



Red Valve Company, Inc.®

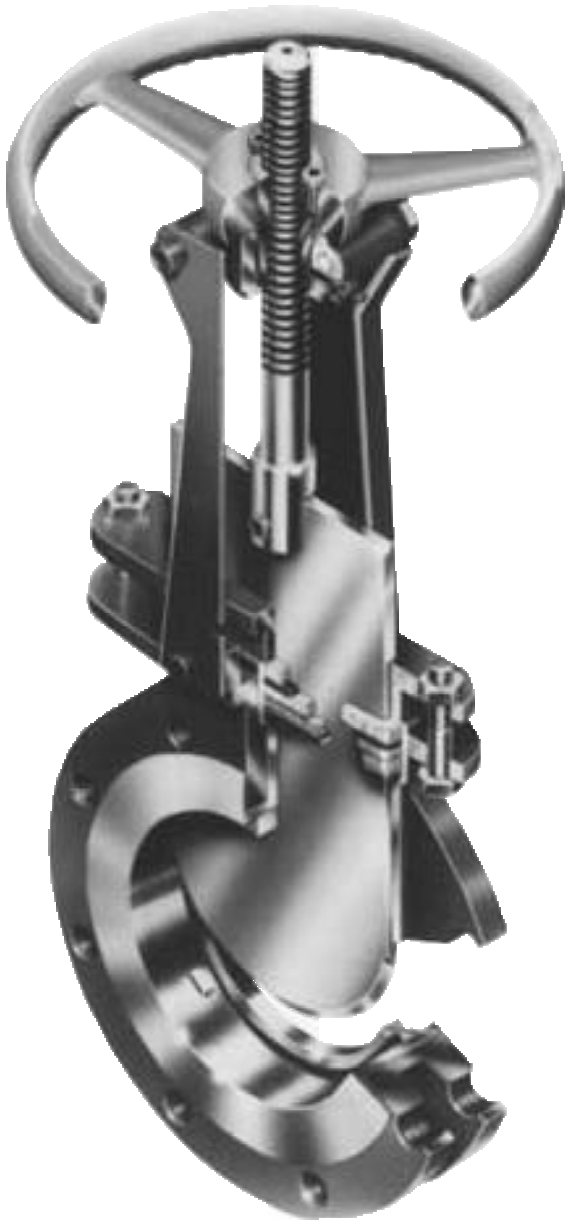
# Series G Knife Gate

## Metal and Resilient Seated

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# Installation, Operation, and Maintenance Manual

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The Red Valve Series G Knife Gate Valve is a 100% full bore, all-metal knife gate valve designed for the toughest applications. The Series G features heavy-duty cast-iron body, stainless-steel wetted parts, and either a metal or resilient seat.

The Series G is designed to meet MSS-SP81 face-to-face dimensions, so that it can be readily placed in service replacing inferior knife gates.

### **IMPORTANT**

Please take a moment to **review this manual. Before performing any maintenance on the valve be sure the pipeline has been de-pressurized.** The improper installation or use of this product may result in personal injury, product failure, or reduced product life. Red Valve Co., Inc. can accept NO liability resulting from the improper use or installation of this product. If you have any questions or problems, please call the customer service department at (412) 279-0044. We appreciate your comments. And thank you for choosing Red Valve.

# INSTALLATION

The Series G Knife Gate Valve has A.N.S.I. B16.5 Class 125/150 flange bolting dimensions, and a 150 psi cold working pressure rating. During installation, great care must be taken to install the gate valve in the proper direction. The gate must be installed so that the gate is pushed against the seat by the flow pressure.

1. Remove the flange covers from the valve.
2. Check the flange faces of the pipe and valve for rough spots and dents. Remove any damaged areas with fine sandpaper or file.
3. Check the valve for proper operation and any damage to the gate or seat. Repair any damaged areas.
4. Clean the gasket surfaces of both the valve and the mating pipe flanges.
5. **IMPORTANT:** Install the valve so that the gate is pushed against the seat by the flow pressure. The seat must be placed on the downstream or low pressure side of the gate. The word "SEAT" or "S" is cast into the body, showing the position of the seat.

NOTE: Great care must be taken to properly install the valve, if the valve is installed backwards the line pressure will push the gate away from the seat, causing the valve to leak.

6. When installing the valve, be sure that the faces of the pipe flanges are parallel to the raised faces of the valve. If the flanges are not parallel the face gaskets may leak.
7. Install the face gaskets between the flanges. Be sure that the inside diameter of the face gasket has the same or slightly larger inside diameter than the raised face for the valve.
8. Install the flange bolts. Stud bolts should be installed in the chest area of the valve. Be sure that the bolts are the proper length.

NOTE: Be sure that the bolts do not bottom out on the liner. If the bolts bottom out on the liner, they may damage the pressure containing part of the valve.

9. Tighten the flange bolts. Tighten the bolts to the recommended torque and tighten all of the bolts evenly. NOTE: If the flange bolting is not tightened evenly the valve may be damaged.
10. Apply grease to both the stem and grease nipple. Operate the valve open and close, repeat the application of grease. Repeat this every three months or as necessary.
11. **IMPORTANT** Tighten the packing bolts before applying pressure to the valve. Packing bolts are loosened to increase the life of the packing during storage.

# OPERATION

**ACTUATORS** All actuators are furnished completely assembled and fully operational. All valves with positioners and limit switches or other instruments are properly set at the Red Valve factory.

**HANDWHEEL** The standard Series GSR has a left hand stem thread. This allows the valve to close when the handwheel is turned in the clockwise direction. The handwheel is labeled O-S (open and shut). The handwheel is turned in either direction until the gate stops moving or is fully seated.

**BEVEL GEAR** Bevel gears operate the same as the standard handwheel. The handwheel is turned clockwise to close and counter clockwise to open.

**CHAINWHEEL** Chainwheels can be furnished on both standard valves and valves with bevel gears. The chain must be fed through the guides and over the spokes around the outside diameter of the rim. The ends of the chain are then connected with a connecting link.

**CYLINDER ACTUATORS** Cylinder actuated valves require a 50 psi air supply to operate the standard cylinder. Actuators may be sized for higher or lower plant air supply. A four-way valve must be used to operate a standard cylinder. The open air supply is connected to the lower cylinder head and close air source is attached to the upper cylinder head. The valve must be assembled so that one side of the piston is exposed to plant air, the other side of the piston must be vented. If the valve has a fail safe system, air only needs to be supplied to the open connection for fail close systems and the close connection for fail open valves. The spring side of the piston should be vented.

If a pneumatic positioner is used, a 3 to 15 psi instrument signal is used to control the positioner. Other pressure ranges of instrument signals are available. Unless otherwise specified, the positioner will close the valve upon increase of signal pressure.

Electronic positioners require a 4 to 20 mA control signal to position the valve. As with pneumatic positioners, other control signals may be provided and the standard positioner closes on increase of the instrument signal.

**ELECTRIC ACTUATORS** Electric Actuators come completely operational, with limit and torque switches set. Please refer to the individual actuator manuals for additional operation or maintenance information.

## RESILIENT SEAT REPLACEMENT

1. Make sure there is no pressure on the valve.
2. Remove the valve from the pipeline.
3. Close the valve so that the metal retaining ring is pushed away from the body.
4. Insert a standard screwdriver between the body and metal retaining ring. Do not insert the screwdriver too deeply or it may damage the gasket. Gently twist the screwdriver several times around the circumference of the seal retainer ring. NOTE: Be sure to remove the retaining ring evenly.
5. Remove the two alignment pins. Remove the seat and the gasket.
6. Remove any rough spots with a fine file or sand paper. Only remove enough metal to smooth the surface. Clean the metal retaining ring. Make sure that the faces of the valve and seal retainer are clean and free of scratches and dents.
7. Replace the seat ring and gasket if necessary. Use silicon seal to keep gasket in place.
8. Open the valve.
9. Insert the retainer ring assembly. NOTE: Be sure that the alignment pins are installed and the retainer ring is installed evenly.
10. Install the valve and new flange gaskets per the Installation Section. NOTE: Be sure that the valve is installed in the proper direction, with the seat on the low pressure side of the valve.

## CYLINDER MAINTENANCE

The air used to operate the pneumatic cylinders, should be free of water and other debris; it is not necessary to lubricate the air, but an air filter is recommended. If water and other debris are in the air supply, cylinder life may be shortened.

1. Check the piston rod for scratches and damage. Repair any minor damage with a fine sandpaper or file. Only remove enough metal to smooth the damaged area.
2. Make sure that there is no pressure in the valve.
3. Close the valve and remove air pressure from the cylinder. For valves with fail open cylinders, closing pressure must be maintained on the cylinder. Remove the bolts that connect the piston rod to the gate. Operate the cylinder to the open position. For valves with fail close cylinders, remove the cylinder assembly from the yoke.

## PISTON ROD SEAL REPLACEMENT

4. Remove the adapter plate on the end of the piston rod.

5. Remove the four (4) bolts that connect the bronze seal retainer to the lower cylinder head. Remove the bronze seal retainer.
6. Apply approximately 3 to 5 psi to the open side of the cylinder. This should push the piston rod seal down the piston rod. Remove the piston rod seal from the piston rod.
7. Replace the piston rod seal. Be careful not to damage the seal during installation. Inspect the wiper ring in the seal retainer and replace it if necessary. Reinstall the seal retainer and tighten the four bolts evenly.

## PISTON SEAL AND CYLINDER GASKET REPLACEMENT

8. Cylinders with failsafe systems may remain bolted to the valve body. Remove the four upper cylinder head nuts.

**CAUTION: Make sure there is no pressure on the cylinder. If the system has a spring loaded fail safe system, remove the top cylinder head nuts evenly. If the nuts are not removed evenly, the tie rod studs may be bent or broken, possibly causing injury.**

9. Remove the upper cylinder head. Remove the spring if the cylinder has a fail safe option. Remove the cylinder from over the piston.
10. Clean the inside of the cylinder of any scale or buildup that has developed. If the cylinder walls are scratched, use a very fine sandpaper to remove the scratch or debris.
11. Clean both cylinder gasket grooves and replace the gaskets if necessary.
12. Remove the nut that retains the piston to the piston rod. Remove the upper piston stop and piston head and small o-rings.
13. Replace the first small o-ring that seals the piston rod and piston head. Install the piston head and second small o-ring. Install the upper piston stop and retainer nut. Tighten the retainer nut, use the hole in the piston rod to keep the piston rod from turning. NOTE: Do not use a pipe wrench or chain wrench on the piston rod.
14. Remove the o-ring on the piston head with a blunt instrument. Be very careful not to scratch the outer edge of the o-ring groove or piston O.D. If the areas are damaged, remove any scratches of damaged areas with a fine file or sandpaper.
15. Lubricate the piston o-ring, cylinder gaskets and inside of the cylinder. Use only compatible lubricants. Install the cylinder over piston head. NOTE: Install the spring if the valve has a fail safe system. Install the upper cylinder head, tighten the cylinder head nuts evenly.
16. Attach the adapter plate to the end of the piston rod. Slowly close the piston, be sure that the groove in the adapter plate lines up with the gate. Install the bolts that connect the gate to the piston rod.
17. Operate the valve open and close several times and check that all nuts and bolts are tight.

# MAINTENANCE

**INSPECTION** Valves should occasionally be inspected for damage and wear. The inspection period should be determined by the severity of the service and environment. If valves are periodically inspected and preventative maintenance done, the valve will last longer and operate better.

**CAUTION:** Do not remove any valve parts or bolting with pressure in the valve. It is very easy to inspect the valve for obvious problems. Several items should be checked, they are as follows: Check the stem for wear and any damaged threads. If threads are damaged, use a small file to remove the damaged portion of the thread. Check the stem and stem bushing for small pieces of bronze which may have worn away. If excess material is noticed the stem bushing should be removed and inspected closer. If the stem or stem bushing is severely worn or damaged, replace the damaged part. After the stem and stem bushing are inspected, lubricate the entire stem and apply grease to the grease nipple until clean grease begins to appear.

The next item to be inspected should be the exposed portion of the gate when it is in the full open position. Check for scoring and excessive wear. If the gate is excessively worn or scored, the valve should be removed from the line and both the seat and entire gate inspected. If the gate and seat show only slight damage, they may be repaired by using a fine grinding wheel or fine sandpaper. If the gate is severely damaged it should be replaced. If the metal seat is severely damaged the valve body must be replaced. Severely damaged elastomer seats or seat rings may be replaced.

Leakage through and gland packing can be easily checked. If the packing is leaking, tighten the packing bolts. All packing bolts must be tightened evenly. If this does not eliminate or reduce the leakage to a satisfactory level, another ring of packing may be added, or the packing may be replaced. If the outside of the valve is exposed to a corrosive atmosphere or fluids, the flange bolting and cast iron body should be checked for severe corrosion. **CAUTION:** Do not remove any valve parts with pressure in the valve.

## ADDITIONAL PACKING INSTALLATION

If the gate packing leaks and the leak can not be stopped by tightening the packing bolts, check to see if the packing gland is bottomed out on the body or the base of the yoke. If additional packing needs to be added, follow the instructions below.

1. Be sure that there is no pressure in the valve.
2. Open the valve. For large cylinder sizes, open pressure may have to be maintained. For valves with a fail close cylinder, open pressure must be maintained on the cylinder.
3. Remove the bolts from the packing stuffer. Lift the packing stuffer, exposing the upper layer of packing.

4. Insert one ring of packing around the gate. Packing should be scarf cut (on a 45 degree angle). If packing is cut straight across, be sure that the ends of the packing butt together and do not overlap.

5. Tamp the packing down with a wood, plastic or brass rod, be sure that the packing contacts the gate and wall of the gland all the way around.

6. Lower the packing stuffer and partially tighten the bolts. Tighten the bolts evenly.

7. Operate the valve open and close several times to break in the packing. Fully tighten the packing bolts.

## PACKING REPLACEMENT

1. Be sure that there is no pressure in the valve.
2. Close the valve. Disconnect the stem from the gate by removing the pin or bolts from the gate.
3. Raise the stem or piston rod. Open pressure must be maintained on fail close cylinders.
4. Remove the bolts from the packing stuffer. Remove the packing stuffer. Remove the old packing. **NOTE:** Be very careful not to damage the gate or lining.
5. Insert one ring of packing around the gate. Packing should be scarf cut (on a 45 degree angle), to make the packing seal better. Great care must be taken to make sure that the gate is flush against the seat. **NOTE:** If the packing is cut straight across, be sure that the ends of the packing butt together and do not overlap. Alternate the cut ends of the packing.
6. Tamp the packing to the bottom of the gland. Use a wood, plastic or brass rod and be sure not to scratch the gate or wall of the gland. **NOTE:** Be sure that the gate is against the seat, and that packing contacts wall of the gland and the gate all the way around.
7. Repeat steps 5 and 6 with another strip of packing. The end joints of the packing should be alternated to reduce the possibility of leakage.
8. Install the rubber secondary seal and push it to the bottom of the gland.
9. Repeat steps 5 and 6 with the third and final layer of packing.
10. Install the packing stuffer and tighten the bolts evenly. The bolts should not be completely tightened. Reconnect the gate to the actuator.
11. Operate the valve several times to break in the packing. Be sure that the gate is against the seat. Fully tighten the packing bolts.

# ACTUATORS

## 1. REQUIREMENTS

A four-way valve must be used to operate a standard cylinder. The open air supply is connected to the lower cylinder head and close air source is attached to the upper cylinder head. The valve must be assembled so that one side of the piston is exposed to plant air, the other side of the piston must be vented. If the valve has a fail open or fail closed spring system, air only needs to be supplied to the open connection for fail close systems and the close connection for fail open valves. The spring side of the piston must be vented.

If a pneumatic positioner is used, a 3 to 15 psi instrument signal is used to control the positioner. Other pressure ranges of instrument signals are available. Unless otherwise specified, the positioner will close the valve upon increase of signal pressure.

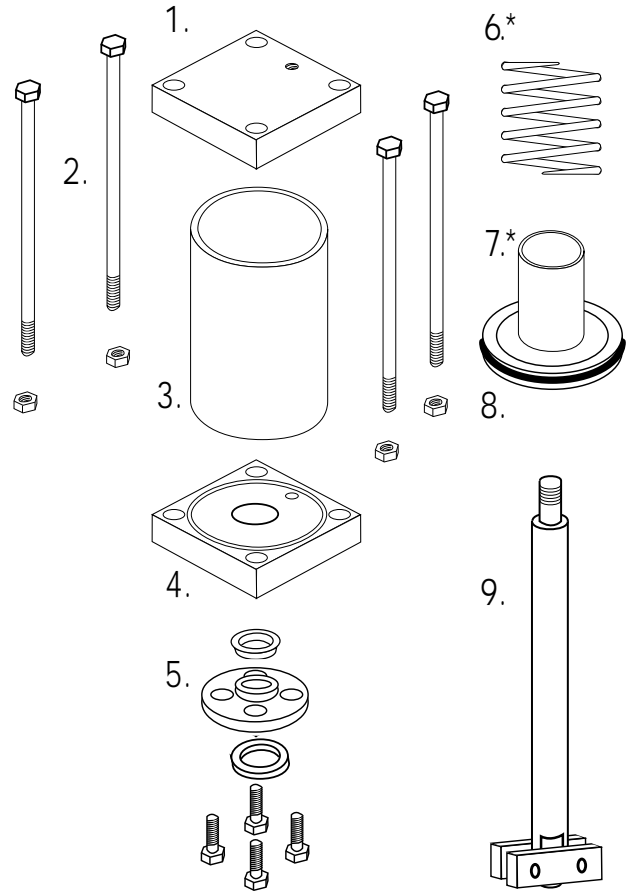
Electronic positioners require a 4 to 20 mA control signal to position the valve. As with pneumatic positioners, other control signals may be provided and the standard positioner closes on increase of the instrument signal.

## 2. ACTUATOR REMOVAL AND REFURBISHMENT

**WARNING:** SPRING LOADED ACTUATORS MUST BE SERVICED WITH EXTREME CAUTION TO PREVENT INJURY. THE SPRINGS ARE COMPRESSED AND HIGHLY STRESSED. THE TOP CYLINDER HEAD OR OTHER PARTS CAN FLY OFF AND CAUSE SERIOUS INJURY IF THE SPRING COMPRESSION IS NOT RELIEVED PROPERLY.

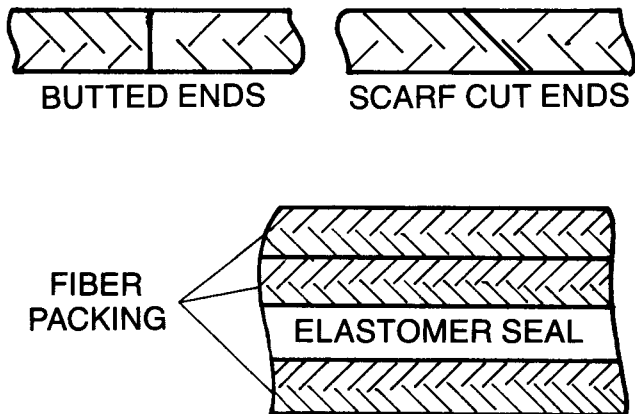
## PARTS – Pneumatic Cylinder

- |                         |                       |
|-------------------------|-----------------------|
| 1. Cylinder Top Head    | 5. Seal Assembly      |
| 2. Tie Rods             | 6.* Spring            |
| 3. Cylinder             | 7.* Piston Stop       |
| 4. Cylinder Bottom Head | 8. Piston with O-ring |
|                         | 9. Piston Rod         |

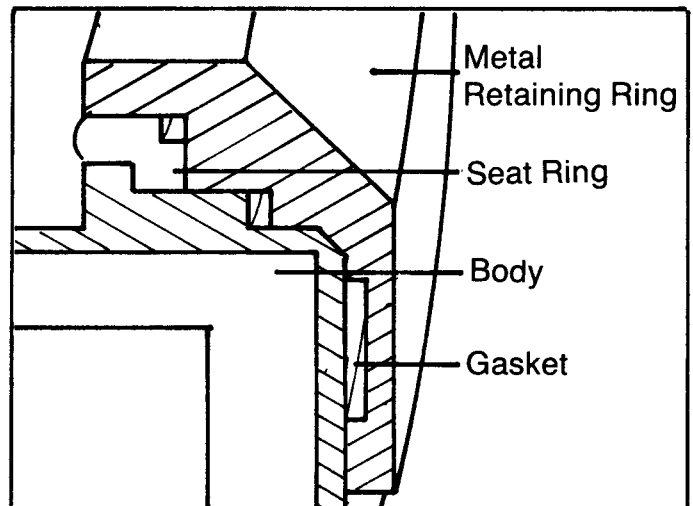


\* Spring Return Cylinders Only

## PACKING



## ELASTOMER SEATS



## NUMBER & SIZE OF BOLTS PER VALVE

VALVE SIZE	BOLTS	THREAD SIZE	LENGTH	# OF STUDS	STUD LENGTH	STUD SIZE	# OF BOLTS	LENGTH
2"	8	3/8"-11 UNC	1.375"	2	5.50"	5/8"-11UNC	4	1.375"
3"	8	3/8"-11 UNC	1.500"	2	6.00"	5/8"-11 UNC	4	1.500"
4"	16	3/8"-11 UNC	1.500"	6	6.00"	5/8"-11UNC	4	1.500"
5"	16	3/8"-10UNC	1.625"	6	6.50"	3/4"-10UNC	4	1.625"
6"	16	3/4"-10UNC	1.750"	6	6.50"	3/4"-10UNC	4	1.750"
8"	16	3/4"-10UNC	1.875"	8	7.25"	3/4 "-10UNC	4	1.875"
10"	24	7/8"-9UNC	2.000"	8	7.75"	7/8"-9UNC	8	2.000"
12"	24	7/8"-9UNC	2.125"	8	8.00"	7/8"-9UNC	8	2.125"
14"	24	1 "-8UNC	2.250"	8	8.50"	1 "-8UNC	8	2.250"
16"	32	1 "-8UNC	2,000"	10	9.25"	1 "-8UNC	12	2.375"
18"	32	1 1/8"-7UNC	2.500"	10	9.75"	1 1/8"-7UNC	12	2.500"
20"	40	1 1/8"-7UNC	2.750"	14	11.00"	1 1/8"-7UNC	12	2.750"
24"	40	1 1/4"-7UNC	3.000"	14	11.50"	1 1/4"-7UNC	12	3.000"

\*Thru bolted Flanges are drilled and tapped in the chest area. Bolt lengths assume standard ANSI 150. Flange and 1/8 to 1/16 thick gasket.

## RED VALVE WARRANTY

### WARRANTIES - REMEDIES - DISCLAIMERS - LIMITATION OF LIABILITY

Unless otherwise agreed to in writing signed by Red Valve, all Products supplied by Red Valve will be described in the specifications set forth on the face hereof.

THE WARRANTIES SET FORTH IN THIS PROVISION ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER STATUTORY, EXPRESS OR IMPLIED (INCLUDING ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ALL WARRANTIES ARISING FROM COURSE OF DEALING OR USAGE OR TRADE).

Red Valve Products are guaranteed for a period of one year from date of shipment, against defective workmanship and material only, when properly installed, operated and serviced in accordance with Red Valve's recommendations. Replacement for items of Red Valve's manufacture will be made free of charge if proved to be defective within such year; but not claim for transportation, labor or consequential damages shall be allowed. We shall have the option of requiring the return of the defective product to our factory, with transportation charges prepaid, to establish the claim and our liability shall be limited to the repair or replacement of the defective product, F.O.B. our factory. Red Valve will not assume costs incurred to remove or install defective products nor shall we incur backcharges or liquidated damages as a result of warranty work. Red Valve does not guarantee resistance to corrosion erosion, abrasion or other sources of failure, nor does Red Valve guarantee a minimum length of service, or that the product shall be fit for any particular service. Failure of purchaser to give prompt written notice of any alleged defect under this guarantee forthwith upon its discovery, or use, and possession thereof after an attempt has been made and completed to remedy defects therein, or failure to return product or part for replacement as herein provided, or failure to install and operate said products and parts according to instructions furnished by Red Valve, or failure to pay entire contract price when due, shall be a waiver by purchaser of all rights under these representations. All orders accepted shall be deemed accepted subject to this warranty which shall be exclusive of any other or previous warranty, and shall be the only effective guarantee or warranty binding on Red Valve, anything on the contrary contained in purchaser's order, or represented by any agent or employee of Red Valve in writing or otherwise, notwithstanding implied warranties. RED VALVE MAKES NO WARRANTY THAT THE PRODUCTS, AUXILIARIES AND PARTS ARE MERCHANTABILITY OR FIT FOR ANY PARTICULAR PURPOSE.