CONSTRUCTION AND INSTALLATION STANDARD

FOR

CONTROL VALVES

SECOND EDITION

FEBRUARY 2015

FOREWORD

The Iranian Petroleum Standards (IPS) reflect the views of the Iranian Ministry of Petroleum and are intended for use in the oil and gas production facilities, oil refineries, chemical and petrochemical plants, gas handling and processing installations and other such facilities.

IPS is based on internationally acceptable standards and includes selections from the items stipulated in the referenced standards. They are also supplemented by additional requirements and/or modifications based on the experience acquired by the Iranian Petroleum Industry and the local market availability. The options which are not specified in the text of the standards are itemized in data sheet/s, so that, the user can select his appropriate preferences therein

The IPS standards are therefore expected to be sufficiently flexible so that the users can adapt these standards to their requirements. However, they may not cover every requirement of each project. For such cases, an addendum to IPS Standard shall be prepared by the user which elaborates the particular requirements of the user. This addendum together with the relevant IPS shall form the job specification for the specific project or work.

The IPS is reviewed and up-dated approximately every five years. Each standards are subject to amendment or withdrawal, if required, thus the latest edition of IPS shall be applicable

The users of IPS are therefore requested to send their views and comments, including any addendum prepared for particular cases to the following address. These comments and recommendations will be reviewed by the relevant technical committee and in case of approval will be incorporated in the next revision of the standard.

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GENERAL DEFINITIONS:

Throughout this Standard the following definitions shall apply.

COMPANY:

Refers to one of the related and/or affiliated companies of the Iranian Ministry of Petroleum such as National Iranian Oil Company, National Iranian Gas Company, National Petrochemical Company and National Iranian Oil Refinery And Distribution Company.

PURCHASER:

Means the “Company” where this standard is a part of direct purchaser order by the “Company”, and the “Contractor” where this Standard is a part of contract documents.

VENDOR AND SUPPLIER:

Refers to firm or person who will supply and/or fabricate the equipment or material.

CONTRACTOR:

Refers to the persons, firm or company whose tender has been accepted by the company.

EXECUTOR:

Executor is the party which carries out all or part of construction and/or commissioning for the project.

INSPECTOR:

The Inspector referred to in this Standard is a person/persons or a body appointed in writing by the company for the inspection of fabrication and installation work.

SHALL:

Is used where a provision is mandatory.

SHOULD:

Is used where a provision is advisory only.

WILL:

Is normally used in connection with the action by the “Company” rather than by a contractor, supplier or vendor.

MAY:

Is used where a provision is completely discretionary.

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1. SCOPE

This Standard represents the minimum and general technical requirements for the installation of different types of control valves and their accessories, which are used in oil, gas and petrochemical industries. In any case, manufacturer's installation instructions should be strictly followed.

Note:

This is a revised version of this standard, which is issued as revision (2)-2015. Revision (1)-2003 of the said standard specification is withdrawn.

2. REFERENCES

Throughout this Standard the following dated and undated standards/codes are referred to. These referenced documents shall, to the extent specified herein, form a part of this standard. For dated references, the edition cited applies. The applicability of changes in dated references that occur after the cited date shall be mutually agreed upon by the Company and the Vendor. For undated references, the latest edition of the referenced documents (including any supplements and amendments) applies.

API (AMERICAN PETROLEUM INSTITUTE)

RP-553	"Refinery Valves and Accessories for Control and Safety Instrumented Systems"
600	"Steel Gate Valves-Flanged and Butt-welding Ends, Bolted Bonnets"
608	"Metal Ball Valves - Flanged, Threaded, and Welding Ends"
609	"Butterfly Valves: Double-flanged, Lug- and Wafer-type"
ANSI/API SPECIFICATION 6D	"Specification for Pipeline Valves"

ASME (AMERICAN SOCIETY OF MECHANICAL ENGINEERS)

ASME B16.34	"Valves - Flanged, Threaded and Welding End"
ASME B16.5	"Pipe Flanges and Flanged Fittings NPS 1/2 through NPS 24 Metric/Inch Standard"
ASME B16.10	"Face to Face and End-to-End Dimensions of Valves"

BSI (BRITISH STANDARDS INSTITUTION)

BS EN 593	"Industrial Valves - Metallic Butterfly Valves"

ISA (INSTRUMENT SOCIETY OF AMERICA)

ANSI/ISA 75.19.01	"Hydrostatic Testing of Control Valves"
ANSI/ISA 75.08.01	"Face-to-Face Dimensions for Flanged Globe-Style Control Valve Bodies: ANSI Classes 125, 150, 250, 300 and 600"
ANSI/ISA 75.08.02	"Face-to-Face Dimensions for Flanged and Flangeless Rotary Control Valves (Classes 150, 300, and 600)"

IPS (IRANIAN PETROLEUM STANDARDS)

IPS-E-PR-230	“Engineering Standard for Piping & Instrumentation Diagrams (P & IDs)”
IPS-E-EL-110	"Engineering Standard for Electrical Area Classifications"
IPS-E-IN-100	"Engineering Standard for General Instrumentation"
IPS-E-IN-160	"Engineering Standard for Control Valves"
IPS-G-IN-200	"General Standard for Instruments air system"

3. UNITS

This Standard is based on International System of Units (SI), as per IPS-E-GN-100 except where otherwise specified.

4. CONTROL VALVE INSTALLATION GENERAL REQUIREMENTS

4.1 All control valves and associated accessories should be installed so that they are readily accessible for maintenance purposes and for operation of a handwheel, if one is provided. They should generally be located at grade unless pressure head or other design conditions make such an arrangement impractical. When located above grade, control valves should be installed so that they are readily accessible from a permanent platform or walkway with ample clearances for maintenance purposes. There should be sufficient clearance between the control valve actuator and the bypass line to allow removal of the actuator, bonnet, and plug. Consult the valve installation manual for preferred mounting and orientation.

4.2 Wherever possible control valves shall be installed with stems vertically above the body.

4.3 Where equipment must be observed, while on manual control, the control valve shall be installed adjacent to the equipment.

4.4 Clearance shall be provided above and below a control valve so that the bottom flange and plug or the top-works and plug may be removed with the valve body in the pipeline.

4.5 The valve body may swing around a selected bolt axis for maintenance access. However clearance still being provided to enable inspection of the valve plug without rotating the valve in the pipeline.

4.6 Control valves shall have removable trims and sufficient clearance shall be allowed for access and removal.

4.7 Clearance also shall be provided for hand wheel operation and positioner maintenance.

4.8 Control valves at fired heaters shall be located 15 m away from burners so that maintenance can be carried out without danger of flash-back.

4.9 Control valves for flammable and volatile fluids shall not be installed adjacent to hot pumps, lines or equipment.

4.10 Control valves shall be located so that diaphragms and electric or electronic components are not damaged by heat radiated from vessels, heaters and other equipment.

4.11 Where it is necessary to reduce from line size to control valve size, swaged reducers shall be used between the block valves and the control valve. Sufficient spacing between block valves shall allow for installation of larger size control valves.

4.12 The computed valve size should be at least one pipe size smaller than lines in which control valves are installed.

4.13 For toxic or other dangerous duties control valve stems shall be bellows sealed, with an independent gland seal, the enclosed space being monitored for bellows leakage.

4.14 When sealing is not possible, a purging system with monitoring for purge flow failure shall be used.

4.15 Control valve vent and drain connections shall not be less than ¾ inch nominal bore.

4.16 Butterfly valves shall be installed with their shafts horizontal.

4.17 Where butterfly valves have to be installed in vertical lines, care shall be taken that the diaphragm actuator stays clear from the piping.

4.18 Control valves shall be installed in main lines but not in long straight runs. In the case of long straight runs, the control valves shall be offset from the main line so that they will not be subjected to line stresses caused. e.g. by thermal expansion and weight of unsupported lines.

4.19 Extra clearance shall be provided where extension bonnets or accessories are used. Clearance should also be provided on the sides of the control valve for maintenance of positioners and other devices.

4.20 Long bolting used with flangeless valves can expand when exposed to fire and cause leakage. A fire deflection shield and/or insulation is recommended. In this regard the recommendation of API RP 553 shall be followed.

4.21 Certain rotary-motion control valve types utilize low-friction plastic lined bearings and as a result are susceptible to static electricity, shall be grounded. Manufacturer's recommendations shall be followed.

5. ACTUATOR INSTALLATION

Electrically operated items such as motor actuators, solenoid valves, converters shall be approved for installation under the applicable hazardous area classifications. Refer to IPS-E-IN-100 Part I for hazardous area classification.

5.1 Pneumatic Diaphragm Actuators

Sliding stem spring loaded diaphragm actuators with air as the operating medium shall be installed vertically above the body, if piping condition prohibit this, manufacturer recommendation should be considered.

5.2 Motor-Operated Valve Actuators

5.2.1 The MOV actuator shall be an integral unit suitable for direct mounting on the valve stem at any position. The unit shall be self centering and no special alignment should be required.

5.2.2 Electric-Motor driven actuators should be mounted so that the motor is above the gear box. This arrangement prevents gear oil from saturating the motor windings.

5.3 Electro-Pneumatic Converters (Transducers)

5.3.1 Electro-Pneumatic converters where required, shall be furnished and mounted independent of the control valve.

5.3.2 Standard mounting kit shall be provided for mounting electro-pneumatic converter on a pipestand, or a panel.

5.4 Air Lock Devices

5.4.1 Air lock-up device shall be provided for all services requiring that the control valve remains in the position in which it was immediately before the air failure. On control valve with a positioner, the lock-up valve shall be installed between the positioner output and the actuator.

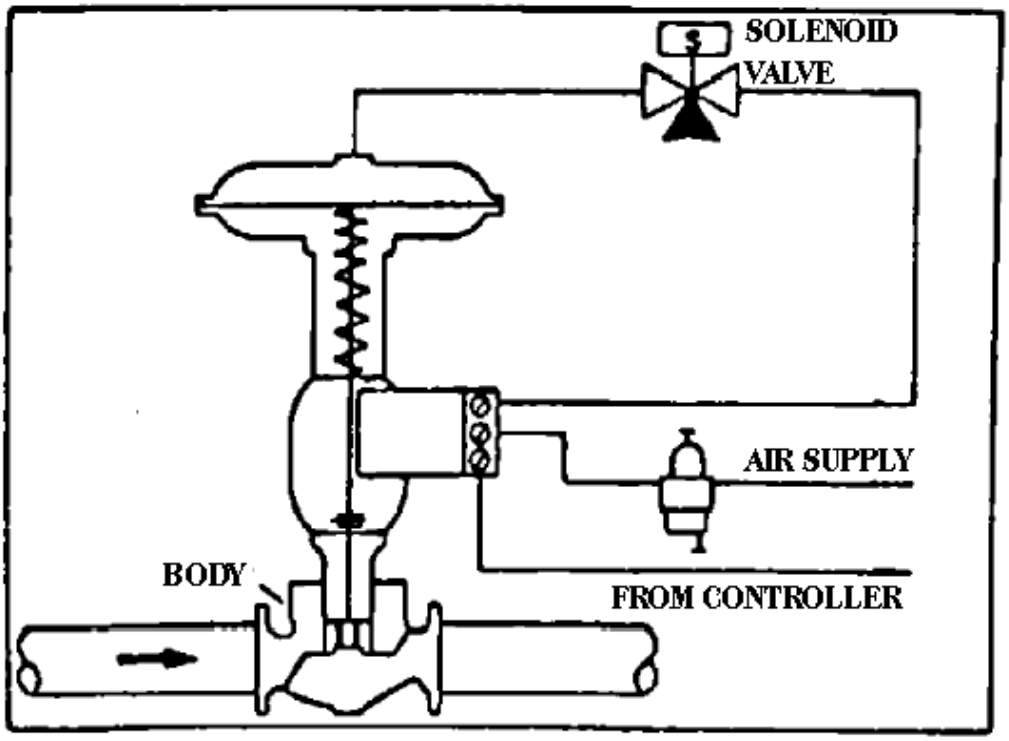
5.4.2 If air lock valves are specified, they shall be installed as close to the valve actuator as possible. However, any solenoid valves associated with protective system shall be installed between the air lock valve and the actuator. The air supply for the air lock shall be the same as for the valve positioner.

5.4.3 Valves with the air lock feature should, in addition, have a pressure gage indicating actual diaphragm pressure, for diaphragm or piston type actuators.

5.5 Solenoid-Operated Valves

5.5.1 Solenoid-operated valves are extremely versatile and are frequently used with the control valves in a variety of on-off or switching applications such as equipment override, fail-safe interlock with two valves, and switching from one instrument or pressure line to another.

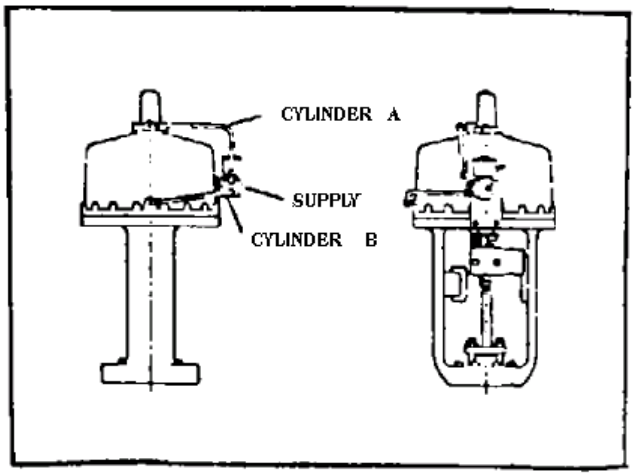
5.5.2 A typical solenoid valve installation on a pneumatically operated control valve is shown in Fig. 1. The solenoid valve is normally open and allows the positioner output into the diaphragm case. Upon a power loss, the solenoid valve closes the port to the valve positioner and bleeds pressure from the diaphragm case of the control valve.



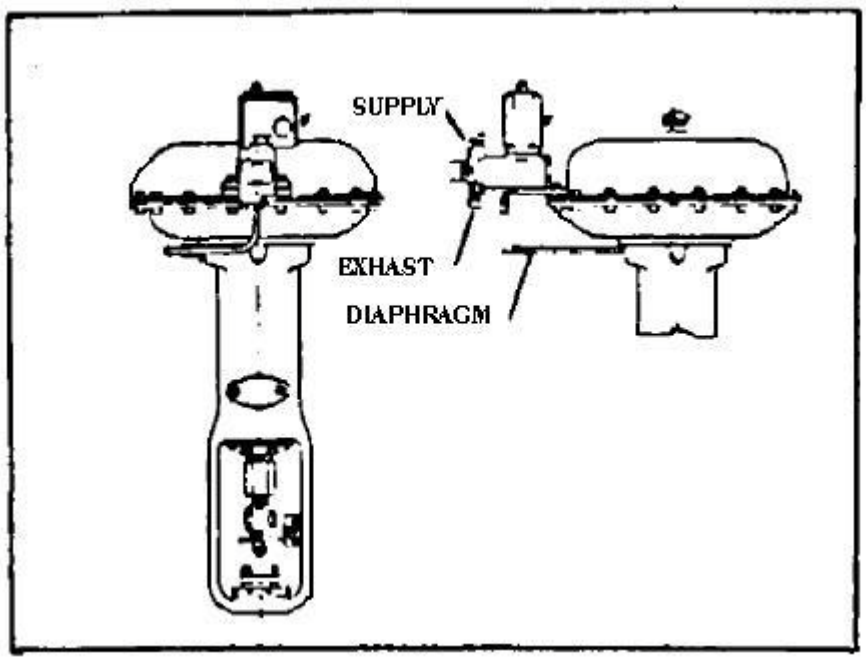
TYPICAL INSTALLATION OF A SOLENOID VALVE
Fig. 1

5.5.3 Where solenoid valves are installed in control air supplies to pneumatically operated valves to seal-in diaphragm pressure, in the event of an electrical failure, the solenoid valves should incorporate a time delay and hand reset to prevent operation resulting from transient interruptions of the electrical supply.

5.5.4 Various solenoid/actuator mounting arrangements are shown in (Fig. 2, 3) below.



TYPICAL FOUR-WAY SOLENOID VALVE MOUNTED ON ACTUATOR
Fig. 2



TYPICAL THREE-WAY SOLENOID VALVE MOUNTED ON ACTUATOR
Fig. 3

5.6 Pneumatic Cylinder Actuators

5.6.1 Pneumatic cylinder actuators which are not an integral part of the final control element, shall be located such that necessary linkage is short and straight. They shall be firmly anchored to floors or rigid structural members.

5.6.2 Where, however, the final control element (damper or louver) is installed in ducting which changes position relative to fixed structures, e.g. due to thermal expansion, or where necessary to prevent long linkages, the actuator shall be installed on the ducting. Ladders and walkways shall then be provided for easy access. (refer to Fig. 4).

5.6.3 Flexible hoses shall be provided where the cylinders are not in a fixed and rigid position.

5.7 Hydraulic Cylinder Actuators

5.7.1 Hydraulic cylinder actuators are usually an integral part of the control valve. Care shall be taken that the valve is installed with the cylinder in the position prescribed by the manufacturer.

Where necessary, access facilities shall be available for maintenance and manual operation.

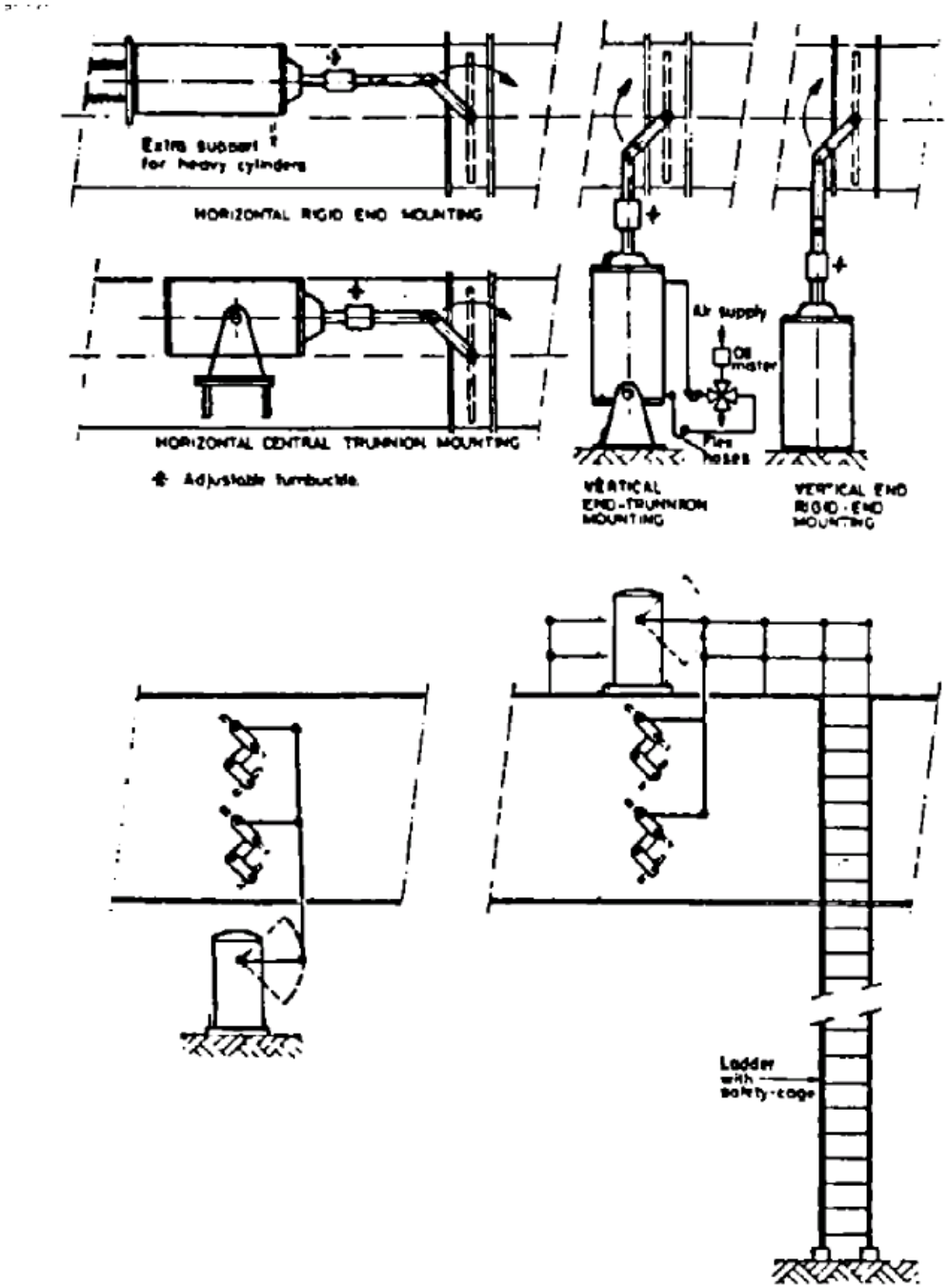
5.7.2 Supply and return piping shall be of sufficient diameter to prevent excessive pressure drop, especially where fast response in emergencies is required.

Isolating valves shall be installed close to the cylinder, refer to Fig. 5 and 6. Cylinder actuators on valves with provisions for manual (handwheel) control shall be provided with external by-pass valve. When manually controlled hydraulic operation near the actuator is required, four-way valves shall be installed in the line-up.

Vent-valves shall be provided at all high points in the hydraulic piping.

5.7.3 When the valve is subject to vibration or installed in equipment subject to thermal expansion, flexible hoses shall be provided. These hoses shall be of corrugated stainless steel, or other suitable flexible material properly welded or fastend to steel unions.

5.7.4 For pilot-operated hydraulic actuators, dual filters shall be installed immediately up-stream of the actuator. (refer to Fig. 7).



INSTALLATION OF PNEUMATIC CYLINDER ACTUATORS

Fig. 4

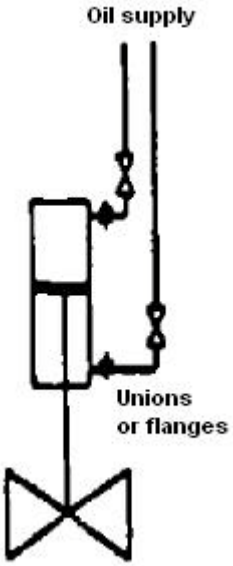


Fig. 5

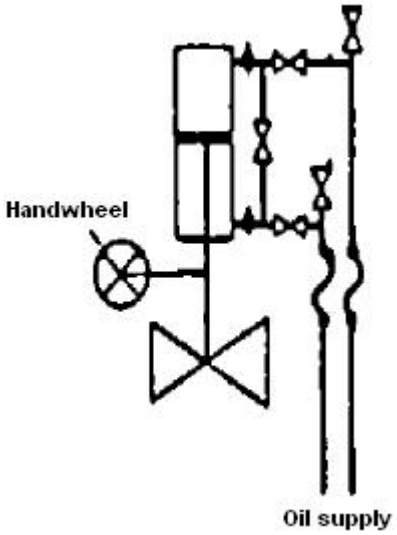
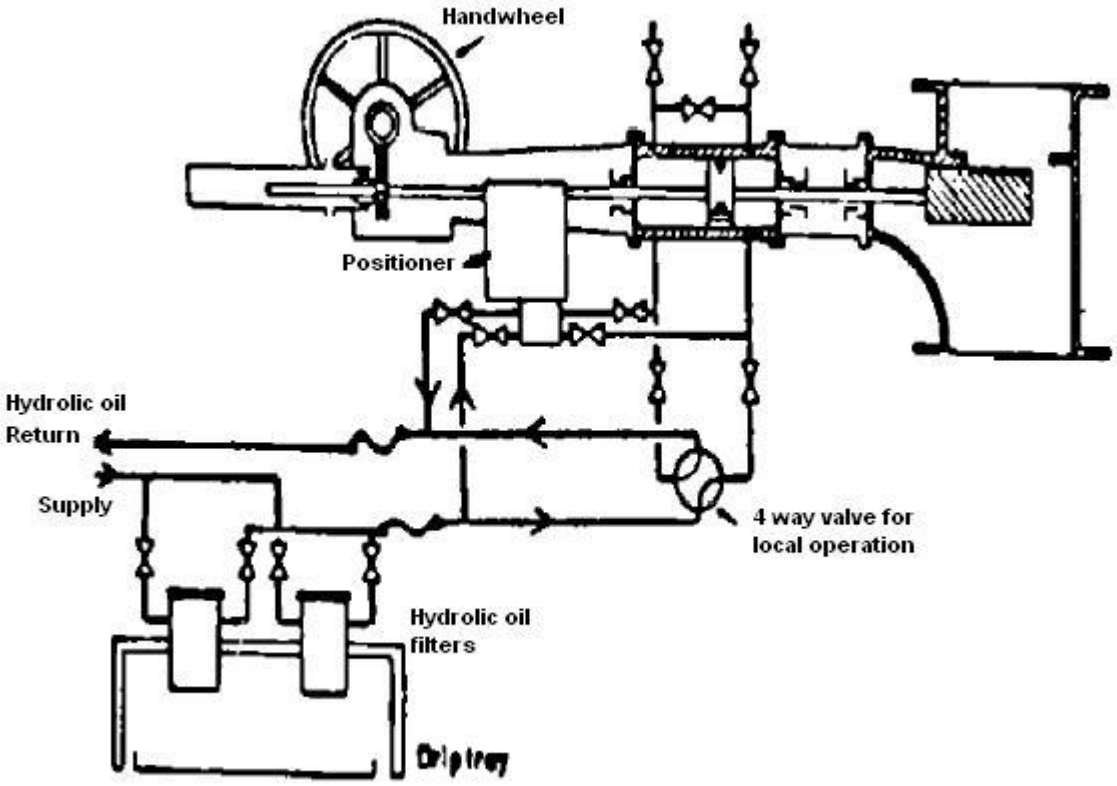


Fig. 6



INSTALLATION OF HYDRAULIC CYLINDER ACTUATORS

Fig. 7

6. BLOCK AND BYPASS VALVES

6.1 A block and by-pass valve system may not be necessary where the process can be shut down to repair the control valve without significant economic loss, or where the process can not be feasibly operated on the by-pass.

6.2 The consequences of shutting down a process unit to perform a simple task (such as replacing control valve packing) should always be considered.

6.3 In cases where the block and by-pass valves are not used, some users require that the control valve be equipped with a handwheel or other operating device.

6.4 Where the greatest flexibility is to be provided for future expansion, the block valves upstream and downstream of the control valve shall be line size. In situations where the control valve is two sizes smaller than line size, the block valves may be one size smaller than line size.

6.5 If control valves are installed without a valved by-pass, the piping layout shall be such that block and by-pass valves can easily be included later.

6.6 The layout of the manifold shall be such that a line size control valve can be installed later (with sufficient clearances).

6.7 The block valves on either side of the control valve shall be gate valves.

6.8 For control valves without handwheels a manifold assembly comprising block valves and a valved by-pass shall be provided. However, no by-pass shall be provided for safety shut-off valves, depressurizing valves, and on some applications where solids suspended in the stream might collect and block the by-pass valve. Clauses 6.9 and 6.10 shall also be considered.

6.9 Block and by-pass valve assemblies shall be provided in the following instances:

a) Where a valve controls a service common to a number of plants.

b) Where valves are in continuous operation and there is not sufficient assurance of reliability over the anticipated period between plant overhauls, e.g. on erosive or corrosive service or where the temperature is below 0°C or above 180°C.

The cost of a failure shall also be taken into account.

c) Where failure of the control valve would necessitate continuous operator attention, e.g., on the fuel control to heaters.

6.10 Block and by-pass valve assemblies should be avoided in the following instances:

a) Around three-way valves.

b) Around self-acting steam pressure reducing valves.

c) Around control valves forming part of a protective system, unless agreed otherwise by the Company.

6.11 Provisions shall be made for draining and/or depressurizing of the control valve.

At least one drain valve shall be provided adjacent to the failed open control valve, either upstream or downstream, depending on the physical layout.

For failed closed (air to open) control valves, two drain valves on upstream and downstream are recommended.

For hazardous, corrosive or toxic fluids more extensive provisions may be required.

6.12 Control valves with handwheels are generally installed in the piping without block valves or valved by-pass.

Block valves may, however, be required on long lines to prevent excessive loss of product or air pollution when the control valve is removed from the line.

6.13 The provision of handwheels, by-passes etc., is governed almost entirely by operational considerations. The P&ID shall therefore indicate the solution adopted for each application.

7. DIMENSIONS OF CONTROL VALVES

7.1 For the piping layout the dimensions of the complete control valve, including actuator diameter, and its distance to control valve body connections, shall be taken into account.

7.2 It is stressed that manufacturer's certified drawings must be consulted for detailing the piping work. For instance, an otherwise normal type of control valve may have an oversize actuator; a top mounted handwheel or extension bonnet will considerably increase total height; angle-type control valves may have outlet connections not equal in size to the inlet, etc.

8. MANIFOLD PIPING ARRANGEMENT

8.1 The manifold piping should be arranged to provide flexibility for removing control valves, particularly where ring type joints are used.

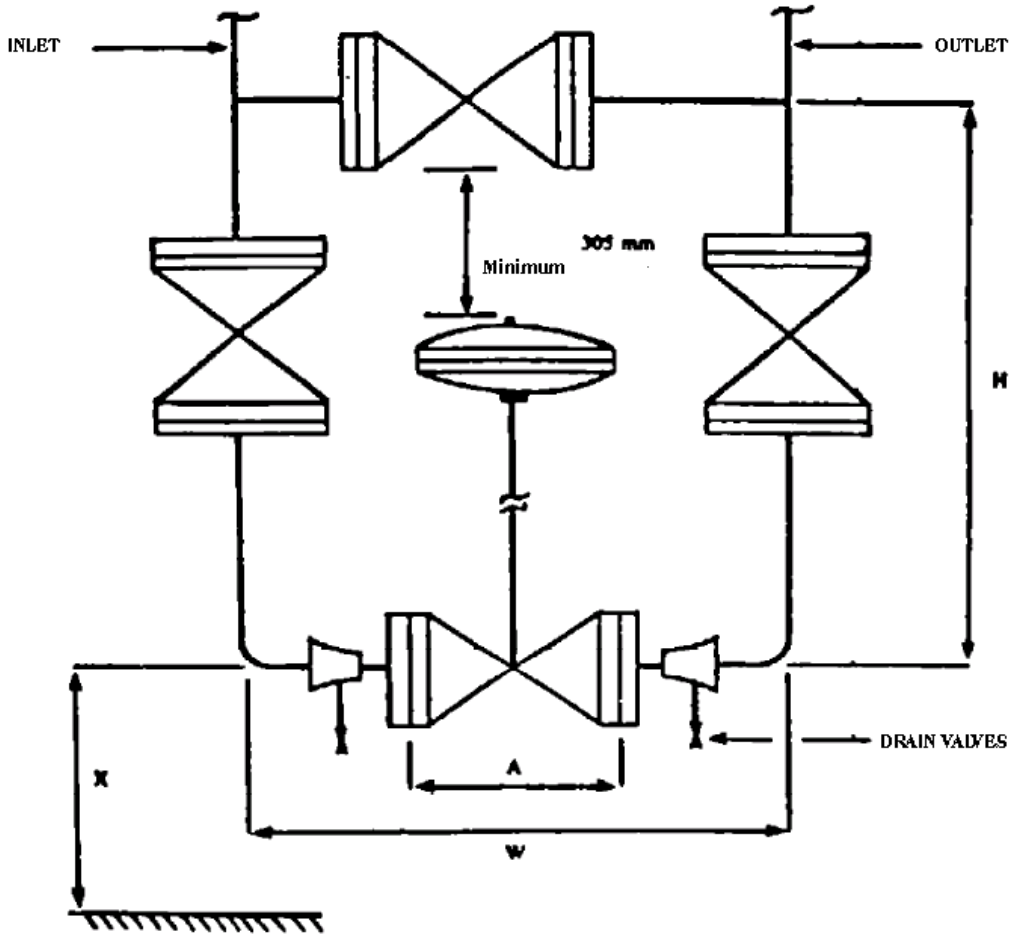
Flexibility of piping is also necessary to keep excessive stresses from being induced in the body of the control valve.

Vents and drains should be provided as required to service the control valve.

8.2 The piping around control valves should be self-supporting or should be permanently supported so that when the control valve or block valve is removed the piping integrity remains.

8.3 Manifold arrangements illustrative of various typical situation are presented in a series of diagrams on the following pages. These may be quite suitable for use as shown, or may be made suitable for specific requirements by minor modifications.

8.4 Six control valve manifold types are presented in this recommendation with space estimates for various sizes. Each of these six types consists of a straight through globe control valve, isolating upstream block valves, and by-pass piping with a manually operated valve. For ease of reference, control valve manifold dimensions for ANSI class 300 are presented here.



ELEVATION

TYPE I CONTROL VALVE MANIFOLD

Fig. 8

Note:

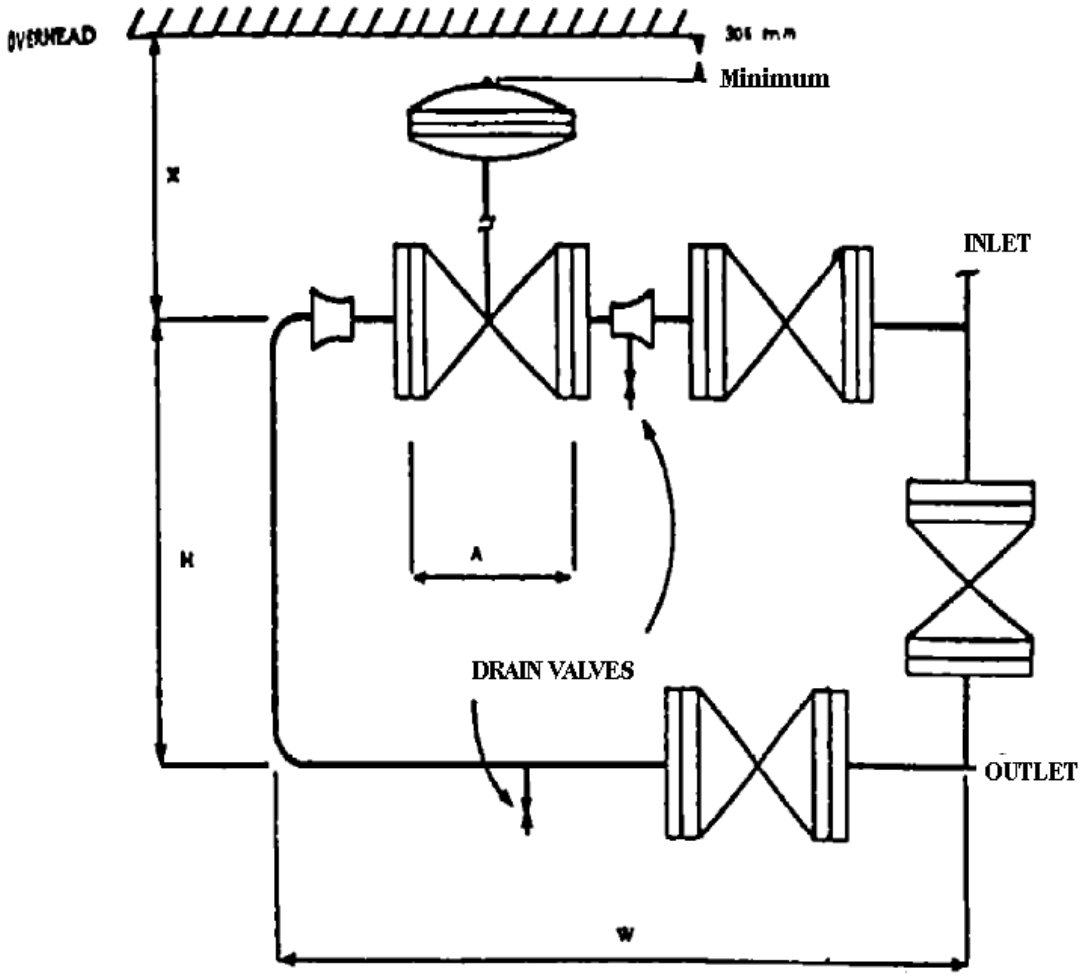
Dimensions shown are suggested piping dimensions and may vary depending upon actual dimensions of components being used.

TABLE 1 - TYPE I CONTROL VALVE MANIFOLD DIMENSIONS FOR ANSI CLASS 300

INCHES							MILLIMETERS				
A*	W**	H**	X**	ACTUAL MANIFOLD PIPE OUTSIDE DIAMETER	NOMINAL SIZE		ACTUAL MANIFOLD PIPE OUTSIDE DIAMETER	A*	W**	H**	X**
					MANIFOLD PIPE	CONTROL VALVE					
7¾	27	39	23	1.315	1	1	33.4	197	690	990	580
9¼	27	39	23	1.900	1½	1½	48.3	235	690	990	580
7¾	27	39	23	1.900	1½	1	48.3	197	690	990	580
10½	27	39	23	2.375	2	2	60.3	267	690	990	580
9¼	27	39	23	2.375	2	1½	60.3	235	690	990	580
7¾	27	39	23	2.375	2	1	60.3	197	690	990	580
12½	30	42	27	3.500	3	3	88.9	317	760	1070	690
10½	30	42	27	3.500	3	2	88.9	267	760	1070	690
9¼	30	42	27	3.500	3	1½	88.9	235	769	1070	690
14½	35	43	30	4.500	4	4	114.3	368	890	1090	760
12½	35	43	30	4.500	4	3	114.3	317	890	1090	760
10½	35	43	30	4.500	4	2	114.3	267	890	1090	760
14½	45	54	39	6.625	6	4	168.3	368	1140	1370	990
12½	45	54	39	6.625	6	3	168.3	317	1140	1370	990
185/8	55	57	46	8.625	8	6	219.1	473	1400	1450	1170
14½	55	57	46	8.625	8	4	219.1	368	1400	1450	1170

*** Actual dimensions from manufacturers drawings.**

**** Suggested dimensions.**



ELEVATION

TYPE II CONTROL VALVE MANIFOLD

Fig. 9

Note:

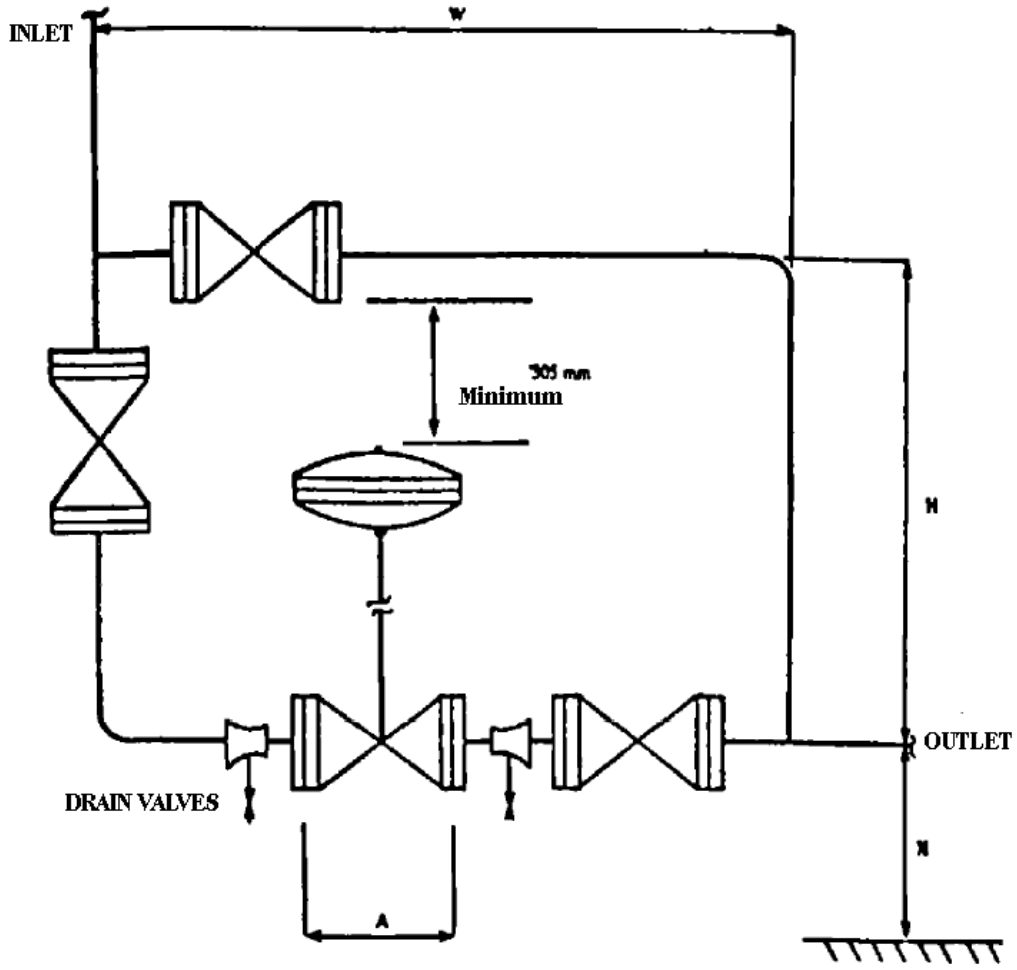
Dimensions shown are suggested piping dimensions and may vary depending upon actual dimensions of components being used.

TABLE 2 - TYPE II CONTROL VALVE MANIFOLD DIMENSIONS FOR ANSI CLASS 300

INCHES							MILLIMETERS				
A*	W**	H**	X**	ACTUAL MANIFOLD PIPE OUTSIDE DIAMETER	NOMINAL SIZE MANIFOLD PIPE	NOMINAL SIZE CONTROL VALVE	ACTUAL MANIFOLD PIPE OUTSIDE DIAMETER	A*	W**	H**	X**
7¾	44	25	37	1.315	1	1	33.4	197	1120	640	940
9¼	44	25	37	1.900	1½	1½	48.3	235	1120	640	940
7¾	44	25	37	1.900	1½	1	48.3	197	1120	640	940
10½	44	25	37	2.375	2	2	60.3	267	1120	640	940
9¼	44	25	37	2.375	2	1½	60.3	235	1120	640	940
7¾	44	25	37	2.375	2	1	60.3	197	1120	640	940
12½	48	29	39	3.500	3	3	88.9	317	1220	740	990
10½	48	29	39	3.500	3	2	88.9	267	1220	740	990
9¼	48	29	39	3.500	3	1½	88.9	235	1220	740	990
14½	56	33	40	4.500	4	4	114.3	368	1430	840	1020
12½	56	33	40	4.500	4	3	114.3	317	1430	840	1020
10½	56	33	40	4.500	4	2	114.3	267	1430	840	1020
14½	70	43	50	6.625	6	4	168.3	368	1780	1090	1270
12½	70	43	50	6.625	6	3	168.3	317	1780	1090	1270
185/8	78	50	52	8.625	8	6	219.1	473	1990	1270	1320
14½	78	50	52	8.625	8	4	219.1	368	1990	1270	1320

*** Actual dimensions from manufacturers drawings.**

**** Suggested dimensions.**



ELEVATION

TYPE III CONTROL VALVE MANIFOLD

Fig. 10

Note:

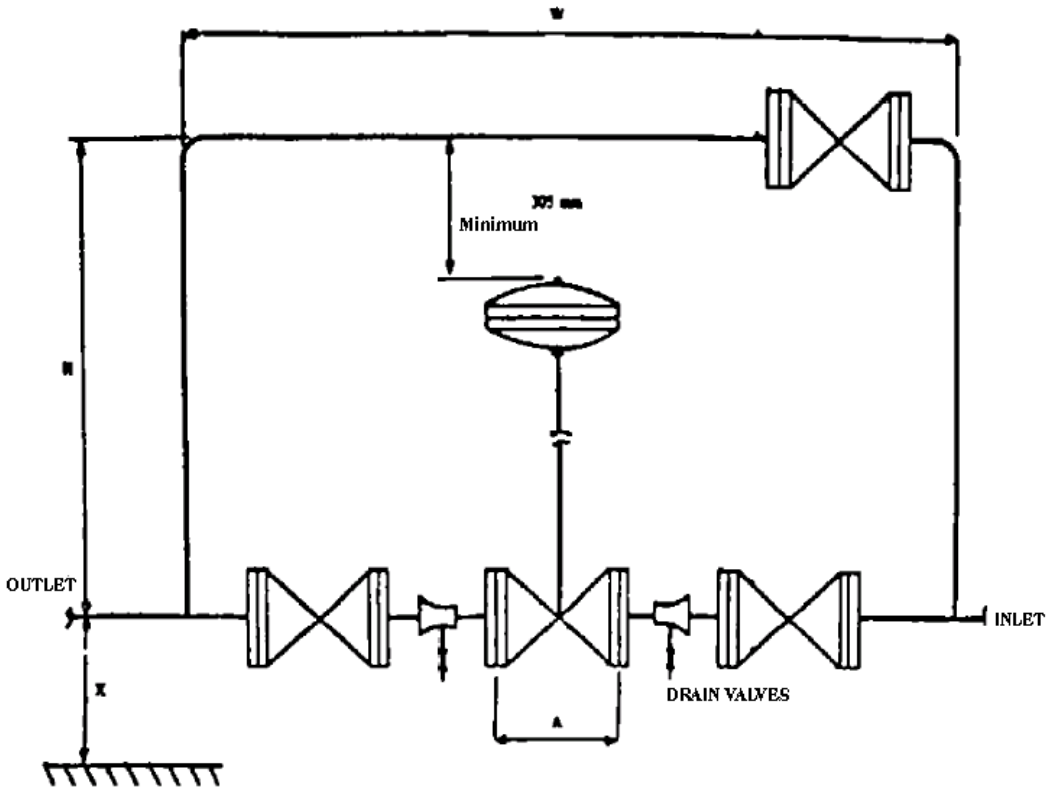
Dimensions shown are suggested piping dimensions and may vary depending upon actual dimensions of components being used.

TABLE 3 - TYPE III CONTROL VALVE MANIFOLD DIMENSIONS FOR ANSI CLASS 300

INCHES							MILLIMETERS				
A*	W**	H**	X**	ACTUAL MANIFOLD PIPE OUTSIDE DIAMETER	NOMINAL SIZE		ACTUAL MANIFOLD PIPE OUTSIDE DIAMETER	A*	W**	H**	X**
					MANIFOLD PIPE	CONTROL VALVE					
7¾	44	39	23	1.315	1	1	33.4	197	197	990	580
9¼	44	39	23	1.900	1½	1½	48.3	235	235	990	580
7¾	44	39	23	1.900	1½	1	48.3	197	197	990	580
10½	44	39	23	2.375	2	2	60.3	267	267	990	580
9¼	44	39	23	2.375	2	1½	60.3	235	235	990	580
7¾	44	39	23	2.375	2	1	60.3	197	197	990	580
12½	48	42	27	3.500	3	3	88.9	317	317	1070	690
10½	48	42	27	3.500	3	2	88.9	267	267	1070	690
9¼	48	42	27	3.500	3	1½	88.9	235	235	1070	690
14½	56	43	30	4.500	4	4	114.3	368	368	1090	760
12½	56	43	30	4.500	4	3	114.3	317	317	1090	760
10½	56	43	30	4.500	4	2	114.3	267	267	1090	760
14½	70	54	39	6.625	6	4	168.3	368	368	1370	990
12½	70	54	39	6.625	6	3	168.3	317	317	1370	990
185/8	78	57	46	8.625	8	6	219.1	473	473	1450	1170
14½	78	57	46	8.625	8	4	219.1	368	368	1450	1170

*** Actual dimensions from manufacturers drawings.**

**** Suggested dimensions**



ELEVATION

TYPE IV CONTROL VALVE MANIFOLD

Fig. 11

Note:

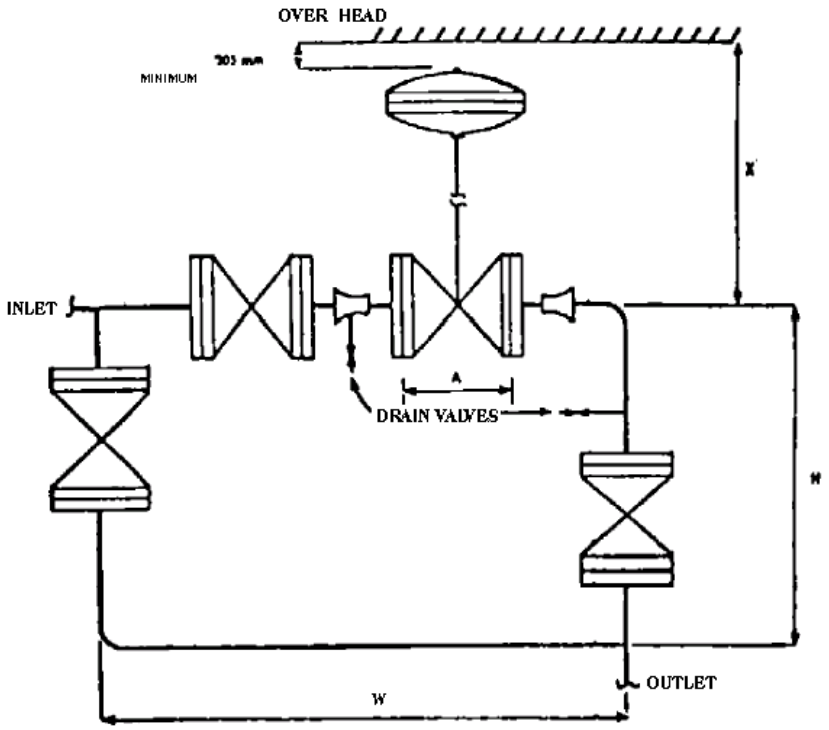
Dimensions shown are suggested piping dimensions and may vary depending upon actual dimensions of compenents being used.

TABLE 4 - TYPE IV CONTROL VALVE MANIFOLD DIMENSIONS

INCHES							MILLIMETERS				
A*	W**	H**	X**	ACTUAL MANIFOLD PIPE OUTSIDE DIAMETER	NOMINAL SIZE MANIFOLD PIPE	NOMINAL SIZE CONTROL VALVE	ACTUAL MANIFOLD PIPE OUTSIDE DIAMETER	A*	W**	H**	X**
7¾	58	39	23	1.315	1	1	33.4	197	1470	990	580
9¼	58	39	23	1.900	1½	1½	48.3	235	1470	990	580
7¾	58	39	23	1.900	1½	1	48.3	197	1470	990	580
10½	58	39	23	2.375	2	2	60.3	267	1470	990	580
9¼	58	39	23	2.375	2	1½	60.3	235	1470	990	580
7¾	58	39	23	2.375	2	1	60.3	197	1470	990	580
12½	67	42	27	3.500	3	3	88.9	317	1700	1070	690
10½	67	42	27	3.500	3	2	88.9	267	1700	1070	690
9¼	67	42	27	3.500	3	1½	88.9	235	1700	1070	690
14½	74	43	30	4.500	4	4	114.3	368	1880	1090	760
12½	74	43	30	4.500	4	3	114.3	317	1880	1090	760
10½	74	43	30	4.500	4	2	114.3	267	1880	1090	760
14½	97	54	39	6.625	6	4	168.3	368	2460	1370	990
12½	97	54	39	6.625	6	3	168.3	317	2460	1370	990
185/8	109	57	46	8.625	8	6	219.1	473	2770	1450	1170
14½	109	57	46	8.625	8	4	219.1	368	2770	1450	1170

*** Actual dimensions from manufacturers drawings.**

**** Suggested dimensions.**



LEVATION

TYPE V CONTROL VALVE MANIFOLD

Fig. 12

Note:

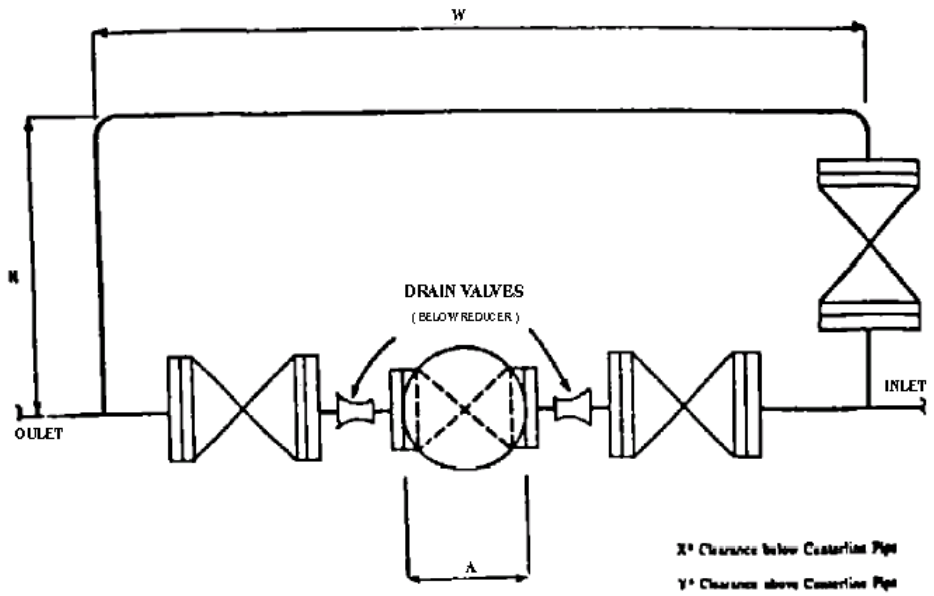
Dimensions shown are suggested piping dimensions and may vary depending upon actual dimensions of components being used.

TABLE 5 - TYPE V CONTROL VALVE MANIFOLD DIMENSIONS FOR ANSI CLASS 300

INCHES							MILLIMETERS				
A*	W**	H**	X**	ACTUAL MANIFOLD PIPE OUTSIDE DIAMETER	NOMINAL SIZE		ACTUAL MANIFOLD PIPE OUTSIDE DIAMETER	A*	W**	H**	X**
					MANIFOLD PIPE	CONTROL VALVE					
7¾	44	36	37	1.315	1	1	33.4	197	1120	910	940
9¼	44	36	37	1.900	1½	1½	48.3	235	1120	910	940
7¾	44	36	37	1.900	1½	1	48.3	197	1120	910	940
10½	44	36	37	2.375	2	2	60.3	267	1120	910	940
9¼	44	36	37	2.375	2	1½	60.3	235	1120	910	940
7¾	44	36	37	2.375	2	1	60.3	197	1120	910	940
12½	48	39	39	3.500	3	3	88.9	317	1220	990	990
10½	48	39	39	3.500	3	2	88.9	267	1220	990	990
9¼	48	39	39	3.500	3	1½	88.9	235	1220	990	990
14½	56	39	40	4.500	4	4	114.3	368	1430	990	1020
12½	56	39	40	4.500	4	3	114.3	317	1430	990	1020
10½	56	39	40	4.500	4	2	114.3	267	1430	990	1020
14½	70	46	50	6.625	6	4	168.3	368	1780	1170	1270
12½	70	46	50	6.625	6	3	168.3	317	1780	1170	1270
185/8	78	50	52	8.625	8	6	219.1	473	1990	1270	1320
14½	78	50	52	8.625	8	4	219.1	368	1990	1270	1320

*** Actual dimensions from manufacturers drawings.**

**** Suggested dimensions.**



PLAN VIEW

TYPE VI CONTROL VALVE MANIFOLD

Fig. 13

Note:

Dimensions shown are suggested piping dimensions and may vary depending upon actual dimensions of components being used.

TABLE 6 - TYPE VI CONTROL VALVE MANIFOLD DIMENSIONS FOR ANSI CLASS 300

INCHES								MILLIMETERS					
A*	W**	H**	X**	V**	ACTUAL MANIFOLD PIPE OUTSIDE DIAMETER	NOMINAL SIZE		ACTUAL MANIFOLD PIPE OUTSIDE DIAMETER	A*	W**	H**	X**	V**
						MANIFOLD PIPE	CONTROL VALVE						
7¾	58	21	23	37	1.315	1	1	33.4	197	1470	530	580	940
9¼	58	21	23	37	1.900	1½	1½	48.3	235	1470	530	580	940
7¾	58	21	23	37	1.900	1½	1	48.3	197	1470	530	580	940
10½	58	21	23	37	2.375	2	2	60.3	267	1470	530	580	940
9¼	58	21	23	37	2.375	2	1½	60.3	235	1470	530	580	940
7¾	58	21	23	37	2.375	2	1	60.3	197	1470	530	580	940
12½	67	26	27	39	3.500	3	3	88.9	317	1700	660	690	990
10½	67	26	27	39	3.500	3	2	88.9	267	1700	660	690	990
9¼	67	26	27	39	3.500	3	1½	88.9	235	1700	660	690	990
14½	74	29	30	40	4.500	4	4	114.3	368	1880	740	760	1020
12½	74	29	30	40	4.500	4	3	114.3	317	1880	740	760	1020
10½	74	29	30	40	4.500	4	2	114.3	267	1880	740	760	1020
14½	97	36	39	50	6.625	6	4	168.3	368	2460	910	990	1270
12½	97	36	39	50	6.625	6	3	168.3	317	2460	910	990	1270
185/8	109	41	46	52	8.625	8	6	219.1	473	2770	1040	1170	1320
14½	109	41	46	52	8.625	8	4	219.1	368	2770	1040	1170	1320

*** Actual dimensions from manufacturers drawings.**

*** Suggested dimensions**

9. SUMMARY OF INSTALLATION PRACTICES

The following detailed items are recommended for consideration in every installation:

9.1 The air supply used to operate pneumatic control valves shall be free from oil, moisture and dust. For more detail refer to IPS-G-IN-200.

9.2 Follow the manufacturer's recommendations for the hydraulic system to power hydraulically driven control valves.

9.3 Follow the manufacturer's recommendations for the electronic system for electrically or electro-hydraulically driven control valves.

9.4 Inlet piping to control valves with small passage-ways, should be fitted with appropriate filters to eliminate internal valve damage from foreign matter in the piping system.

9.5 Do not put excessive stress on valve bodies when installing in the system. This is particularly important for split body valves.

9.6 Before initial start-up and after a maintenance shut-down, install screens ahead of the control valve to collect pipe scale, rust, and other debris. Whenever possible, the piping system should be fitted with a spool piece and flushed out prior to control valve installation.

9.7 If the valve is to operate in a dusty atmosphere, install a rubber or plastic boot around the stem to protect its polished surface from damage according to manufacturer's recommendations.

9.8 Be sure to follow all of the manufacturer's instructions for adjustments and switch positions for the accessories. For example, do not leave the valve positioner by-pass switch in the by-pass position.

9.9 If the control valve is to be removed from the system after installation be sure that all block valves are closed and tagged. If the control valve contains damaging fluids or contaminants, it should be tagged accordingly, for proper cleaning, prior to disassembly.

9.10 Be sure the valve is installed with the flow direction arrow in the proper direction. Cases have been reported where the manufacturer furnished a valve with the arrow pointing in the wrong direction.

9.11 Review all of the control valve manufacturer's specific instructions prior to installation.

10. CONTROL VALVE TESTS GENERAL REQUIREMENTS

10.1 For testing, all valves shall be completely assembled with packing box fully packed and torqued to the appropriate value for the valve per the valve manufacturer's specifications and made up handtight. The valve stem may be lightly lubricated. If the valve is equipped with a positioner, tests shall be performed with the positioner bypassed.

10.2 Control valves shall be checked for smooth stroking and correct input span. Attention shall be given to spring action, split-range operation, reverse-action positioners, etc.

10.3 Packing boxes of all control valves shall be inspected for presence of lantern ring and correct type of packing. Where packing is unsuitable for the intended service, or damaged during inspection, new packing shall be applied.

10.4 For operational testing, the performance values noted below are considered to provide adequate performance for many process applications. If tighter control performance is required by the process application, or process license agreement, the end user may specify different values in the purchase requisition.

Testing should consist of applying increasing and decreasing control signals directly to the positioner and at the same time measuring valve stem position. For PTFE, the following performance criteria should be achievable with repeatable results.

a) For polytetrafluoroethylene (PTFE) packing, the stem position error should not exceed 2% of rated travel.

b) For polytetrafluoroethylene (PTFE) packing, hysteresis plus dead band should not exceed 2% of rated travel.

Graphite packing is often specified for high temperature applications. Since graphite packing tends to exhibit more system friction at cooler temperatures, the performance values noted below compensate for the increased friction at room temperature when the test is conducted. The following performance criteria for graphite packing should be achievable with repeatable results.

a) For graphite packing, the stem position error should not exceed 3% of rated travel.

b) For graphite packing, hysteresis plus dead band should not exceed 3 % of rated travel.

10.5 Actuators for variable pitch fans on air-cooled heat exchangers shall be tested in situ.

Final adjustment shall be done when plant is in operation:

a) Minimum pitch (usually negative to compensate for heat conduction) shall cause zero air flow.

b) Maximum pitch shall coinside with maximum allowable motor current.

10.6 Cylinder actuators for dampers etc. shall be tested in situ for correct operation.

10.7 The following is considered the minimum inspection criteria for factory assembled control valves. The test requirements of IPS-E-IN-160 shall be considered.

a) Visual examination, using the assembly drawing;

b) Hydrostatic test;

c) Leakage test;

d) Hysteresis check;

e) Valve-travel check by the operator;

f) Operational check of all accessories limit switches, valve positioners, etc.

g) Electrical tests (Megger and multimeter) for electrical devices;

h) Packaging and shipping checks to specifications and procedures.

If these tests are properly performed at the factory the receipt inspection will only require visual examination. If these tests were not performed at the factory, or if there is reason to suspect problems, these tests should be performed on site, as required.

10.8 During the start up of any new facilities, care should be taken to keep scale, welding rods, and other foreign material from plugging or damaging control valves. One method is to remove the valve and substitute a spool piece during flashing operation.