

VAAS Installation & Operation Manual

Knife Gate Valve model 940/950/960

IOM-94560/01/2001

Models and features

- Model 940** – Uni-directional, lugged, single- seated knife gate valve
- Model 950** – Uni-directional, wafer, two lug, single-seated knife gate valve
- Model 960** – Uni-directional, square / rectangular, single-seated knife gate valves

All these have wafer body designed to mount between companion flanges drilled suitably. For all pressure and temperature capabilities of the valve, please refer to relevant VAAS Bulletins. While the descriptions and/or figures refer to the 940/950 range, relevant parts of this manual are applicable to model 960 also.

Storage

- > Valves are shipped wrapped in polyethylene cover in wooden boxes. It is *preferable* to store these valves in the same packing indoors and without direct exposure to the environment
- > All resilient seated valves shall be stored in the open (unseated) position

Unpacking

After ensuring that the box is not damaged externally, open the box carefully and check for any damage to valve and its components during transit. Notify the damages, if any, to the relevant insurance agency.

Markings

Valve size as also brief material specification of body (markings such as “CF8M” or “Cl”) would be marked on the valve body. Flow directions are *not usually indicated* on the valve as these would depend on the application for which the valve is used for. However, to enable correct mounting orientation, the seat side of the valve can be identified with the word “SEAT” marked and easily visible at the top part of the gate. The stainless steel name plate fixed on to the superstructure contains most of the relevant information on the valve including **VAAS workorder number** and **unique serial number** of the valve which should be quoted for all requirements of service and spares.

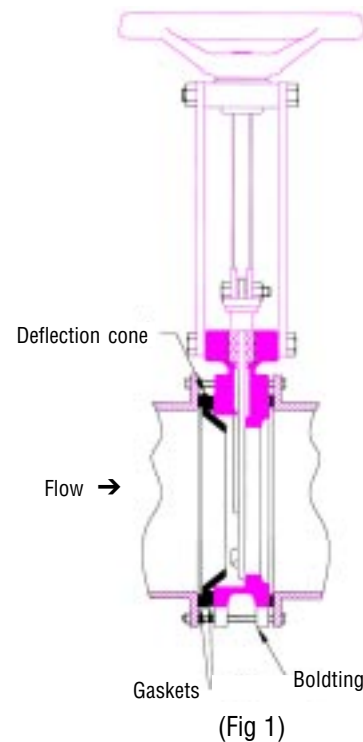
Installation & mounting orientation

- > Mount the valve between flanges using studs and bolts of the correct size. Bolt holes in the chest area are always blind tapped and care should be taken not to bottom the studs while tightening. Studs are recommended for chest area holes. **(1, Fig1)**
- > Valve packing gland is tightened to hold the specified pressure and tested for no leakage before dispatch. However, this may require some tightening at site due to loosening in transit etc. In such cases, if leakage is observed through the gland, tighten the gland nuts uniformly until the leakage stops

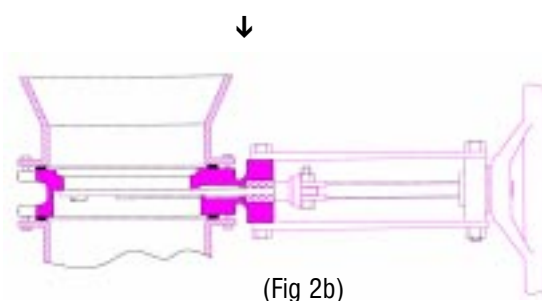
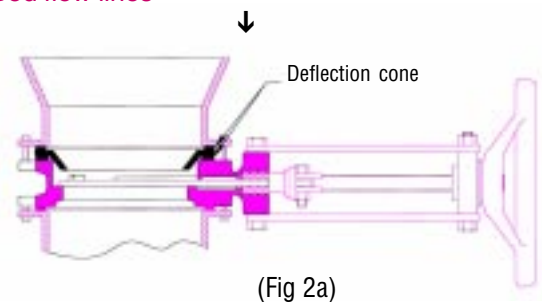
Caution

Do not overtighten the gland nuts as this may cause excessive friction and premature damage to packing.

- > Single-seated knife gate valves are to be generally mounted such that pressure is not exerted on the gate in a way that the gate is pushed away from the seat. Unless otherwise advised the following orientations may be used for typical applications situations such as fluid pumping lines **(Fig1)** and powder material isolation locations **(Fig 2)**. Please note these are general guidelines and in case of doubt VAAS representative may be contacted for suggestions.



Pumped flow lines



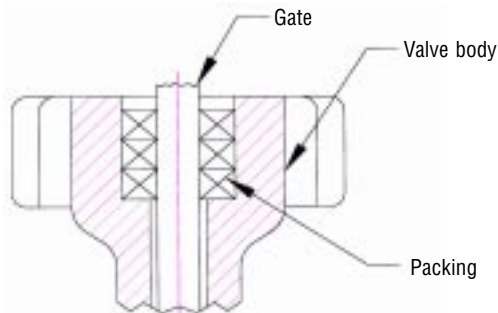
Hopper isolation

CAUTION

A wrong orientation *can cause extremely premature failure* of the valve parts in some services, particularly those handling abrasive media

Lubrication

Routine periodic lubrication of the stem of manually operated valves is generally not required. However if excessive operating torque is experienced, lubricate the valve stem with lithium based grease through the grease nipple provided in the collar (**13 A, Fig 7**)



(Fig 3)

Packing replacement

Recommended *minimum* number of packing layers (including a wiper layer, lowest, if used) :-

Valve size	No. of layers
50mm to 450mm (2" to 18")	3
500m to 600mm (20" to 24")	4
More than 600mm (24" and above)	5

CAUTION

Relieve line pressure before loosening gland nuts to avoid personnel injury and/or equipment damage

Follow these steps when packing replacement is undertaken (no. refer to parts in **Fig 7**) :-

- > Relieve line pressure
- > Close the valve fully
- > Disconnect the stem by removing the connecting bolts & nuts(4)
- > Operate the handwheel (16) and bring up the stem(7) fully
- > Remove the gland nuts (6) and the gland(4)
- > Remove the old packing(5) from the packing chamber, one at a time, using a long thin tool (say, a screwdriver) to pry it out
- > If the lowest layer is a *wiper ring (copper, inconel etc.)*, clean it with a common solvent; if damaged, replace with new one.
- > Insert new packing one at a time *ensuring that the gate is in full contact with the seat (gate fully down) and not rubbing with bottom of packing chamber*; stagger the cut end of the packing so that *they do not line up*
- > Tap each packing ring firmly and evenly into the chamber before installing the next ring; the ends of each ring should meet but not overlap.
- > Install the packing gland and gland nuts
- > Tighten the gland nuts *finger tight plus ½ turn*
- > Operate the handwheel to lower stem and connect to the gate with nuts & bolts

If leakage is observed after installing the valve in pipeline and valve is pressurized, tighten the gland nuts *just enough* to stop leakage. Do not over-tighten the gland nuts

Seat replacement

(Not applicable for valves with integral seat and Model 960)



(Fig 4)

Follow these steps for seat replacement :-

- > Relieve pipeline pressure
- > Close the valve
- > Remove the valve from pipeline
- > Disconnect stem from gate by removing connecting bolts & nuts
- > Remove the one set of superstructure bolting and *tilt the superstructure* to one side as shown in above sketch (**Fig 4**)
- > Lift the gate up till it fully clears the seat area and remove the old seat by tilting the top of the seat (**1, Fig 4**) away from body
- > Insert the new seat with the bottom part first and lower the gate fully
- > Bolt the superstructure to body again and then fasten the stem-to-gate bolts.

Accessories and special constructions

Deflection cone (for model 940/950)

Deflection cone, when supplied, should be installed on the side *opposite* to the one marked "SEAT" on the gate. This orientation will direct the flowing medium towards the centre of the pipeline, thus avoiding direct impingement on the raised seat (**4, Fig 1**). Deflection cones are supplied with a gasket for the side mating with the valve; another gasket should be used between the deflection cone and the flange as shown below (**2, Fig 1**).

Purge connections

Purge connections (body and/or chest), when provided, must be connected to a suitable media for cleaning the seat and/or packing chamber. This fluid must be admitted at approx. 1 bar higher pressure than the fluid in the pipelines and should be admitted for a duration of about 2-5 minutes before the valves is closed.

Actuators

Manual

Valves equipped with manual handwheel or chainwheel actuators do not need any routine maintenance. If excessive torque much above the normal (20 kgf rim pull max.) is experienced, grease may be applied on the stem threads using suitable grease gun on the nipple provided (**13A, Fig 7**). Standard lubricating grease may be used.

Pneumatic

VAAS pneumatic cylinder actuator is a *low maintenance* design and does not require any routine maintenance. This has an FRP tube which is lubricated for life with a special coating on the inside wall. Filtered plant air (lubricated or non-lubricated) may be used for its operation at the specified air supply pressure.

CAUTION

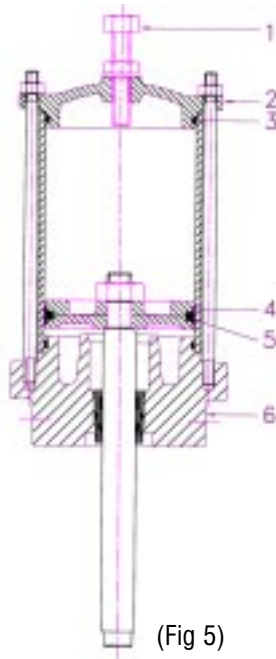
The actuator tube is made of FRP (fiberglass reinforced plastic) and should not be subjected to *more than 20 bar pressure or 100 deg C*.

Replacement of actuators

VAAS knife gate valves are provided with superstructure (yoke) that allows quick and easy interchangeability between handwheel and VAAS pneumatic cylinder actuator.

To change from handwheel to pneumatic cylinder actuator, follow these steps:-

- > Hold the valve firmly in a vice if the change is being made with the valve removed from pipe line. If replacement is done in with valve in the pipeline, ensure that the line is not pressurized to avoid personal injury.
- > Fully *close* the valve
- > Unscrew the stem-to-gate bolts **(9, Fig 7)**
- > Unscrew the mounting nuts on the top of the superstructure (yoke), and remove the bolts **(11B, Fig 7)**.
- > *Slightly loosen* both bolts on *one side* at the *lower part* of the yoke so that the yoke on this side can be slightly tilted **(11A, Fig 7)**.
- > Bring the pneumatic actuator piston rod to fully retracted position, if not already in that position (*VAAS actuators are shipped in this condition from the factory*). This can be done by applying air specified pressure to the port at the yoke end of the actuator **(6, Fig 5)**.
- > With the actuator supported by a suitable holding device above the valve, gently lower the actuator to the yoke and align the holes on the top of the yoke with the holes at the lower endcap of the actuator
- > Replace the mounting bolts and nuts without *fully tightening* the same.
- > If the actuator has been *stored for a long period*, it is advisable to *stroke for a few times* using air connected to either port through a suitable regulator, before the next step.
- > Connect the top air port of the actuator to an air regulator (max. 10 bar) and gradually increase the outlet pressure to fully stroke the actuator, taking care to *slow down and align the clevis* with the gate as may be required
- > Connect the actuator piston rod to gate using the same stem-



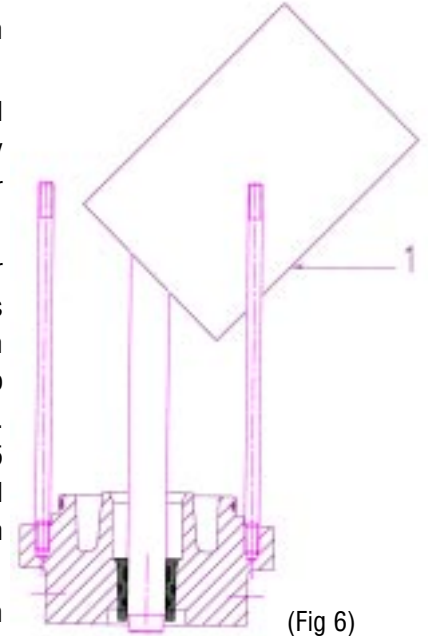
to-gate fasteners removed earlier **(9, Fig 8)**

- > Stroke the actuator with the valve slowly using air from a regulator at top and bottom ports alternatively. Check for smooth jerk-free movement.
- > Tighten the mounting bolts **(11, Fig 8)**

Replacement of piston seal

Over a period of time, the piston seals may require replacement as per following procedure:-

- > Relieve pressure from the actuator
- > Unscrew the top tie-rod nuts and carefully remove the top cover **(2,3, Fig 5)**.
- > Lift-off the cylinder tube vertically from its seat on the bottom cover and slide up to almost clear the piston. Tilt the tube to 45 degrees to vertical and remove from the piston **(1, Fig 6)**
- > Remove the old piston seal **(4,5, Fig 5)**
- > Replace with new seal- first o-ring and then the PTFE layer



Operation of manual override

Where provided the valve may be opened using the manual override in case of failure of air supply to the actuator.

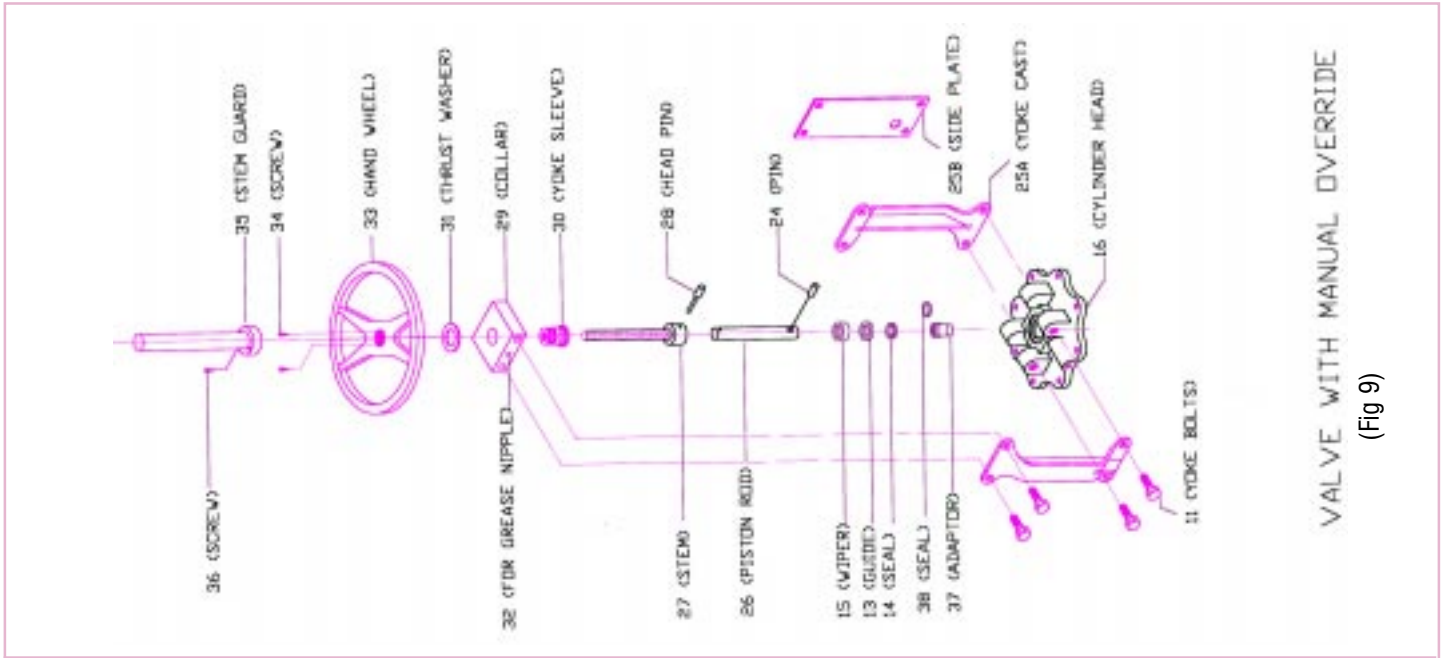
To *engage* the manual override, follow these steps

- > Equalize any residual air pressure between actuator compartments using the equalizing valve (if provided) or the manual override button of the solenoid valve, as applicable.
- > Bring down the override stem **(27, Fig 9)** by turning the handwheel **(33, Fig 9) clockwise**
- > Align the coupling hole on the override stem with the hole in the actuator stem and insert the connector pin **(28, fig 9)** and use the lock pin to secure the same.
- > Open or close the valve using the handwheel
- To *disengage* the manual override, follow these steps
- > Bring down the override stem and remove the locking pin and connector pin
- > Turn the handwheel and raise the override stem as high as it goes.

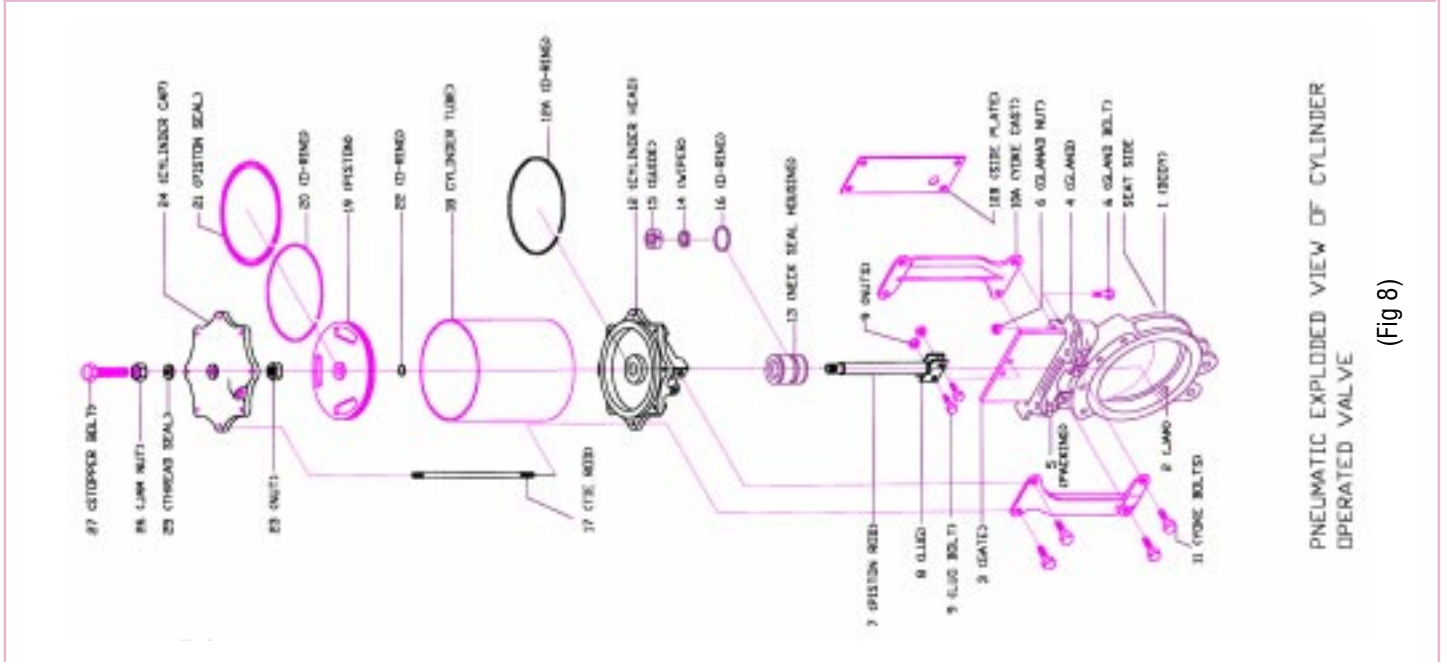
Recommended spare parts

Following are the parts recommended as spares and which may be stocked. Please note the requirement and quantity of spares would vary with severity of applications

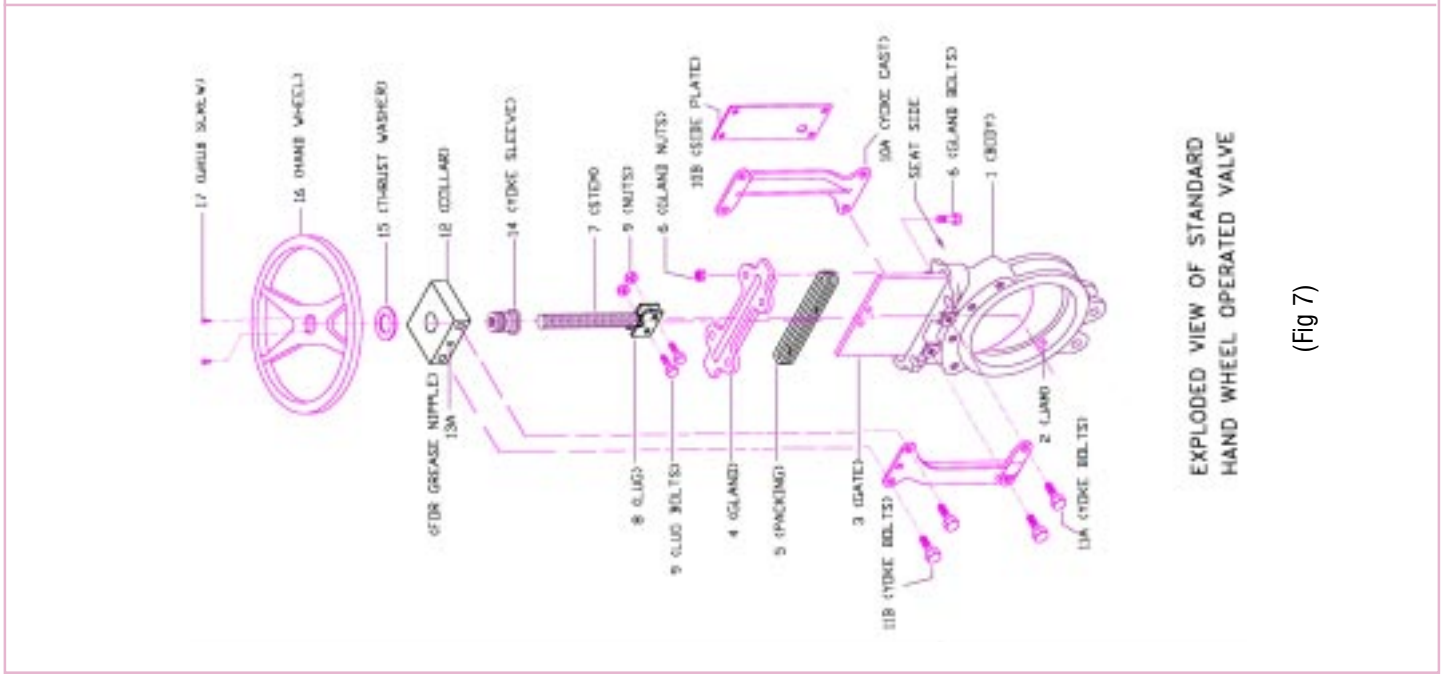
- * Spare packing **(5, Fig7)**.
- * Spare seat **(1, Fig4)** (for replaceable seat designs)
- * Cylinder repair kit (consists of o-rings for cylinder head **(3, Fig 5)**, cap **(5, Fig 5)** and piston **(4, Fig 5)**)



VALVE WITH MANUAL OVERRIDE
(Fig 9)



PNEUMATIC EXPLODED VIEW OF CYLINDER
OPERATED VALVE
(Fig 8)



EXPLODED VIEW OF STANDARD
HAND WHEEL OPERATED VALVE
(Fig 7)