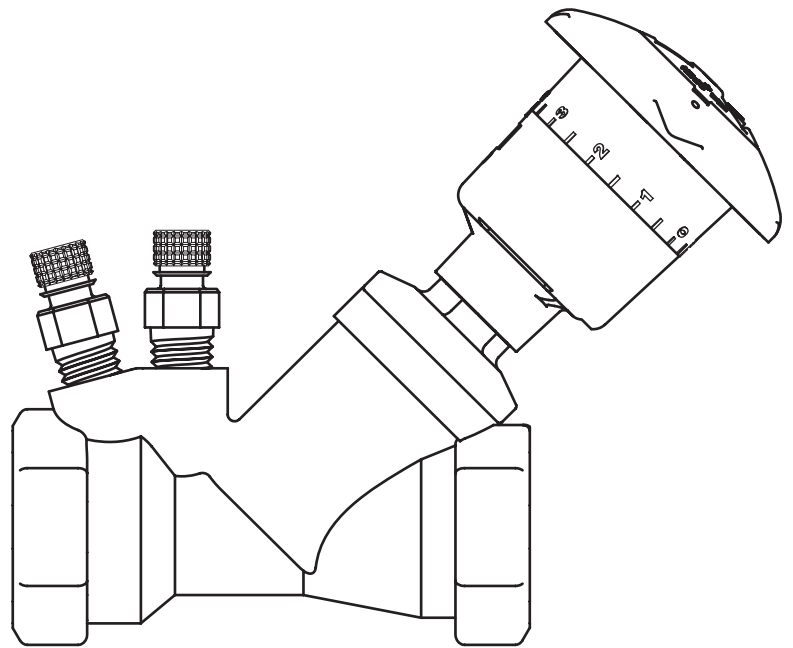




AURORA[®]



MODELS CBV-S5 AND CBV-NPT5 **FIVE TURN VENTURI CIRCUIT BALANCING VALVES**

INSTALLATION AND OPERATION MANUAL

NOTE! To the installer: Please make sure you provide this manual to the owner of the equipment or to the responsible party who maintains the system.


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CALIFORNIA PROPOSITION 65 WARNING:

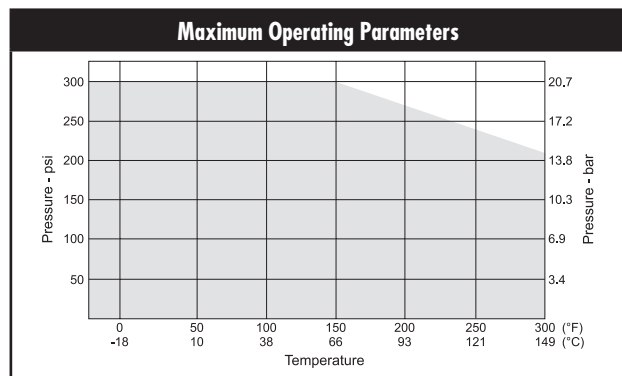
Warning: This product and related accessories contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

TYPICAL APPLICATIONS:

Aurora® circuit balancing valves are most often used in hydronic heating and cooling installations, using a recirculating liquid as the heat transfer medium. Suitable liquids include water, glycol-water mixtures (both ethylene and propylene glycols) and brine. For applications or liquids other than these, please call Aurora Technical Support for recommendation of suitability of these valves in the target application.

Technical Data	
Connection	Model CBV-S5 – Solder Joint Model CBV-NPT5 – Threaded NPT
Maximum Working Pressure	300 psi / 20 bar (PN20)
Operating Temperature Range	-4°F to 300°F (-20°C to 150°C)
Product is in compliance with lead free pipe, pipe fittings, plumbing fittings or fixtures, as defined by CA, LA, MD, VT state laws and the U.S. Safe Water Drinking Act.	
	

Materials of Construction	
Body, Bonnet	Brass Alloy CW617
Stem and Disk	Brass Alloy B16
Elastomers	EPDM
Handwheel	Reinforced Nylon; ABS



Flow Rate Ranges		
Valve Size	Min. Flow	Max. Flow
½" LF	0.26 (0.016)	2.2 (0.14)
¾" LF	0.40 (0.025)	3.4 (0.21)
½"	1.4 (0.086)	10.4 (0.66)
¾"	2.1 (0.13)	13.5 (0.85)
1"	5.2 (0.33)	20.2 (1.28)
1¼"	8.2 (0.52)	35.5 (2.24)
1½"	8.1 (0.51)	48.9 (3.09)
2"	14.0 (0.88)	83.3 (5.25)

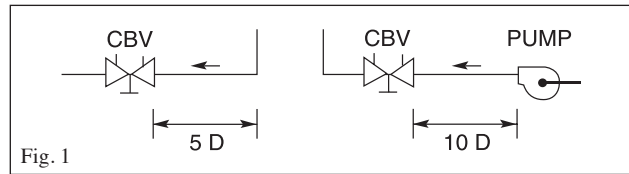
Note: Flow in US gpm (L/s)

INSTALLATION:

Clean the system piping of debris (pipe scale, rust, welding slag) and other contaminants. As with any water system it is important to make provisions to keep the system clean. For optimum operation, air entrapment in the fluid must be removed.

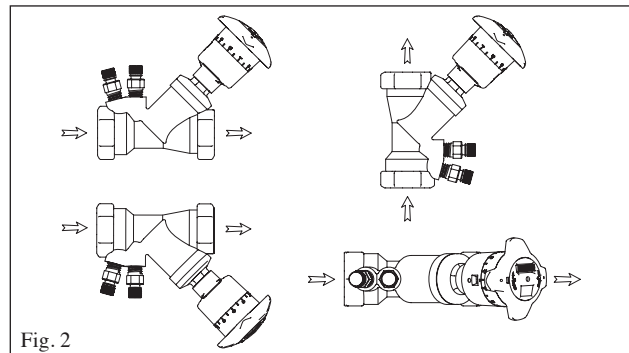
The operation of the valve is dependent on the fluid characteristics such as specific gravity and viscosity, which vary with the fluid temperature. For installations using fluids other than 100% water, flow rates must be corrected for the changes created by the fluid medium.

To ensure accuracy of measurement Circuit Balancing Valves (CBV's) should be located at least five pipe diameters downstream from any fitting and at least ten pipe diameters downstream from a pump (as illustrated in Fig. 1).



All CBV's are marked with an arrow on the valve body to indicate direction of flow. The arrow must point in the direction of flow for proper operation.

CBV's may be installed in horizontal or vertical piping (as illustrated in Fig. 2). Provisions must be made for easy access to the probe metering ports (PMP's), reading scale and memory stop.



SWEAT (SOLDER) CONNECTIONS:

CBV-S5 models are supplied with sweat style connections. Caution should be used when sweat style connection valves are installed to prevent overheating the valve.

Solder the valve body in line using 95/5 (95% tin, 5% antimony) type solder or equal. Always follow local plumbing codes for installation best practices.

CAUTION

Before soldering, ensure the valve is opened at least one full turn to avoid damage to the sealing O-ring due to overheating.

Aurora recommends that the CBV be protected during installation by wrapping a damp rag around the handle/bonnet assembly prior to soldering the valve into the line.

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THREADED CONNECTIONS:

CBV-NPT5 models are tapped with NPT threaded connections. All threaded connections should be sealed using an approved pipe sealant per industry standards. Once the CBV installation has been completed and the system has been filled and purged, each valve loop must be adjusted to the correct flow setting. Employ piping best practice when engaging pipe to threaded valves. Overtightening when installing valves may result in fracturing of the valve body at the threads.

Warning:

Aurora DOES NOT recommend leak testing an HVAC system with air due to safety concerns.

Testing HVAC systems with pressurized air can be dangerous due to the high compressibility of air, as compared to water.

OPERATION:

Valves are circuit balancing valves that are selected to deliver the correct flow in a piping circuit based on line size and design flow rate.

To set the system flow, adjust the handwheel position until the differential pressure reading across the venturi corresponds to the required GPM.

The valve operates from fully open to closed by a clockwise rotation of the red handwheel using five 360° turns. Two indicators describe the position of the valve: the handwheel turns dial and the micrometer scale.

• **“Handwheel Turns” Dial:**

This dial is printed on the outer surface of a gearing mechanism located inside the lower half of the handle assembly (Fig. 6). Each complete 360° revolution of the handwheel is visible through a display window and is scaled 0 – 5 to indicate the valve position in terms of the number of full turns. (Fig. 3)

• **Micrometer Scale:**

This scale is marked 0 – 9 and is located on the upper half of the handle assembly. Each mark represents 1/10th of a full, 360° turn of opening when lined up with an arrowhead symbol, located above the handwheel turns display window. (Fig. 3)

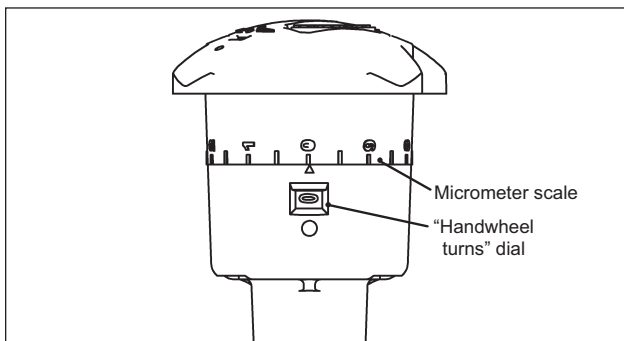


Fig. 3: CBV setting of 0.0 indicates that the valve is closed. Both the handwheel turns dial and the micrometer scale indicate a valve position reading of 0.

The valve is considered “zeroed” when fully closed hand-tight. The “0” on the micrometer scale should be within one half of 1/10th of a turn of the arrowhead symbol when the valve is closed hand-tight. **DO NOT USE A WRENCH ON THESE VALVES – THEY SHOULD BE OPENED AND CLOSED HAND-TIGHT ONLY!**

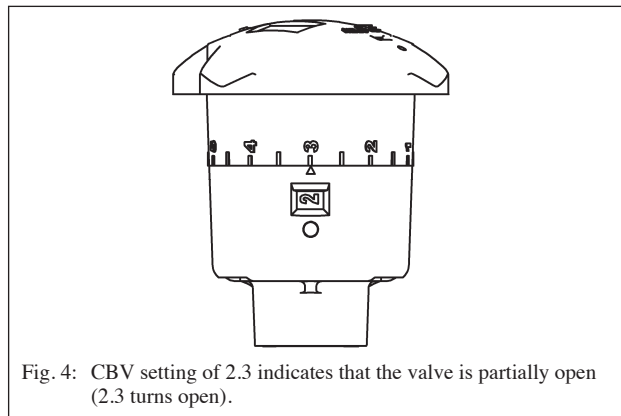


Fig. 4: CBV setting of 2.3 indicates that the valve is partially open (2.3 turns open).

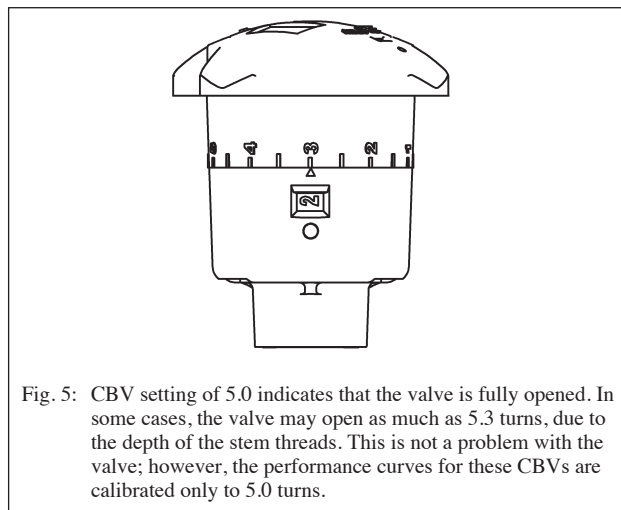


Fig. 5: CBV setting of 5.0 indicates that the valve is fully opened. In some cases, the valve may open as much as 5.3 turns, due to the depth of the stem threads. This is not a problem with the valve; however, the performance curves for these CBVs are calibrated only to 5.0 turns.

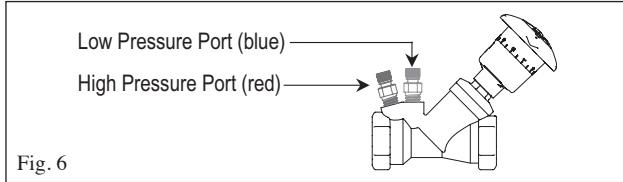
CAUTION

Hot water leakage can occur from metering ports (P.M.P.’s) during probe insertion and hookup of metering device. Wear protective eyewear and clothing to prevent personal injury when measuring pressure.

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Connect pressure measuring device to the CBV metering ports as follows:

- Remove protective cap from metering ports (¼" NPT connection).
- Insert the meter probe into the metering ports. The hose with red fitting, up stream; the hose with blue fitting downstream. Refer to Fig. 6.



CAUTION

When inserting probe, do not bend, as this will cause permanent damage to the probe, adversely affecting the pressure measurement. Do not use any lubrication on the probes when inserting them. If necessary, simply wet the probes with clean water.

The probe should not be left inserted into the fitting for prolonged periods of time, overnight, etc., as leakage of the P.M.P. may occur when the probe is removed.

The locking nut on the probe is designed to hold it in the P.M.P. when taking readings. As sealing is accomplished internally on the probe stem, it is only necessary to tighten the locking nut FINGER-TIGHT. Overtightening may cause damage to the P.M.P. or locking nut threads.

Before taking a measurement reading, set the valve to its fully open position (5.0) or at a preset position. Read the pressure drop across the venturi with a digital meter. Determine flow rate by use of Venturi C_v Performance Curves (Fig. 8).

The handle of the CBV is not designed to be removable. Do not try to take it off the valve, or it may become damaged. If for any reason the handle is damaged, replace the entire handle/stem assembly with the appropriate replacement part indicated below.

571155-225 for size 1/2"-2"
570155-105 for size 2-1/2"-6"
570155-015 for size 8"-12"

MEMORY SETTING:

After valve has been properly adjusted and without moving the handwheel, the locking memory stop should be set. The memory stop will allow the valve to be fully closed for isolation and then reopened to the preset flow position.

Insert a 2.5 mm (or 3/32") Allen key through the hole provided in the valve's handle cap. (Fig. 7)

Turn the setscrew in a clockwise direction until it stops. It is not necessary to tighten. The memory has now been set. This establishes the maximum opening position for this particular valve.

The valve may now be closed tightly, as needed, for isolating the piping during system maintenance.

To return the valve to its preset "balanced" position, simply open the valve by turning the handwheel counterclockwise until the handle stops turning (the valve stem inside the handle has hit the memory set screw). **DO NOT APPLY EXCESSIVE FORCE WHEN REOPENING THE VALVE – OPEN ONLY UNTIL THE VALVE STOPS TURNING UNDER "HAND-TIGHT" CONDITIONS. DO NOT USE A WRENCH TO OPEN, CLOSE, OR TIGHTEN VALVES.**

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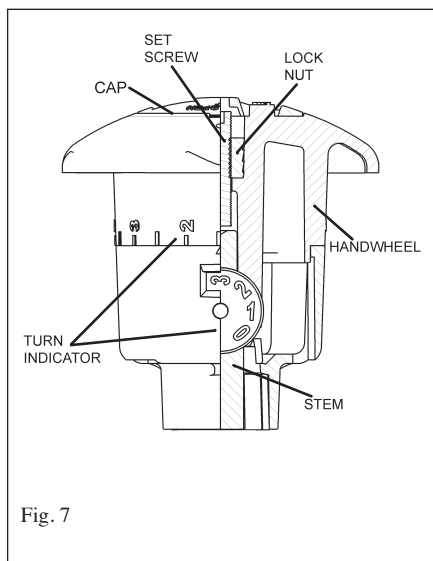


Fig. 7

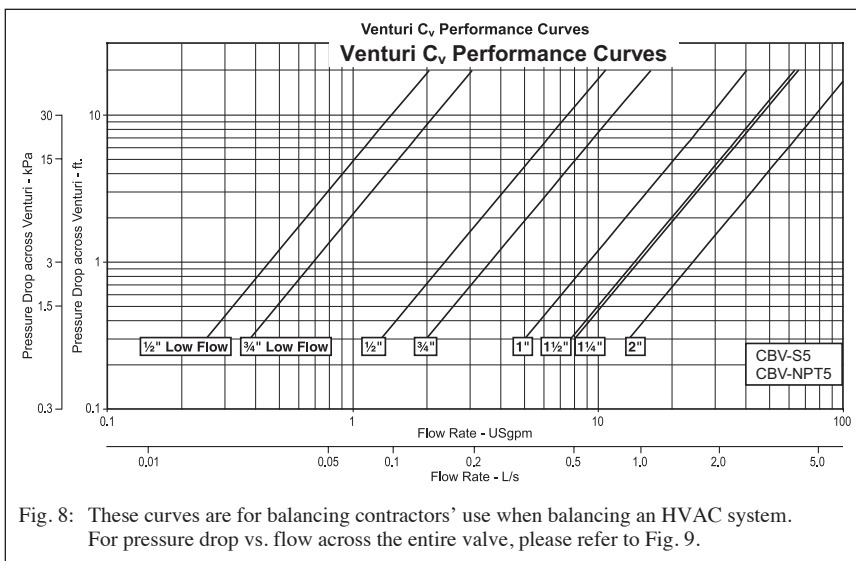


Fig. 8: These curves are for balancing contractors' use when balancing an HVAC system. For pressure drop vs. flow across the entire valve, please refer to Fig. 9.

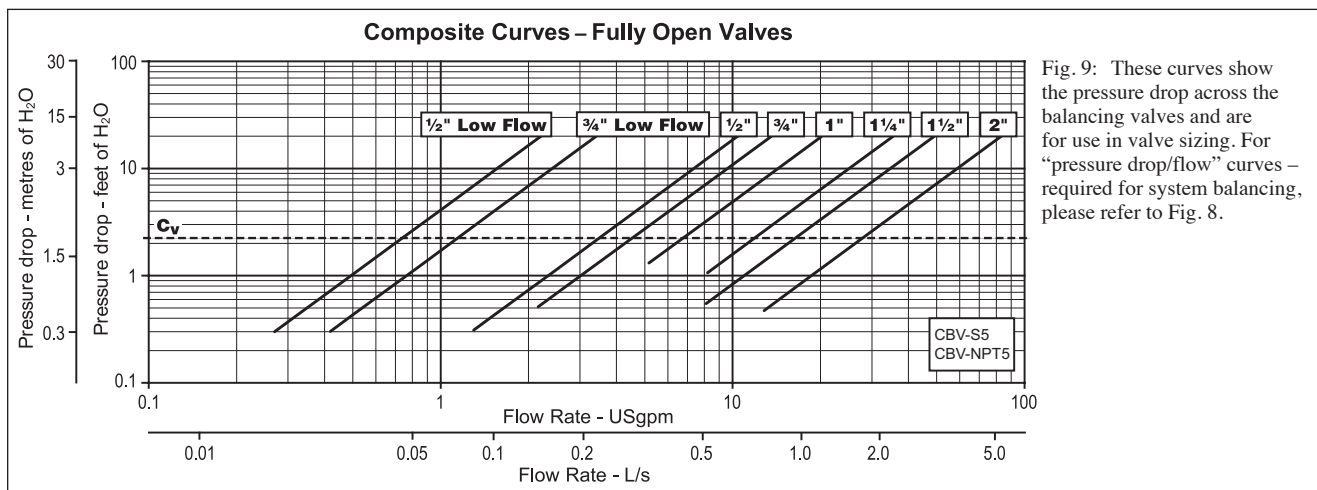


Fig. 9: These curves show the pressure drop across the balancing valves and are for use in valve sizing. For "pressure drop/flow" curves - required for system balancing, please refer to Fig. 8.

INSTALLATION TROUBLESHOOTING GUIDE

Fault	Possible Cause	Remedy
Valve is leaking: • At the bonnet / body joint. • At the pipe connection.	Bonnet O-ring has been damaged.	Remove the handle/stem assembly and replace with the appropriate replacement part indicated in the table on page 3.
	If solder joint - the joint has failed, or was not soldered properly.	Resolder the connection and recheck for leakage.
	If threaded - the connection is not sufficiently tight, or	Tighten and recheck for leakage.
	the valve was overtightened during installation and the valve body has cracked (fractured).	Remove and reinstall a new valve, being careful not to overtighten.
Valve does not shut off completely when closed (hand tight).	The seat O-ring has been deformed due to overheating during soldering.	Remove the handle/stem assembly and replace with the appropriate replacement part indicated in the table on page 3.

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WARRANTY

Seller warrants equipment (and its component parts) of its own manufacture against defects in materials and workmanship under normal use and service for one (1) year from the date of installation or start-up, or for eighteen (18) months after the date of shipment, whichever occurs first. Seller does not warrant accessories or components that are not manufactured by Seller; however, to the extent possible, Seller agrees to assign to Buyer its rights under the original manufacturer's warranty, without recourse to Seller. Buyer must give Seller notice in writing of any alleged defect covered by this warranty (together with all identifying details, including the serial number, the type of equipment, and the date of purchase) within thirty (30) days of the discovery of such defect during the warranty period. No claim made more than 30 days after the expiration of the warranty period shall be valid. Guarantees of performance and warranties are based on the use of original equipment manufactured (OEM) replacement parts. Seller assumes no responsibility or liability if alterations, non-authorized design modifications and/or non-OEM replacement parts are incorporated. If requested by Seller, any equipment (or its component parts) must be promptly returned to Seller prior to any attempted repair, or sent to an authorized service station designated by Seller, and Buyer shall prepay all shipping expenses. Seller shall not be liable for any loss or damage to goods in transit, nor will any warranty claim be valid unless the returned goods are received intact and undamaged as a result of shipment. Repaired or replaced material returned to customer will be shipped F.O.B., Seller's factory. Seller will not give Buyer credit for parts or equipment returned to Seller, and will not accept delivery of any such parts or equipment, unless Buyer has obtained Seller's approval in writing. The warranty extends to repaired or replaced parts of Seller's manufacture for ninety (90) days or for the remainder of the original warranty period applicable to the equipment or parts being repaired or replaced, whichever is greater. This warranty applies to the repaired or replaced part and is not extended to the product or any other component of the product being repaired. Repair parts of its own manufacture sold after the original warranty period are warranted for a period of one (1) year from shipment against defects in materials and workmanship under normal use and service. This warranty applies to the replacement part only and is not extended to the product or any other component of the product being repaired. Seller may substitute new equipment or improve part(s) of any equipment judged defective without further liability. All repairs or services performed by Seller, which are not covered by this warranty, will be charged in accordance with Seller's standard prices then in effect.

THIS WARRANTY IS THE SOLE WARRANTY OF SELLER AND SELLER HEREBY EXPRESSLY DISCLAIMS AND BUYER WAIVES ALL OTHER WARRANTIES EXPRESSED, IMPLIED IN LAW OR IMPLIED IN FACT, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Seller's sole obligation under this warranty shall be, at its option, to repair or replace any equipment (or its component parts) which has a defect covered by this warranty, or to refund the purchase price of such equipment or part. Under the terms of this warranty, Seller shall not be liable for (a) consequential, collateral, special or liquidated losses or damages; (b) equipment conditions caused by normal wear and tear, abnormal conditions of use, accident, neglect, or misuse of said equipment; (c) the expense of, and loss or damage caused by, repairs or alterations made by anyone other than the Seller; (d) damage caused by abrasive materials, chemicals, scale deposits, corrosion, lightning, improper voltage, mishandling, or other similar conditions; (e) any loss, damage, or expense relating to or resulting from installation, removal or reinstallation of equipment; (f) any labor costs or charges incurred in repairing or replacing defective equipment or parts, including the cost of reinstalling parts that are repaired or replaced by Seller; (g) any expense of shipment of equipment or repaired or replacement parts; or (h) any other loss, damage or expense of any nature.

The above warranty shall not apply to any equipment which may be separately covered by any alternate or special warranties.

PERFORMANCE: In the absence of Certified Pump Performance Tests, equipment performance is not warranted or guaranteed. Performance curves and other information submitted to Buyer are approximate and no warranty or guarantee shall be deemed to arise as a result of such submittal. All testing shall be done in accordance with Seller's standard policy under Hydraulic Institute procedures.

LIABILITY LIMITATIONS: Under no circumstances shall the Seller have any liability under the Order or otherwise for liquidated damages or for collateral, consequential or special damages or for loss of profits, or for actual losses or for loss of production or progress of construction, regardless of the cause of such damages or losses. In any event, Seller's aggregate total liability under the Order or otherwise shall not exceed the contract price.

ACTS OF GOD: Seller shall in no event be liable for delays in delivery of the equipment or other failures to perform caused by fires, acts of God, strikes, labor difficulties, acts of governmental or military authorities, delays in transportation or procuring materials, or causes of any kind beyond Seller's control.

COMPLIANCE WITH LAW: Seller agrees to comply with all United States laws and regulations applicable to the manufacturing of the subject equipment. Such compliance shall include: The Fair Labor Standards Acts of 1938, as amended; Equal Employment Opportunity clauses of Executive Order 11246, as amended; Occupational Safety and Health Act of 1970 and the standards promulgated thereunder, if applicable. Since compliance with the various Federal, State, and Local laws and regulations concerning occupational health and safety, pollution or local codes are affected by the use, installation and operation of the equipment and other matters over which Seller has no control, Seller assumes no responsibility for compliance with those laws and regulations, whether by way of indemnity, warranty, or otherwise. It is incumbent upon the Buyer to specify equipment which complies with local codes and ordinances.



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