve maintenance specialist as different service, media, pressures and temperatures, etc., can require totally different practises. APV recommends the following programme for start up: -

1. For the first year, inject a small amount of grease into the seats before turning the valve, every time.
2. Cycle the valves periodically as follows:
  - For the first month, every week.
  - For the second month, every two weeks.
  - For the third month, every month, for at least 6 months.
  - Then every three months.

Carefully select the type of seat inserts to suit the type of particulates encountered in the media. Nylon and Devlon are hard and resistant to scratching, PEEK is even harder. Teflon® (PTFE) is softer and scratches easier, yet it can have more resilience and 'memory' in terms of resistance to permanent indentations but has a lower pressure rating. However, all soft seated valves are only suitable for clean service 'metal to metal' seated valves are required for dirty or higher temperature service. Regardless of soft seat materials, valves need to be regularly partially stroked to prevent sticking of seats and accumulation of entrapped debris.



## 3.0 REMOVAL FROM LINE

It is desirable that the maintenance operations are carried out by skilled personnel who are experienced and well trained in standard field techniques and procedures. Be sure that the personnel involved in such operations are aware of fundamental safety rules indispensable for the protection of their own and other people's safety. Gate valves are field maintainable, hence to carry out normal maintenance (stem lubrication, stem packing substitution, seat lubrication) it is not necessary to remove it from line (seat lubrication is only for emergency purposes not for maintenance).

If it is required to remove the valve from the line proceed as follows:

- a- Ensure the line is fully depressurised.
- b- Partially open the gate in order to depressurise the valve.
- c- Remove the drain plug and vent plug. First release vent to ensure no remaining pressurised gas or fluid trapped in cavity. Take safety precautions to avoid personal injury during this procedure. Then carefully remove drain plug once you are sure valve has no remaining fluid or gas in cavity.
- d- Keep the gate in the fully open position.
- e- Remove the valve from the line. The valve shall be handled by means of lifting lugs fitting on the valve (if applicable). Standard field techniques and procedures are satisfactory to disconnect it from the line.
- f- After removal of the valve from the line, clean the valve and seal the ends with plastic or wooden covers.



Caution

*Stem seal body leakage can result in personal injury. In an emergency, injecting grease into the grease sealant injection nipple fitted to stem (where fitted) may temporarily cause the leakage to cease but the valve should be removed from the line for repair as soon as possible.*



Caution

*When removing the safety cap of the grease fitting, be careful not to unscrew the complete grease fitting out of the body, because it is under pipe pressure. Use a back-up wrench.*

## 4.0 GEARBOX REMOVAL

- a- Removal (refer to enclosed drawings)
  - Unscrew the bolts/nuts.
  - Lift the gear box to disengage the valve stem and remove it with the plate.
- b- Put in position a removable cover to prevent the introduction of dust, sand, etc., in the actuator bushing.

## 5.0 VALVE DISASSEMBLY

The following should only be performed by an APV approved reconditioner.

*Note, The below parts refer to the general drawing labelled Diagram 1. This is a general overview drawing only. Each size & class range does vary so refer to the actual as-built drawing.*



*Check the stem sealing area for pressurised process fluids even after the valve has been removed from the pipeline, particularly when removing packing hardware or sealing rings.*

## 6.0 INSPECTION AND REPAIRS

The following inspection and maintenance procedures of valve components should be performed by a professional valve repairer. Replace any parts that are damaged with genuine APV spare parts.

The sampled diagram labelled Diagram 1 only shows the main parts. The Bill of Material varies according to size, class & trim, hence refer to as-built drawing.



*If a gasket or seal is disturbed while removing or adjusting soft parts, APV recommends installing a new gasket or seal. A proper seal is required to ensure optimum operation.*

### 6.1 BOLTS, NUTS AND THREADED COMPONENTS

- a- All bolts, nuts, and threaded particulars shall be cleaned with kerosene, dried and lubricated with protective oil. The body bolts should have a copper based anti-seize grease applied. To ensure grease does not dry or wash out and does prevent corrosion protective plastic nut caps with grease nipples are available.
- b- The threads should be visually inspected to verify the integrity of the components.

## 7.0 VALVE ASSEMBLY

The sample drawing labelled Diagram 1 is used as a reference, however, refer to actual as-built drawing as the Bill of Material varies according to size, class and trim.

### 7.1 VALVE LUBRICATION

For components that need to be lubricated use grease IP Bimol Grease or similar.

### 7.2 GEARBOX MOUNTING TO VALVE

- a- Assemble the gear support with the valve.
- b- Insert the actuator/gear on the support with the valve.
- c- Screw and tighten the studs/nuts actuator.

### 7.3 PRESSURE TEST

- a- Move the gate in the half position.
- b- Pressurise the valve body. The body hydrostatic test should be performed at a pressure 1.5 times the maximum rating pressure in accordance with API6D.
- c- With the gate in the fully open or closed position the maximum seat hydrostatic test pressure should be performed at a pressure 1.1 times the maximum pressure rating in accordance with API6D. In addition a low pressure pneumatic test of 700KPA should be performed in accordance with API6D. Seats should be tested bi-directionally.

Nominal Pressure (Class)	Test Pressure at Normal Temperature (PSI)			
	Hydrostatic Shell Test	Hydrostatic Seat Test	High/Low Pressure Back Seat	Gas Seat Test
CL150	450	325	325/80	80
CL150	1125	825	825/80	80
CL150	2225	1650	1650/80	80
CL150	3350	2450	2450/80	80
CL150	5575	4075	4075/80	80
CL150	9275	6800	6800/80	80

## 8.0 OPERATION & MAINTENANCE



Caution

*The valve is only intended to block or allow flow through the pipeline. The valve should only be used in either fully open or fully closed position. Do not use this valve to regulate flow by partially opening or partially closing the valve. The valve should not stay in a semi-open or semi-closed state for more than two minutes.*

## 8.1 OPERATION INSTRUCTION

- a- Hand wheel and gear operated gate valve have to be fully opened and closed to check the valve is correctly operating.
- b- In the case of automated valves, the instructions from the actuator's manufacturer shall be supplied separately. In this case, automated valves shall be operated with the required energy source (electric, pneumatic, hydraulic) to check correct functioning.
- c- Do not change any settings such as position stops or speed or torque governing devices.
- d- Clockwise rotate the handwheel to CLOSE the valve, rotate counter-clockwise to OPEN the valve.
- e- When operating a gate valve, APV does not recommend the use of any leverage tool opening or closing the valve. Carefully observe the position of indicator during operation. When the position indicator shows OPEN or CLOSED, rotate the handwheel in the opposite direction one half turn to release the pressure between the stem and drive nut.
- f- The APV gate valve is not designed to be used as a throttle valve.
- g- If necessary, with the valve fully CLOSED, cavity pressure can be relieved through the bonnet vent fitting.

**Important:** In the event that the gate valve body cavity needs to be depressurised, please refer section 8.5, Body Bleed Procedure.



**Always wear approved safety gear and face away from the bonnet when relieving pressure from the valve.**

- h- To remove the foreign debris from the valve, remove the drain plug from the bottom of the valve body. Reinstall the drain plug when cleaning is complete.

## 8.2 MAINTENANCE

### 8.2.1 Cleaning and lubricating the stem

- a- IF LINE CONDITIONS PERMIT, cycle the valve to the full OPEN position.
- b- Remove stem protector.
- c- Use a wire brush to clean the stem threads and thoroughly remove any dust, dirt or debris.
- d- Check condition of threads for wear or damage.
- e- Using a lithium based general purpose grease with a minimum 150 viscosity grease lubricate the thread.
- f- To ensure even grease distribution over the stem and drive nut cycle the gate OPEN and CLOSED several times.
- g- Return the valve to the desired operating position.
- h- Replace stem protector.

*(For lubrication frequency and procedure for the actuators please refer to manufacturer's recommendations).*

### 8.2.2 Seat Lubrication/Sealant

- a- Twin secondary sealant injection ports are fitted in the middle of the valve body. In the case of seat sealing surface damage or leakage, a grease gun can be used with an approved sealant to inject the seats.
- b- The pressure required to fully inject sealant into the seat/gate surfaces should not exceed 3000 psi over the line pressure. There will be some pressure needed to pump the grease through the gun, hose and extended piping. The amount could be several pounds of pressure more in colder weather. Please note the following example:
 

Pressure to pump grease:	13,780 kPa
Line pressure:	6,890 kPa
Amount required above:	2,067 kPa
Total amount in cold weather:	22,048 kPa
- c- Lubricating the seats on a through conduit gate valve is not necessary however, this will ensure smooth operation. When lubricating the seats and gate surfaces, cycle the gate OPEN and CLOSED several times to evenly lubricant both surfaces.
- d- Return the gate to either the full OPEN or full CLOSED position and inject an additional amount of lubricant to complete the process.
- e- APV recommends for buried valves, a minimum of 4 cups of lubricant per valve once extended lines are filled.
- f- While APV does not generally recommend a lubricant, we do recommend containing Climax Valve Lubricants with the specifics of the product in the line for a lubricant best suited for the intended service.

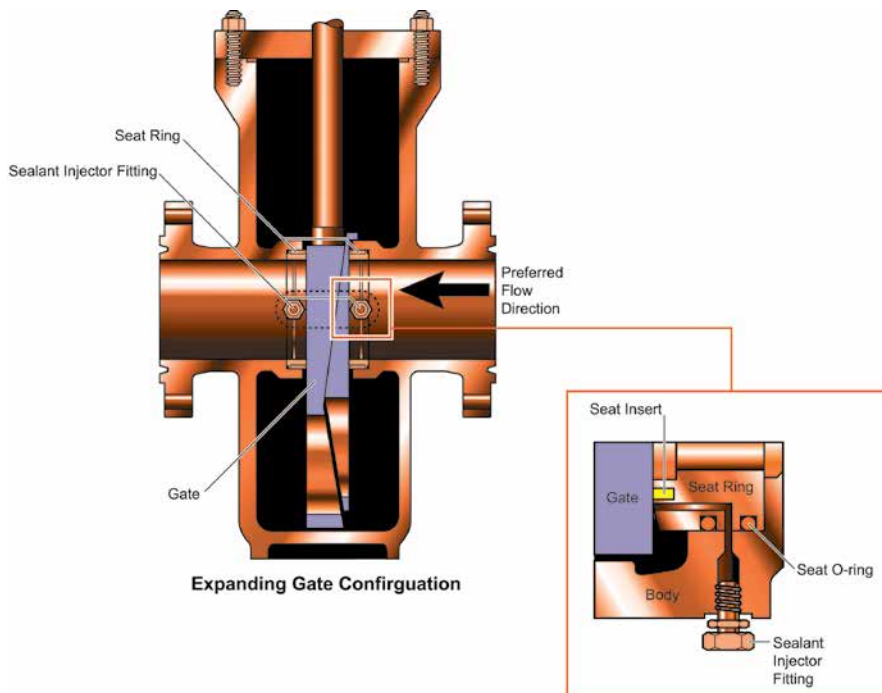


Figure 1: Secondary Seat Lubricant/Sealant Injection System



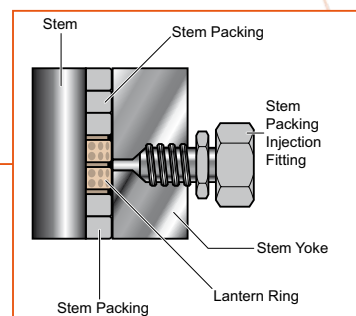
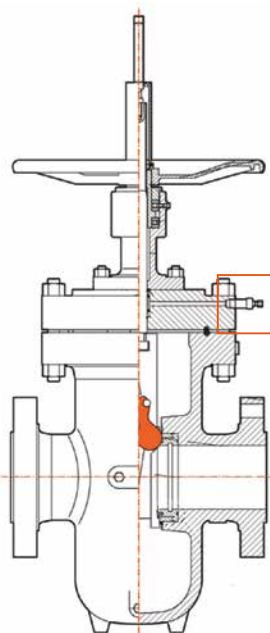
### 8.2.3 Stem Seal/ Packing Maintenance

- a- In the event of stem packing leakage, CLOSE the valve and release the cavity pressure.
- b- Remove the stinger from the packing injection fitting. Insert the pressure relieving stinger tool to relieve any stem packing pressure.
- c- Once pressure is removed and the relief tool has been removed, remove the plug from the packing relief port.
- d- Using a grease gun, inject stem seal packing into the packing injector fitting until fresh packing is seen coming through the relief port.
- e- Reinstall the relief port plug. Add additional packing until the pressure in the packing gland stabilises then tighten the injector stinger. Please see the Packing Box Pressure PSIG table below for required pressures.

PACKING BOX PRESSURE PSIG	
Valve Pressure Class	Packing Box Pressure (PSIG)
150	13,263 kPa (1925 psi)
300	17,914 kPa (2600 psi)
400	20,325 kPa (2950 psi)
600	25,321 kPa (3675 psi)
900	32,727 kPa (4750 psi)
1500	47,541 kPa (6900 psi)




**Over pressurising the injectable packing will distort packing, making the valve difficult to operate.**



**Figure 2: Packing Injection**  
(Design/fitment varies depending on size/class specification)

Pressure Exerted By Frozen Fluids	
Temperature (C)	Internal Pressure
0°C	101 kPa
-1°C	14,469 kPa
-4°C	48,230 kPa
-7.5°C	87,227 kPa
-12.5°C	138,186 kPa
-15°C	159,262 kPa
-17.5°C	179,850 kPa

**NOTE:** Eliminate trapped water in your system to avoid system damage




**Note**

0°C is the temperature water will freeze. However, some frozen water hydraulics generated by fluids frozen solid.

### 8.2.4 Cold Temperature Maintenance


Allowing freezable fluids to be trapped inside the valve will result in damage to the valve when the fluid freezes.

## 8.3 ACTUATION



**Note**

APV through conduit gate valves are manufactured with ISO standard mounting plates for manual or automation installations.



**Caution**

Correct actuator calibration is critical for proper valve performance and longevity. Incorrect TRAVEL LIMIT and TORQUE LIMIT settings can result in catastrophic valve failure!

**Important:** APV recommends that all actuation is installed and calibrated in a controlled testing environment. Utilise a hydro-test to simulate the targeted operating conditions while setting TRAVEL LIMITS and TORQUE LIMITS.

### 8.3.1

The APV Expanding gate valve is a “torque seated” design. For proper actuator torque requirements, please consult with APV.



Note

*If actuation is to be installed after shipment from APV, IT IS CRITICAL THAT THE SLAB DOES NOT DROP TO THE BOTTOM OF THE VALVE DURING ACTUATION INSTALLATION! THIS MAY RESULT IN SEAT DAMAGE.*

### 8.3.2

To protect the seats, ensure the slab is above the closed position prior to actuation installation.

## 8.4 TROUBLE SHOOTING GUIDE

Problem	Possible Reason	Action
Difficult to OPEN or CLOSE	Valve has not been opened or closed for a long time, the seats and gate tied tightly	OPEN and CLOSE the valve rapidly several times till the gate is loosened, then OPEN or CLOSE the valve to the required position
	Dry stem	Inject lubricant as necessary
	Medium frozen in the cavity	Heating
	Pipeline distorted	Eliminate the distorting restriction of pipeline
The gate will not CLOSE	Medium frozen in the bottom	Heating
	Debris obstruction in bottom of valve	Remove debris through bottom drain plug
Sealing incompletely to upstream and downstream (the pressure in middle cavity cannot relieve to low pressure)	The gate is not CLOSED completely	CLOSE the valve
	Damage to sealing surface	Replace the damaged sealing element
	Damage to O-ring	Replace O-ring
Stem packing leakage	Damage to packing	Inject stem packing
Imbalance of operation	Dry bearing	Inject the distorting as necessary
	Possible damage to drive nut or bearing	Replace the damaged parts
Leakage in bonnet flange	Bonnet bolts loose	Tighten bonnet bolts as necessary
	Damage to gasket	Replace the gasket
Leakage in grease injection and waste valve	Damages to ball, spring and sealing ring	Replace the damaged components
	Screw cap is not tight	Tighten screw cap as necessary

## 8.5 BODY BLEED PROCEDURE



Note

*To relieve pressure from the internal cavity (body) of the valve while under pressure, please follow this procedure carefully. Operate the valve into the full torqued CLOSED position.*

Whilst through conduit valves are block & bleed capable, the valve needs to be ordered and tested as a block & bleed valve. A special bleed system should be specifically plumbed as per diagram below.

This characteristic is used to:

- a- Ensure that the seats are providing an effective seal, or
- b- Drain or flush the body cavity of an in-service gate valve.



Caution

*Use extreme caution when venting the body cavity of a pressurised valve.*



Caution

*If the body cavity keeps venting fluid at a constant flow rate for a very long time, it is a signal of bad sealing of the valve seats. For liquid service only a lower drain valve will immediately indicate a leak.*

### 8.5.1

- a- Operate the valve to the CLOSED position.
- b- CLOSE upstream drain valve, tightly.
- c- Make sure the drain valve (see before drain) is in the OPEN position.
- d- Double check the valves again to insure they are in the proper position.
- e- Lightly loosen the body bleed fitting plunger ('B' below) to allow slow release of pressure from the cavity.



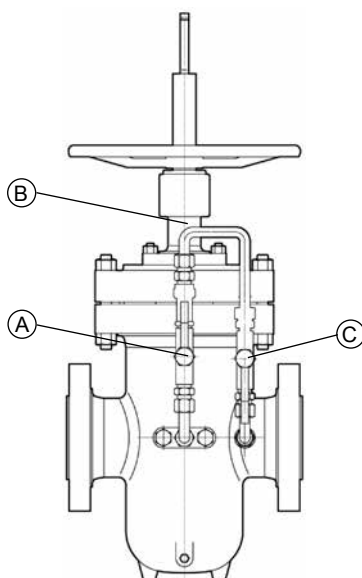
Caution

*Please make sure all persons are clear of the fitting opening during venting. Pressure will begin to decrease and flow will lessen as valve body pressure is released.*



Note

*If pressure does not bleed down, CLOSE fitting ('B' below) and operate valve again to the CLOSE position to insure proper closure. Reopen fitting ('B' below) and allow pressure to finish venting.*



**DIAGRAM 1**

Thermal relief system with bonnet vent

f- Once venting is complete, CLOSE fitting ('B' below) tightly, then operate the valve to the OPEN position and OPEN valve 'A' to allow the thermal relief system to operate as designed.

### 8.5.2 Draining procedure

The purpose of draining the body cavity is to bleed out all the liquid collected in the body cavity. Even in gas service, some condensate, compressor oil and other residues may get trapped in the body cavity after a while. We recommend to drain the body cavity once a year.



**Caution**

*Drain the liquids into a suitable bucket to avoid releasing them to the environment. Keep your working area clean. The cavity can be exposed to line or cavity pressure, wear protective eye wear.*

To drain the body cavity, proceed as follows:

1. Operate the valve to the fully open or fully closed position, whichever is more convenient for you.
2. Turn loose the head of the drain fitting (18) located at the bottom of the body, to bleed liquids trapped in the body cavity. We recommend a special drain valve specified for this task.

It will take some time to bleed the body cavity. It depends on the size of the fitting, pressure in the body cavity and compressibility of the fluid.



**Caution**

*If there are hydrates in gas service, the drain fitting may freeze during high-pressure draining. Work slowly and ensure that the pressure trapped in the body cavity has been completely released, by opening and closing the drain fitting several times.*



### 8.6 EMERGENCY STEM SEAL PLASTIC PACKING INJECTION

APV Expanding Gate Valves are equipped with a packing fitting usually having a ball check as illustrated in Figure 3. In the event of damage to the stem packing which causes a leak, plastic stick packing can be injected into the packing box to increase packing box pressure and eliminate the leakage. A ratchet with a socket, which fits the hex head on the packing fitting stinger, is recommended for this operation.

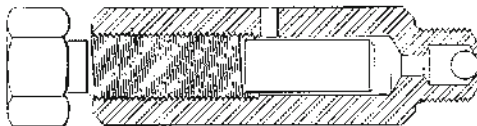


Figure 3

a) Remove the packing fitting injection stinger and insert a plastic packing stick into the fitting.



Caution

*Do not remove the stinger if there is continuous leakage through the weep hole of the packing fitting when the stinger is being backed out.*

b) Run the stinger all the way in against the seat of the fitting.

c) Repeat injection of the plastic packing sticks to the extent necessary to stop the stem seal leakage.



Note

*Excessive packing injection may cause the valve stem to bind and/ or decrease the life of the stem seals. DO NOT exceed the appropriate packing pressure in the table below. Excessive packing pressure can cause the valve to be hard to operate and may also shorten the life of the stem seal.*

#### 8.6.1 Replacing the injectable packing

There may be occasions when the packing must be replaced. The valve must be in the fully closed position. Bleed the valve body using the procedure in Section 8.5. Screw the injector screw in all the way against the seat, then remove the injector screw from the fitting ONLY after being certain that the internal ball check is fully seated and is sealing.

Remove the packing plug opposite the packing fitting. Inject packing into the packing box until the old packing is discharged through the packing plug opening. Replace the packing plug, then inject packing until reaching the appropriate pressure shown in the table below.

VALVE PRESSURE CLASS	PACKING BOX PRESSURE (psig)
150	1925
300	2600
400	2950
600	3675
900	4750
1500	6900

### 8.7 PRESSURE RELIEF VALVE OPTION

Since an expanding gate valve seals against both the upstream and downstream seats, fluid trapped in the body cavity can cause excessive pressure. This may be due to a temperature change which can cause thermal expansion of the fluid, or the body may be full of liquid and over-pressured when lubricating the seats.

Pressure relief valves can be fitted to the valve body cavity on request. A typical installation is shown in Figure 4. As an alternate, the valve can be provided with the upstream relief piping which relieves excess body pressure to the upstream side of the valve (Figure 5). *Important: Needle valves must remain open except during testing.*

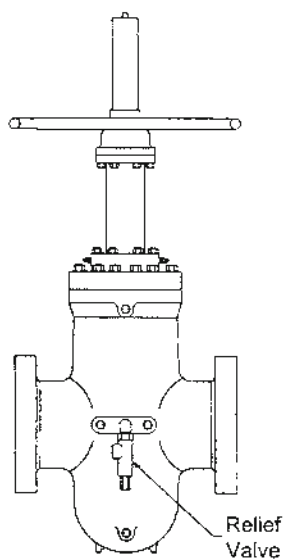


Figure 4

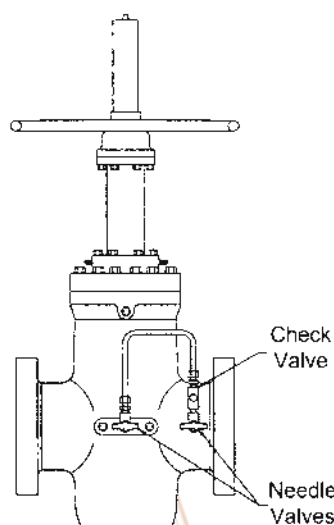


Figure 5

Any pressure relief valve must be tested periodically to ensure reliable functioning. The proper pressure relief settings are shown in this table below.

PRESSURE CLASS	OPERATING PRESSURE (psig)	SHELL TEST (psig)	RELIEF VALVE SETTING (psig)
150	275	425	375
300	720	1100	820
400	960	1450	1060
600	1440	2175	1540
900	2160	3250	2260

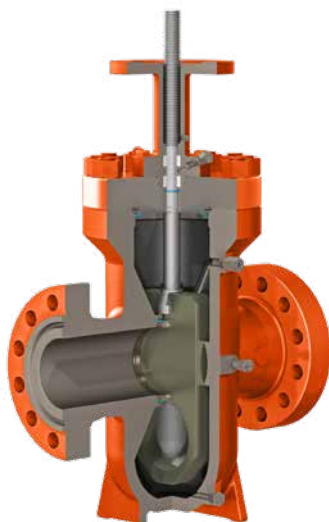


Caution

**NEVER** remove the pressure relief valve.  
**NEVER** plug the pressure relief valve.  
**REPLACE** the pressure relief valve if it is leaking, fails to relieve at the proper set pressure, or fails to reset after test.  
 A pressure relief valve is an emergency safety device; it is not a substitute for draining the valve body or for taking other common sense safety precautions. The correct relief valves are available through APV service or sales representatives.

## 9.0 OVERVIEW DESIGN FEATURES

### OVERVIEW API6D THROUGH CONDUIT GATE VALVES



Slab Gate



Expanding Gate

#### Through conduit Full bore

The through conduit opening design provides full flow passage and allows for the smooth passing or pipeline pigs. Pressure drop through the valve is no greater than that through an equal length of equal diameter pipe.

#### External pressure relief system for cavity over pressure protection

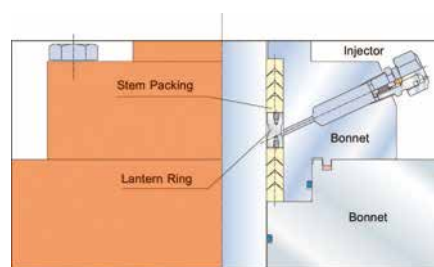
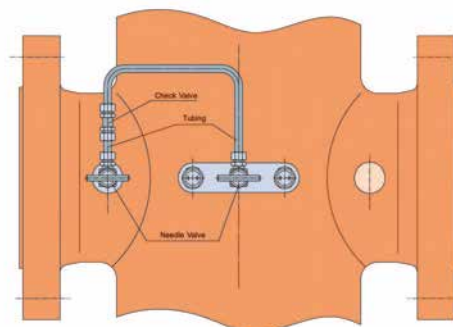
Due to the double tight sealing isolation design for expanding gate valve, cavity pressure can increase significantly through thermal expansion of fluid in the cavity. A body cavity thermal relief system can be provided to relieve this excess body cavity pressure.

#### In Line repairable

The top entry design allows for access to all internal parts if maintenance is required with the valve still in the pipeline.

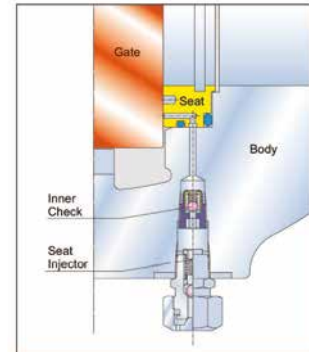
#### Ease of on-line stem packing maintenance

Top and bottom Chevron PTFE packing + lantern ring is the standard stem seal equipped with a stem injector with integrated check valve. Injectable packing material can be injected directly into the packing box through the injector to enhance stem sealing while the valve is under pressure.

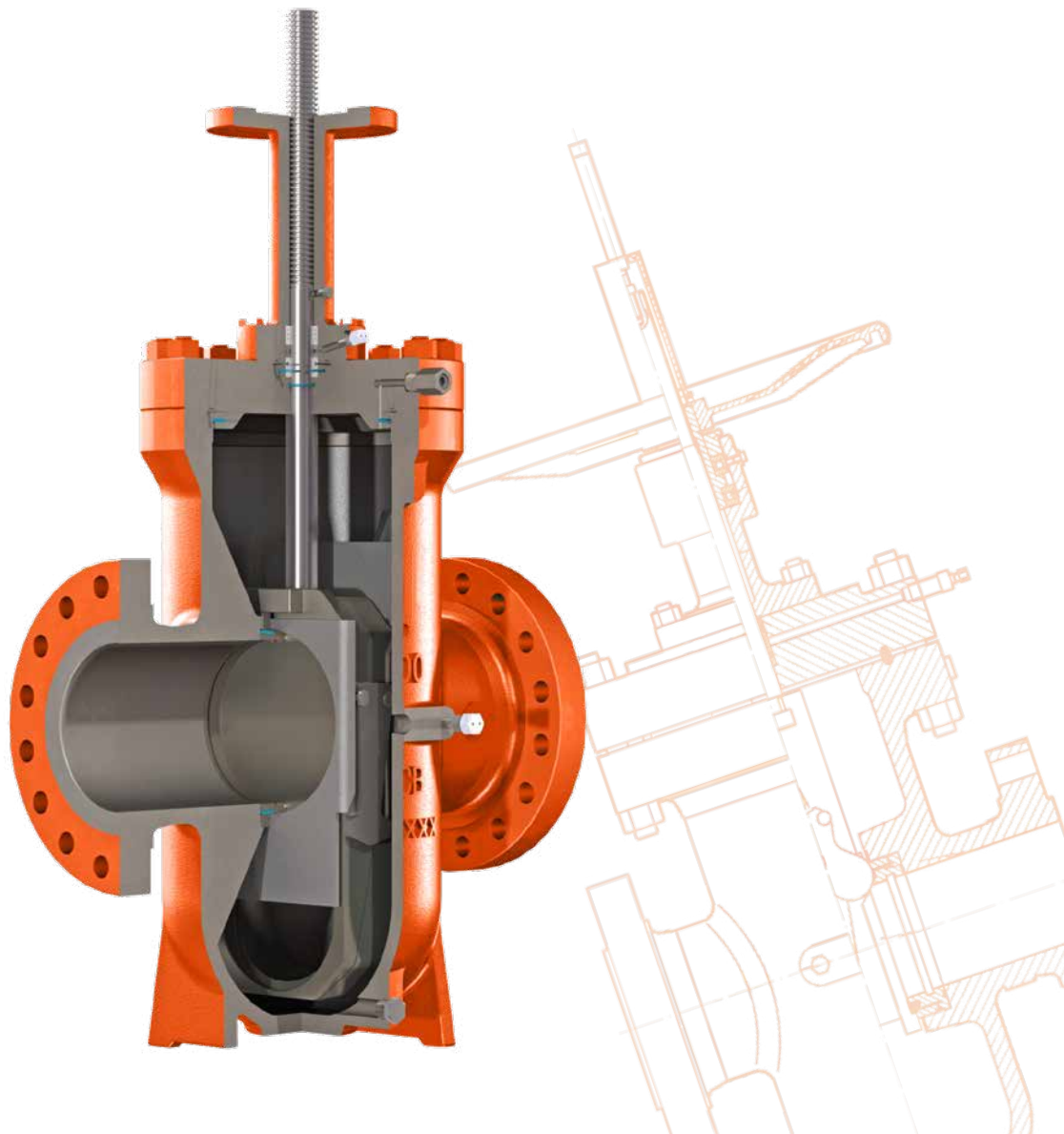


### Emergency sealant injection on seats

Provision of seat injectors with integrated check valve provides emergency back up sealing. Additionally, an inner check valve is installed in front of the seat injector to prevent blow out in case of wrong operation. If a seal surface is damaged by foreign matter, valve leakage can be eliminated by using a sealant injected into a specially designed groove in the seat ring assembly. The secondary seat sealant injection backup provides a peace of mind to users who demand reliable block valve service until the valve can be properly serviced. Seats may be lubricated by injecting lubricant to enhance service life and reduce operating torque.



### API6D EXPANDING GATE VALVE



**Double isolation and bleed DIB-1 (both seats bi-directional)**

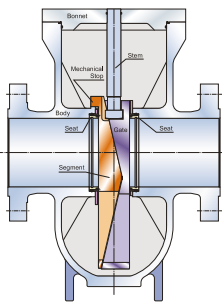
Double sealing established on each seat bi-directionally by initial plastic-to metal contact in addition to metal-to-metal contact, both upstream, downstream and body cavity. In the closed position, the gate forms a tight seal simultaneously on both seats bi-directionally. This allows the body cavity to be manually bled. An automatic cavity pressure relief device is provided to relieve the build-up of over pressure in the body cavity.

**Mechanically induced bubble tight seal**

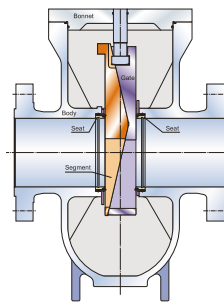
When closing, the segment is positioned by a mechanical stop while the gate continues going downward, expanding the segment and gate against their opposite seats. This action forms a bubble tight seal on both the upstream and downstream seat to reach a double isolation sealing function.

**Wear and tear reduction**

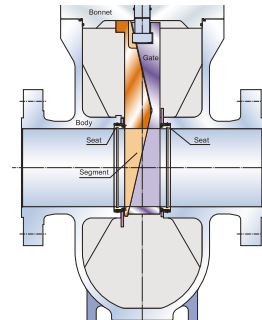
When the valve is completely closed, the gate and segment are wedged tightly against each seat. During operation, the gate and segment retract from the seats prior to stroking; this retraction provides an operating clearance to reduce rubbing of the resilient seat material and protects the sealing surfaces. Additionally this reduces the operating torque and allows a smaller and more economical operator for smooth operation.



In the fully closed position, the segment is positioned by the mechanical stop and the gate is wedged downward under stem thrust force, expanding the segment and gate to form a tight seal on each seat bi-directionally between upstream and downstream.



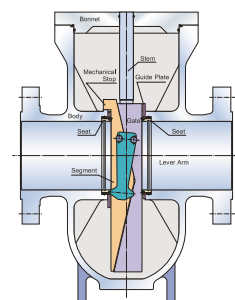
During travel between fully open or close position, the gate and segment retract from the seats prior to travel; this retraction provides an operating clearance to reduce wear on the sealing surface and operating torque.



When the bore of the segment is aligned with the body bore, the segment is positioned by the mechanical stop and the gate continues to move upwards, expanding the gate and the segment to form a through conduit bore and protect the sealing surface from flow erosion.

**Lever lock mechanism - Size 150NB (6”) and above**

The lever arm maintains the gate & segment surfaces parallel by guide plates, while the expanding gate assembly is moving through its stroke. Near the end of stroke, the guide plate allows the lever arm to tilt. The gate and segment slide against their angled faces under stem provided thrust force, creating the expanding seal action. In their final position, the gate and segment are mechanically secured in place. The guide plates forms a rail at both sides of the expanding gate assembly to guide its movements and align it with the seats.

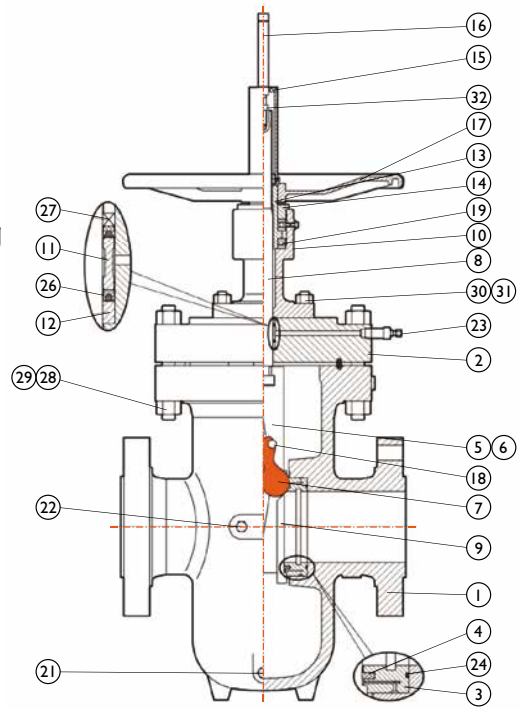




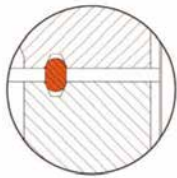


**Features**

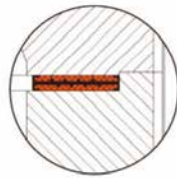
- Pow-R-Seal®\* Style Through conduit design with minimum flow resistance
- Double-sealing replaceable seat Locking device
- Body thermal relief system
- Stem extension upon request
- Soft Seat or 'Metal to Metal'



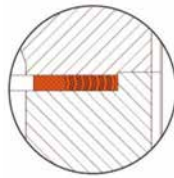
**DIAGRAM 2**



Ring Type Joint  
≥ 600lb



Metal Backup  
Graphite Gasket 150lb



Spiral Wound Gasket  
300lb

**Materials**

Part Name	Carbon Steel to ASTM			Alloy Steel to ASTM			Stainless Steel to ASTM		
1 Body	A216 WCB	A352 LB	A352 LCC	A217 WC6	A217 C5	A217 C12	A351 CF8	A351 CF8M	A890 4A
2 Bonnet	A105	A350 LF2	A350 LF2	A105	A105	A105	A182 F304	A182 F316	A182 F51
3 Seat	A105	A350 LF2	A350 LF2	A105	A105	A105	A182 F304	A182 F316	A182 F51
4 Seat Insert	RPTFE/PTFE/Nylon M/Devlon/Peek or Metal to Metal								
5 Gate	A105	A350 LF2	A350 LF2	A105	A105	A105	A182 F304	A182 F316	A182 F51
6 Segment	A105	A350 LF2	A350 LF2	A105	A105	A105	A182 F304	A182 F316	A182 F51
7 Lever	A276 420	A276 420	A276 420	A276 420	A276 420	A276 420	A182 F304	A182 F316	A182 F51
8 Stem	A276 420	A276 420	A276 420	A276 420	A276 420	A276 420	A182 F304	A182 F316	A182 F51
9 Skirt	A276 420	A276 420	A276 420	A276 420	A276 420	A276 420	A182 F304	A182 F316	A182 F51
10 Yoke	A216 WCB	A352 LCB	A352 LCC	A217 WC6	A217 C5	A217 C12	A351 CF8	A351 CF8M	A890 4A
11 Lantern Ring	A276 420	A276 420	A276 420	A276 420	A276 420	A276 420	A182 F304	A182 F316	A182 F51
12 Packing Plate	A276 420	A276 420	A276 420	A276 420	A276 420	A276 420	A182 F304	A182 F316	A182 F51
13 Stem Nut	A439 D2						B150 C61900		
14 Washer	Steel								
15 Dustproof Cover	Steel								
16 Indicator	Steel								
17 Handwheel	Ductile Iron								
18 Rivet	Steel								
19 Bearing	Steel								
21 Drain Fitting	316SS	316SS	316SS	316SS	316SS	316SS	316SS	316SS	A182 F51
22 Seat Sealant Injection	Assembly								
23 Stem Sealant Injection	Assembly								
24 O-Ring	Viton								
26 Packing	Non-metal								
27 Graphite Packing	Flexible Graphite								
28 Stud	A193 B7	A320 L7	A320 L7	A193 B16	A193 B16	A193 B16	A193 B8	A193 B8M	A193 B8MLCuN
29 Nut	A194 2H	A194 7	A194 7	A194 4	A194 4	A194 4	A194 8	A194 8M	A194 B8MLCuN
30 Stud	A193 B7	A320 L7	A320 L7	A193 B16	A193 B16	A193 B16	A193 B8	A193 B8M	A193 B8MLCuN
31 Nut	A194 2H	A194 7	A194 7	A194 4	A194 4	A194 4	A194 8	A194 B8	A194 B8MLCuN
32 Nut	A194 2H	A194 7	A194 7	A194 4	A194 4	A194 4	A194 8	A194 8M	A194 B8MLCuN

Sample only, varies according to size & class.

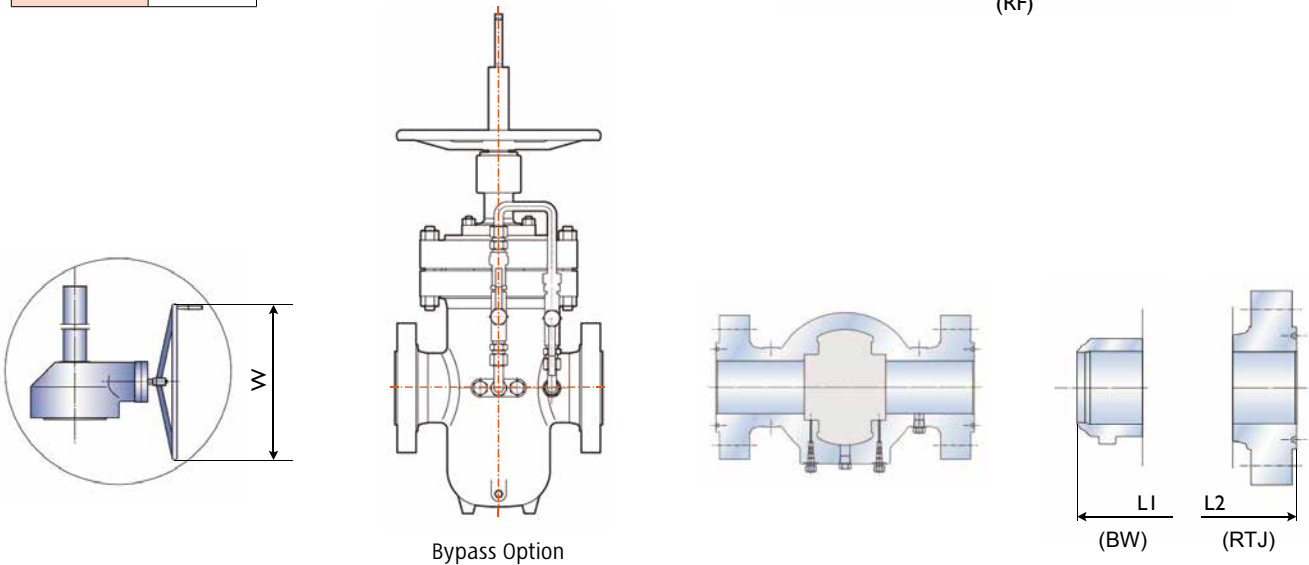
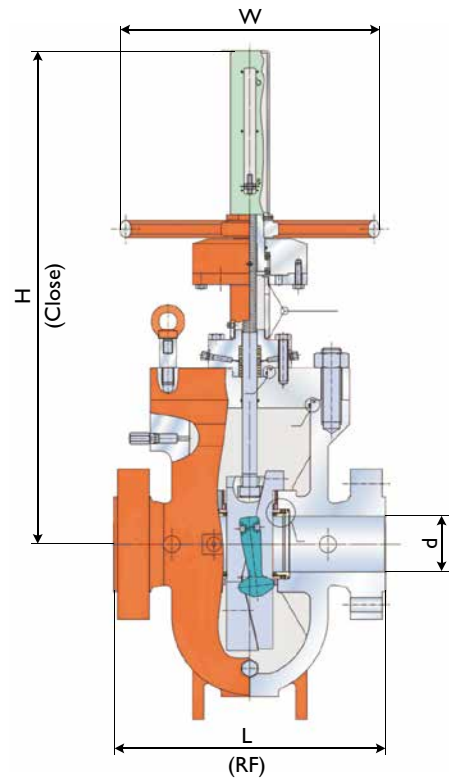
\*Pow-R-Seal® is a registered trademark of Cameron®. APV is not associated, endorsed or affiliated with Cameron® in any way

**Specifications**

Basic Design: API6D ASME B16.34  
 Face to Face: API6D  
 End Flange:  
 2"-24" ASME B16.5  
 B.W. End: ASME B16.25  
 Test and Inspection: API6D & API 598  
 Manufacturing to NACE MR0175 on request

**Gear Operator:**

150LB	≥ 20"
300LB	≥ 16"
600LB	≥ 12"
900LB	≥ 10"
1500LB	≥ 8"
2500LB	≥ 4"



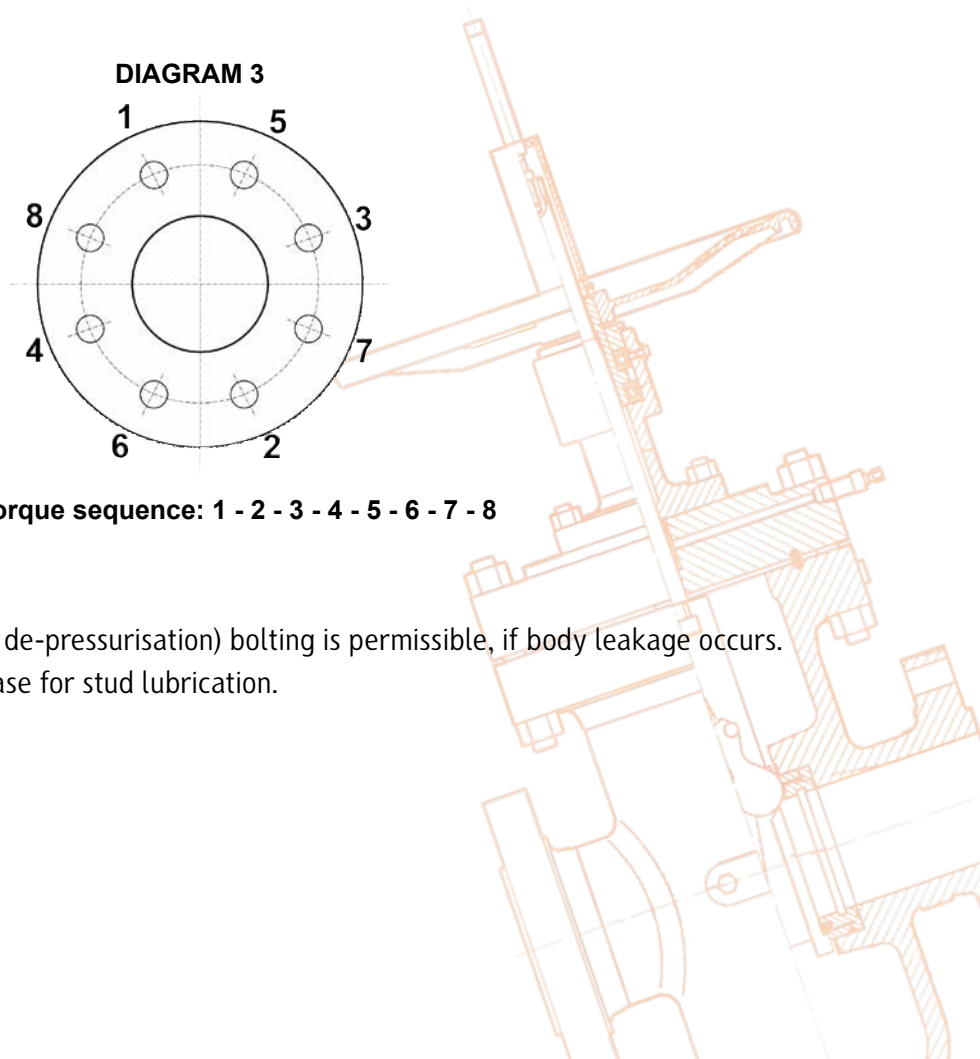
# APPENDIX 1

## Materials for main parts

Part Name	Material	
	Standard Type Soft Seat	Standard Type Metal Seat
Body	Carbon Steel	Carbon Steel
Bonnet	Carbon Steel	Carbon Steel
Yoke	Carbon Steel	Carbon Steel
Stem	Stainless Steel	Stainless Steel
Seat	Stainless Steel	Carbon Steel + Stellite
Gate	Stainless Steel	Carbon Steel + Stellite
Packing	Viton + PTFE + Expanding Graphite	Viton + PTFE + Expanding Graphite
Gland Flange	Carbon Steel	Carbon Steel
Stem Nut	Casting Copper Alloy	Casting Copper Alloy
Sealing Face	Soft, Hard Sealing	Metal to Metal
Seat Insert	PTFE	Stellite
Gasket	304 + Flexible Graphite	304 + Flexible Graphite

The materials can be selected upon customer's different requirements and product design specifications. Materials vary according to size, class & model, refer as built drawing.

# APPENDIX 2



## Stud Lubrication

- Re-tightening of body (with system de-pressurisation) bolting is permissible, if body leakage occurs.
- Use a Copper-Based Anti-Seize Grease for stud lubrication.

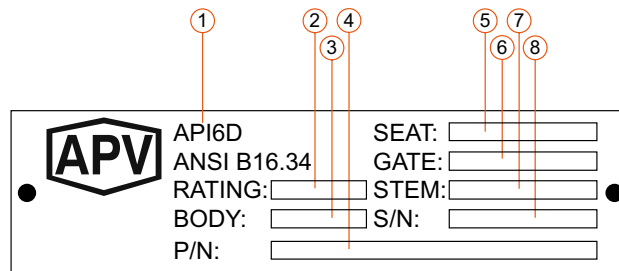
# APPENDIX 3

## APV VALVE IDENTIFICATION LABEL

No.	Figure Number Code	Description
1	Standard	Identifies manufacturing design & standard
2	Pressure Class	Identifies pressure classifications per API requirements
3	Body Material	Identifies body metal material composition (A105, WCB, F51, CF8M, etc.)
4	Figure Number	Identifies the detailed valve configuration (valve type, bore size, pressure class, materials, etc.)
5	Seat Material	Identifies material composition (PEEK, Teflon, Nylon, etc.)
6	Gate Material	Identifies gate material composition (A105 + Stellite, 316SS, A105+ENP, etc.)
7	Stem Material	Identifies stem material (A105, 410SS, 17-4pH, etc.)
8	Serial Number	Identifies certified serial number
*	Size	Identifies bore size
**	NACE MR0175	Identifies corrosion resistance

\* The body size is stamped on the body.

\*\* NACE is indicated by a separate NACE tag.



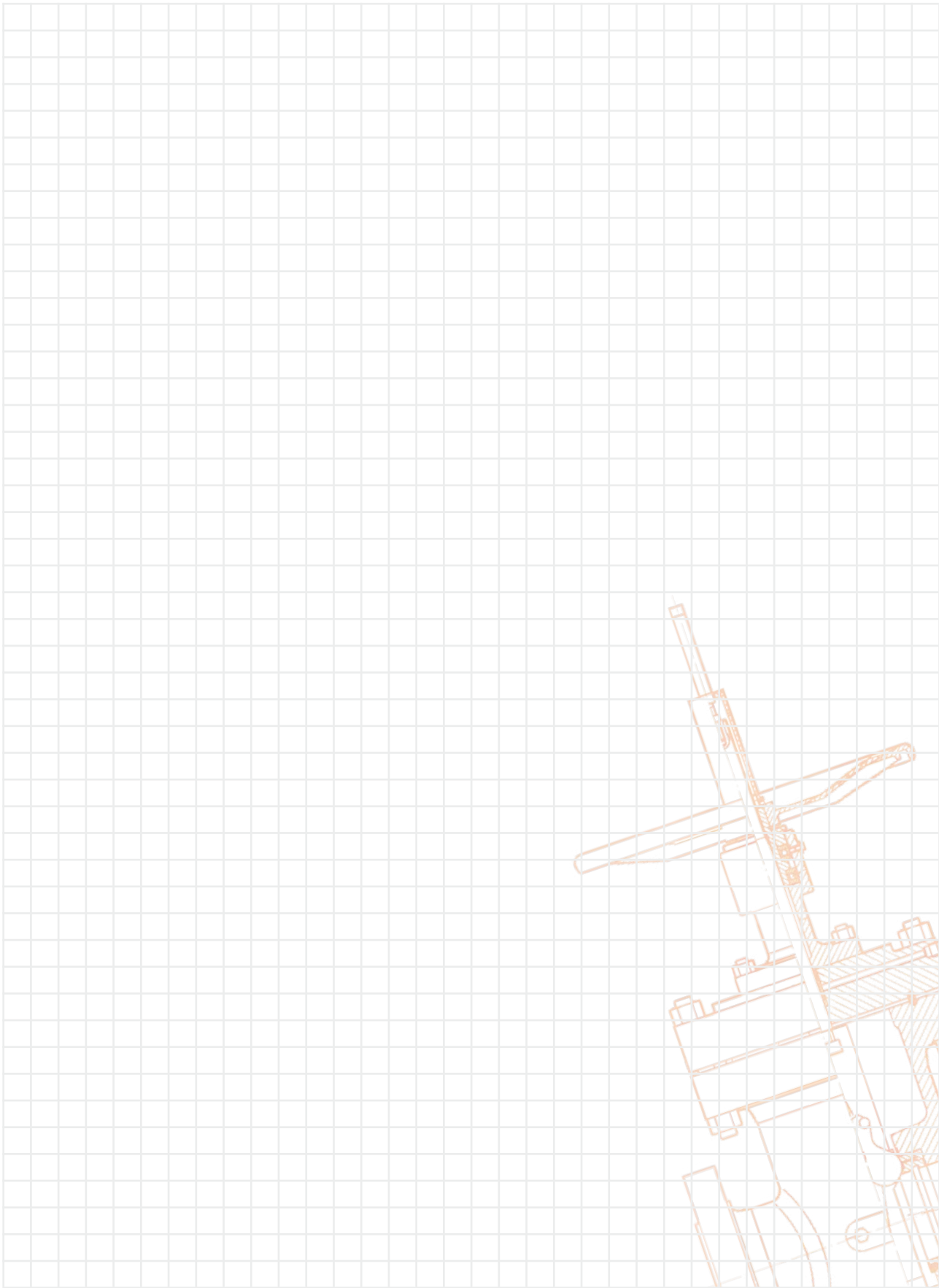
# APPENDIX 4

## DESIGN FEATURES



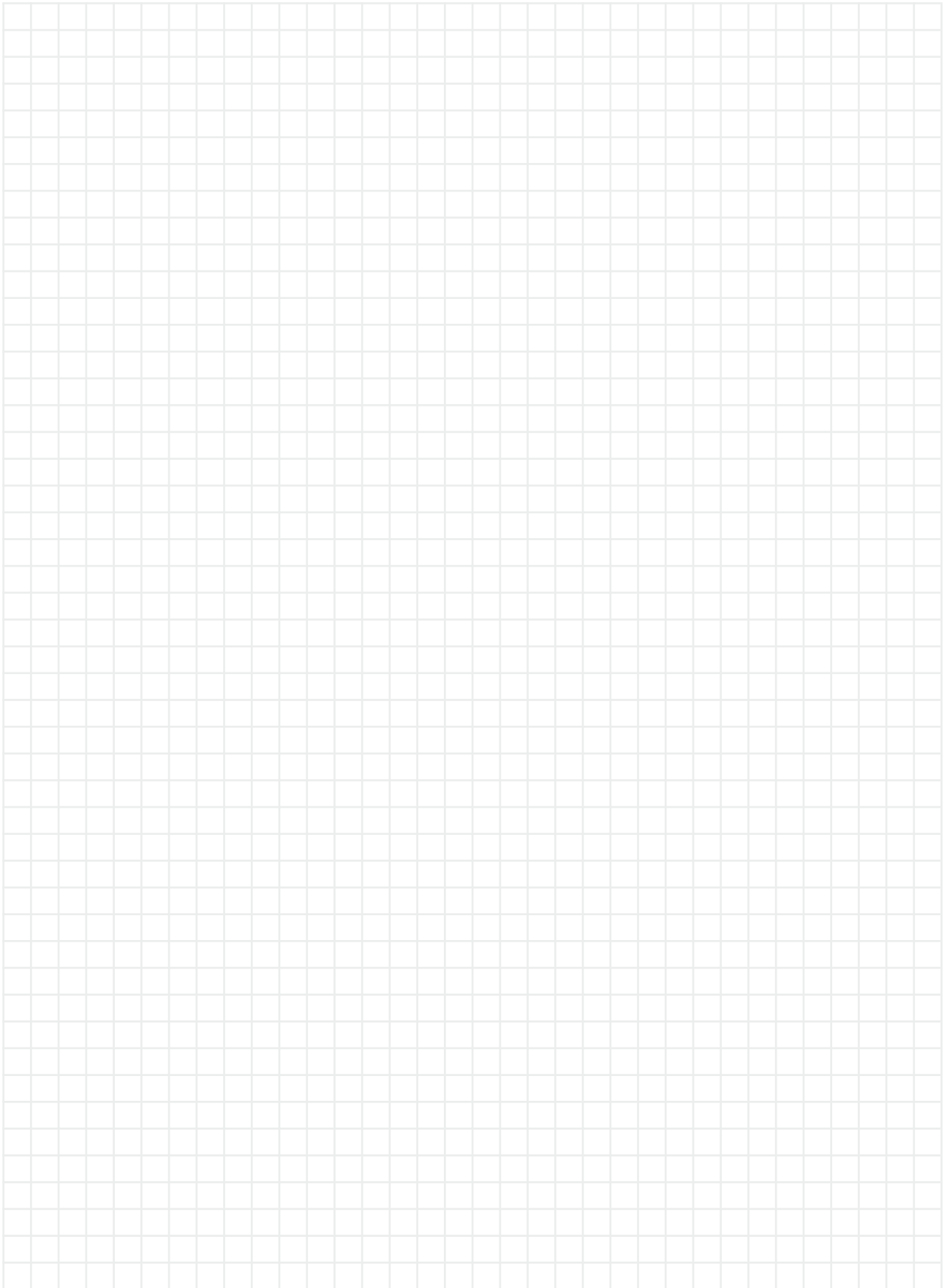
### Manufacturing Specifications

Specification	Standards
General design standard	API6D
Pressure-temperature rating	ASME B16.34
Face to face dimensions	ASME B16.10
Flange type and dimensions	ASTM B16.5
Butt-weld ends	ASTM B16.25
Inspection and test	API6D/API598/ISO14313

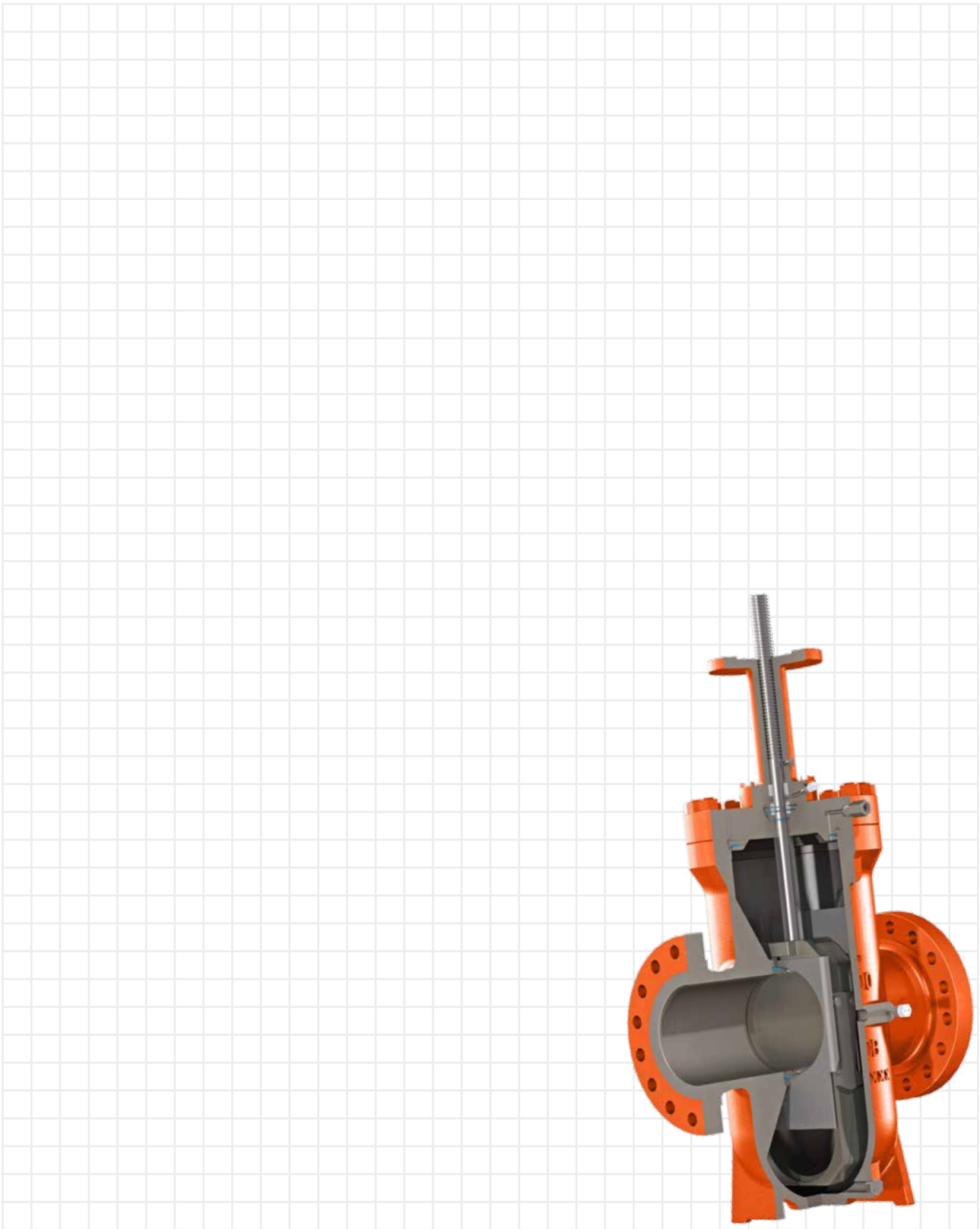


## NOTES

---

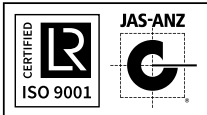






© Copyright Australian Pipeline Valve 1990 - 2013 Edition

Catalogues, photos, brochures and technical publications are the exclusive property of Australian Pipeline Valve. Any unauthorised reproduction in total or in part, shall result in prosecution. Products and data sheets in this publication are subject to change at anytime without notice. Australian Pipeline Valve reserves the right to carry out amendments to products and materials.



# AUSTRALIAN PIPELINE VALVE®

ADELAIDE • BRISBANE • PERTH



AUSTRALIAN PIPELINE VALVE® HEAD OFFICE  
70-78 Stanbel Road Salisbury Plain South Australia 5109 Telephone +61 (0)8 8285 0033 Fax +61 (0)8 8285 0044  
email: admin@australianpipelinevalve.com.au

[www.australianpipelinevalve.com.au](http://www.australianpipelinevalve.com.au)

LOCAL DISTRIBUTOR/AGENT

*If you have any requirements in the field of valves, please contact us for a prompt response. Continuous development of Australian Pipeline Valve products may necessitate changes in the design or manufacture process. Australian Pipeline Valve reserves the right to effect any such changes without prior notice.*

