EUREKA

AN ISO 9001:2008 CERTIFIED COMPANY

BYE PASS ROTAMETER

For Reliable Flow Rate Indication

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Eureka make Byepass Rotameters are being used for variety of applications in the industry for serveral years. These are available for flow measurement in pipe size 1" & above. These can be used for clean non viscous liquids & variety of gases. Special models for corrosive fluids are also available. These flowmeters can be installed in horizontal as well as vertical piping systems. Three different designs are available based on the type of pressure tappings used.

WORKING PRINCIPLE

A Byepass Rotameter is a differential pressure measurement type flowmeter.It consists of three components.

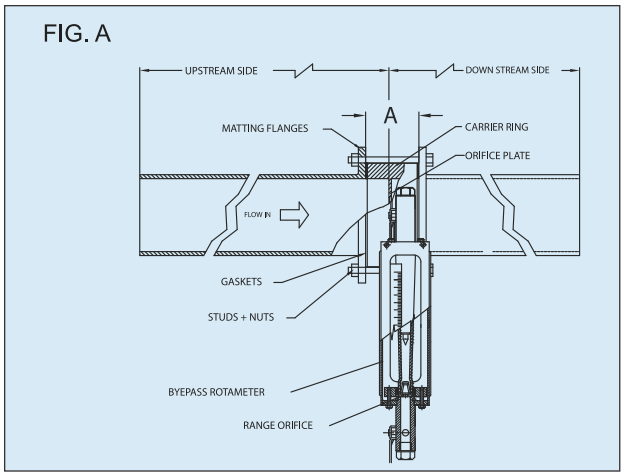
1. Main line Orifice Plate:
An Orifice plate is installed in the main pipe line whose flow rate is to be measured. The plate can either be installed in between the flanges or a carrier ring assembly. This orifice plate creates a differential pressure due the restriction created to the main line flow. The differential pressure varies with the fluid flow in the main line. Based on the differential pressure, the flow through a pipe can be established using a mathematical equation.

2. Indicating Rotameter:
This is a Glass/Metal tube inline rotameter which is installed in a byepass arrangement. A small range orifice is fixed at the inlet of this rotameter .The range orifice is designed to create the same differential pressure which is created by a main line orifice plate. With this arrangement the rotameter works as a manometer or a differential measuring device.

3. Byepass Piping:
Byepass arrangement is used to divert a small portion of flow from the main line through an indicating rotameter. The flow at the upstream side of a main line orifice plate is connected at the inlet of the rotameter & outlet of the rotameter is connected to a downstream side of an orifice plate. The isolation valves are also provided in the byepass piping system for easy maintenance.
Eureka make Byepass Rotameters are offered by using three types of pressure tappings.

1. Corner Tapping: (Ref FIG.A)
It is normally used for carrier ring type arrangement. The pressure taps are drilled through a carrier ring assembly. These taps open at the corner of an orifice plate mounted in between the carrier ring. The carrier ring is sandwiched between the line flanges. A Carrier Ring type Byepass Rotameter (BPC series) is available for pipe size from 25 mm to 450 mm NB. It can be designed to suit various types & pressure classes of line flanges. BPC series rotameters are normally manufactured as a complete unit comprising of a carrier ring with byepass arrangement and indicating Glass/Metal tube rotameter. The carrier ring is designed in one/two piece unit.

FIG. A



2. Flange Tapping: (Ref FIG.B)
The pressure taps are drilled on the orifice flange which is welded to the main line pipe. The taps are at a distance of 24.5 mm from the orifice plate. The Byepass rotameter with flange tappings (BPF series) are available from 50 mm to 900 mm NB pipe sizes. Normally weld neck flanges are used. The scope of supply includes an orifice plate, a pair of orifice flanges ,indicating rotameter & byepass arrangement (optional).

3. D & D/2 Tapping: (Ref FIG.C)
In this type the pressure tappings are drilled on the main pipe itself. The upstream tapping is at a distance of D which is internal pipe diameter from the orifice plate. The downstream tap is at a distance of D/2 from the orifice plate. The D, D/2 type byepass rotameters are available for line size of 50 mm to 1000 mm NB. The scope of supply includes an orifice plate and an indicating rotameter. The mainline flanges & byepass arrangement is normally in customer's scope.

FIG.B.

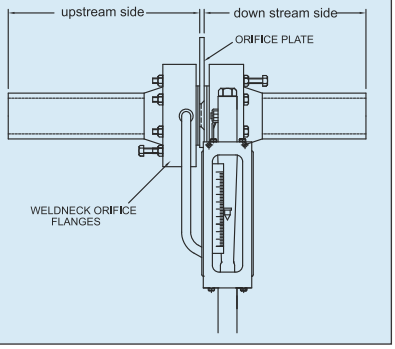
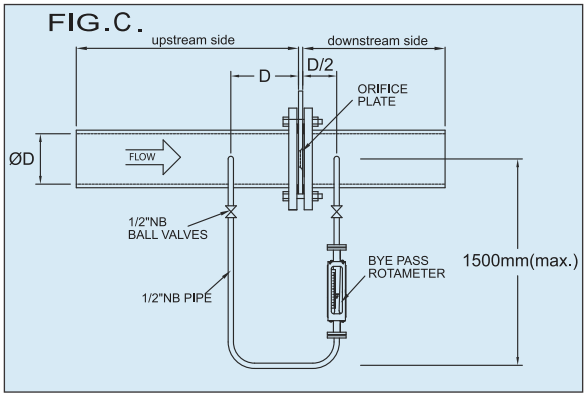


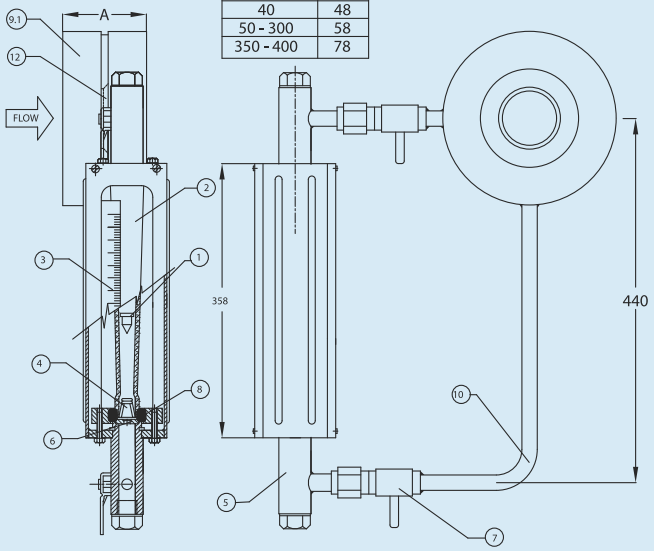
FIG.C.



GENERAL CONSTRUCTION FOR BYE PASS CARRIER RING ASSEMBLY

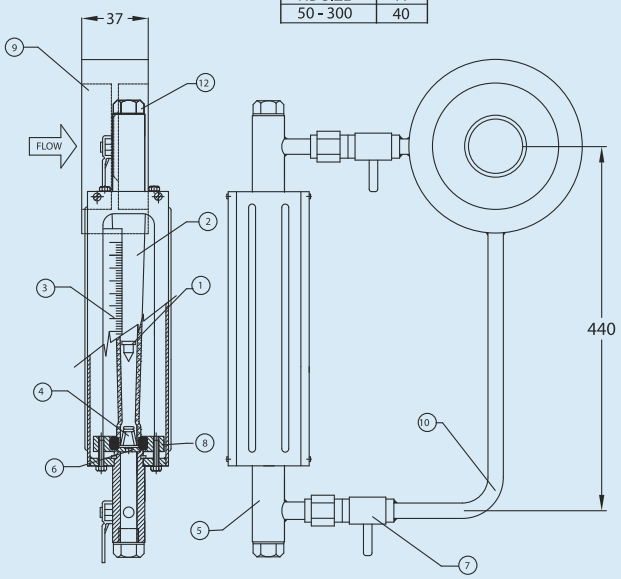
BYE PASS GLASS TUBE ROTAMETER WITH TWO PIECE CARRIER RINGS

NB SIZE	A
25	35
40	48
50 - 300	58
350 - 400	78

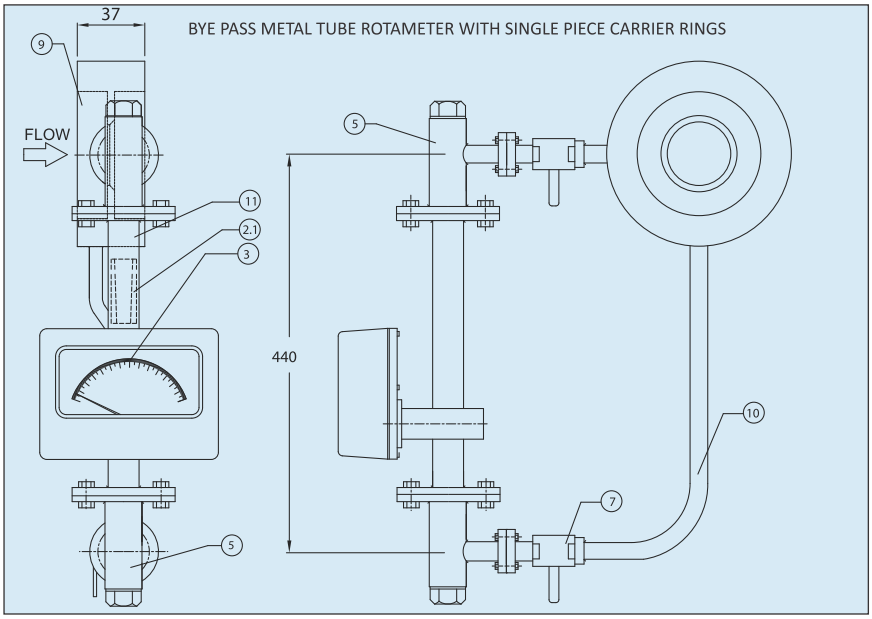


BYE PASS GLASS TUBE ROTAMETER WITH SINGLE PIECE CARRIER RINGS

NB SIZE	A
50 - 300	40



BYE PASS METAL TUBE ROTAMETER WITH SINGLE PIECE CARRIER RINGS



SR.NO.	PART NAME
1	FLOAT
2	MEASURING TUBE GTR TYPE
2.1	MEASURING TUBE MTR TYPE
3	SCALE
4	FLOAT RETAINER
5	END BLOCKS
6	RANGE ORIFICE
7	ISOLATING VALVES
8	GLAND PACKINGS
9	CARRIER RINGS SINGLE PIECE WITH ORIFICE PLATE
9.1	CARRIER RINGS TWO PIECE
10	B.P. LINE
11	METAL TUBE
12	ORIFICE PLATE

MATERIAL OF CONSTRUCTION

Orifice plate	316 SS / EBONITE / HASTEALLOY `C'
Carrier rings	316 SS / MILD STEEL / C.S.
Orifice flanges*	ASTM-A-182 / A-105
Orifice flanges std :	ASME B16.36
Pipe line	316 SS / MILD STEEL / C.S.
Wetted parts of the Rotameter	316 SS / Mild Steel / C.S. or Rubber Lined Steel **/ PTFE Lined Steel.**

** In case of D & D/2 TAPPINGS

* In case of FLANGE TAPPINGS ONLY

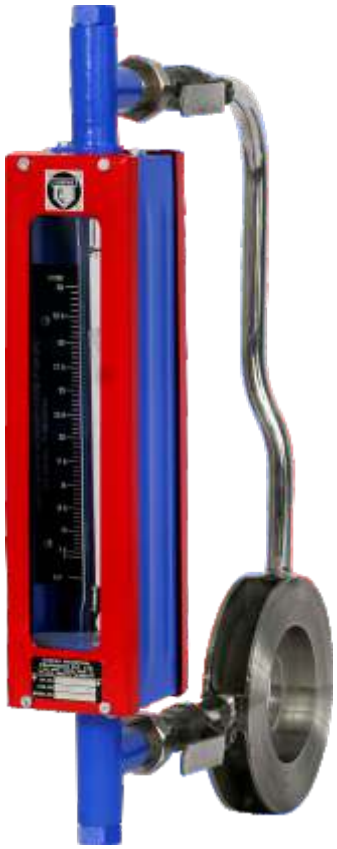
PERFORMANCE

Accuracy	±2% of full flow
Rangeability	7 : 1 or 5 : 1
GTR Type	10 : 1 on request
Rangeability	3 : 1
MTR Type	
Accessories	High & Low flow alarms.
Transmitter	Against Specific Request.

STANDARD RANGE FOR WATER AT 20°C

NB	MAXIMUM FLOWRATE (M3/HR)	NB	MAXIMUM FLOWRATE (M3/HR)
25	5	225	450
40	10	250	550
50	20	275	650
80	36	300	800
100	80	350	1000
125	125	400	1200
150	150	------	------
200	320	------	------

Data required for sizing :
Name of fluid
Sp. Gr. of fluid at Operating temperature.
Viscosity of fluid at Operating temperature.
Temperature.
Pressure.
Measuring range
Material of construction desired.



MODEL NO. IDENTIFICATION CHART

CODE	TYPE
BP	BYE PASS ROTAMETER

CODE	TYPE OF TAPPING
C	CORNER TAPPING (CARRIER RINGS)
D	D & D/2 TAPPING
F	FLANGE TAPPING

CODE	MATERIAL OF CONSTRUCTION
SS	STAINLESS STEEL
MS	MILD STEEL
TL	PTFE LINED
RL	RUBBER LINED
CI	CAST IRON

CODE	LINE SIZE (NB)
25	25 NB
TO	TO
600	600 (HIGHER SIZES ON REQUEST

CODE	TUBE SIZE
1	MTS - 1
2	PG-2 (FOR LOW PRESSURE APPLICATION)
3	PG-3 (FOR NORMAL PRESSURE APPLICATION)
4	PG-4 (FOR CORROSIVE APPLICATION)

CODE	ACCESSORIES
FSPL	FLOW SWITCH (PROXIMITY SINGLE)
FSPHL	FLOW SWITCH (DOUBLE POINT)
T	TRANSMITTER
WP	WEATHER PROOF

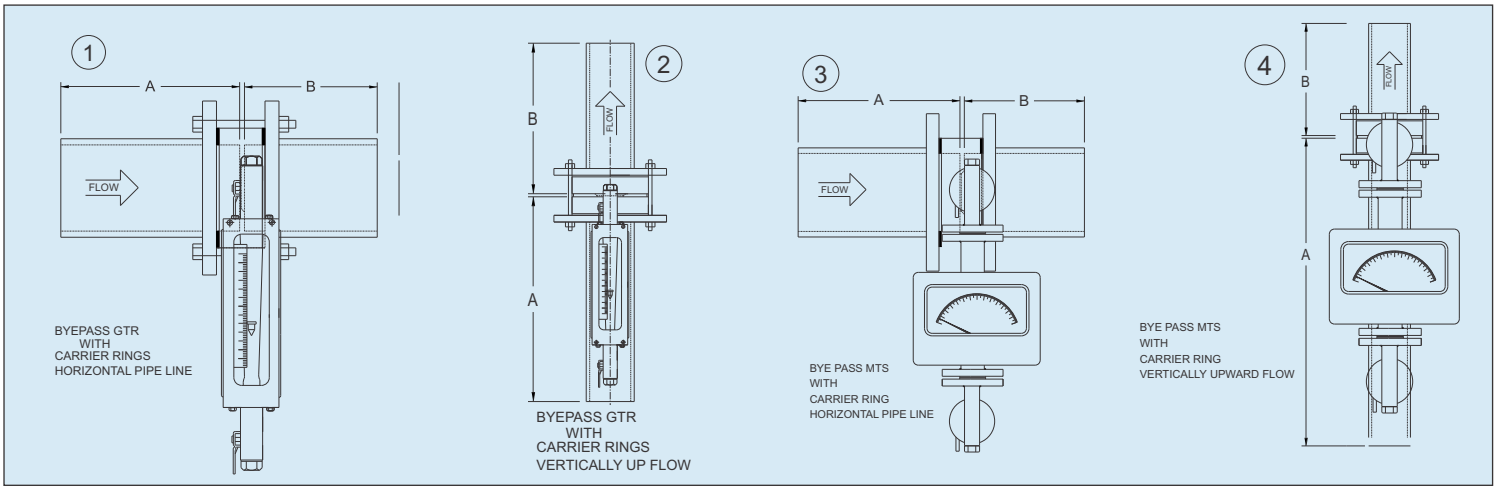
CODE	FLOW DIRECTION
	HORIZONTAL(LEFT TO RIGHT)
(VU)	FLOW VERTICALLY UP
(VD)	FLOW VERTICALLY DOWN
(M)	FOR NON STD. CONN.FOR BPD

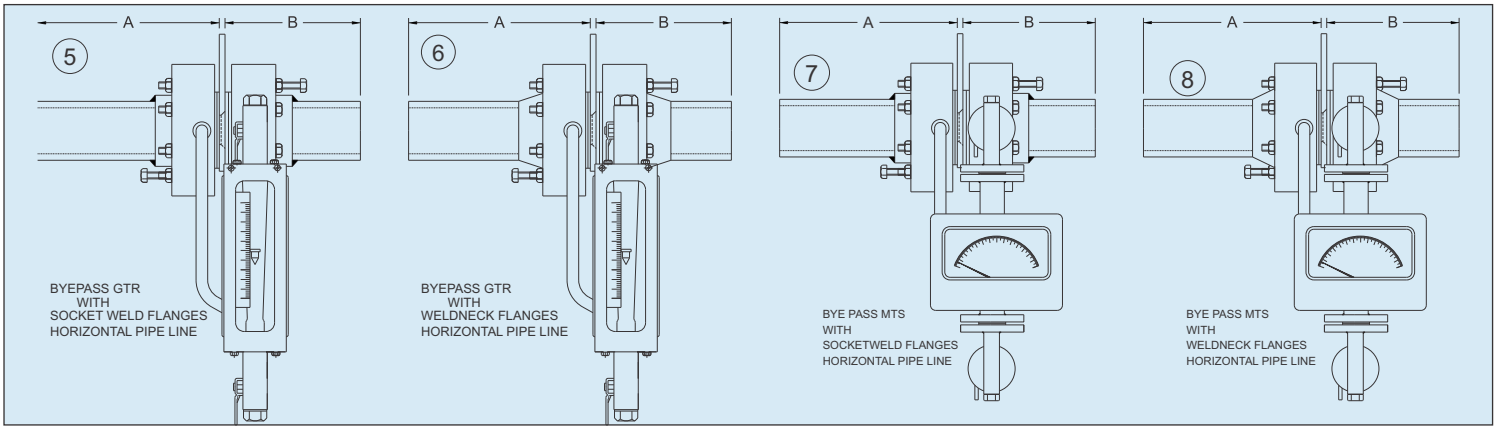
BP D SS 250 3 ⟸ TYPICAL MODEL NO.

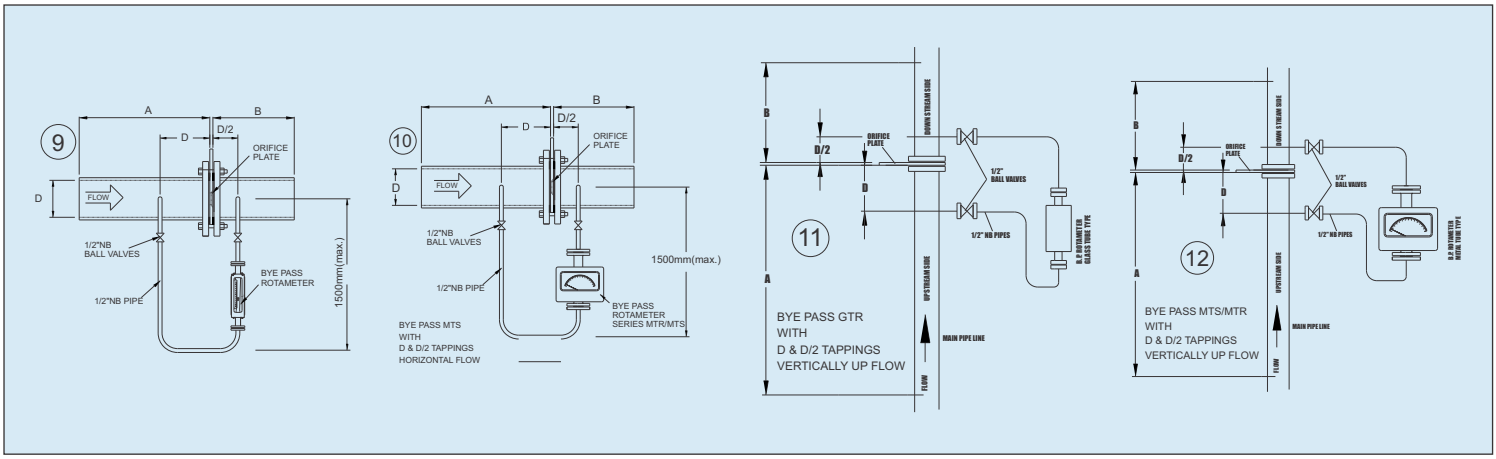
REMARKS.

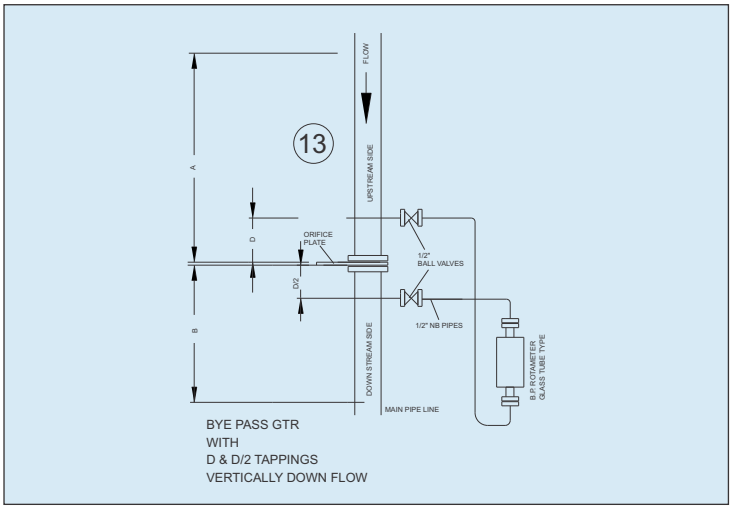
1) MATERIAL OF CONSTRUCTION CODE RL, CI. & TL ARE NOT AVAILABLE IN CASE OF TYPE OF TAPPING CODE C&F
2) TYPE OF TAPPING CODE C IS APPLICABLE UPTO 450 NB SIZE
3) FLOW SWITCH WILL BE PROVIDED ONLY FOR TUBE SIZE PG-3 ONLY
4) WP IS NOT APPLICABLE IN CASE OF CODE FSPL & FSPHL

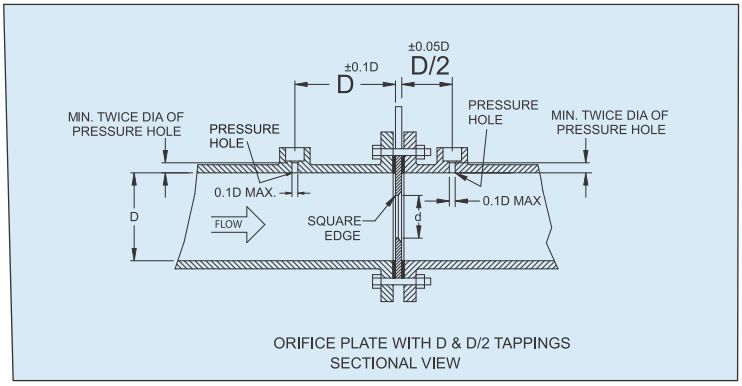
TYPICAL INSTALLATION DRAWINGS











NOTE :–

D = PIPE INTERNAL DIAMETER

A = UPSTREAM STRAIGHT PIPE LENGTH

B = DOWNSTREAM STRAIGHT PIPE LENGTH

A & B SHOULD BE MAINTAINED AS PER TABLE (FIGURE - D)

FIGURE :- D

REQUIRED STRAIGHT LENGTHS BETWEEN ORIFICE PLATES & FITTINGS WITHOUT FLOW CONDITIONERS(AS SPECIFIED IN ISO-5167)

VALUES EXPRESSED AS MULTIPLES OF INTERNAL DIAMETER, D

	UPSTREAM (INLET) SIDE OF ORIFICE PLATE																						DOWN STREAM (OUTLET) SIDE OF THE ORIFICE PLATE	
DIAMETER RATIO β	SINGLE 90° BEND TWO 90° BENDS IN ANY PLANE (S > 30D) a		TWO 90° BENDS IN THE SAME PLANE S-CONFIGUR-ATION (30D ≥ S > 10D) a		TWO 90° BENDS IN THE SAME PLANE S-CONFIGUR-ATION (10D ≥ S) a		TWO 90° BENDS IN PERPEN-DICULAR PLANES (30D ≥ S ≥ 5D) a		TWO 90° BENDS IN PERPEN-DICULAR PLANES (5D ≥ S) a,b		SINGLE 90° TEE WITH OR WITHOUT AN EXTENSION MITRE 90° BEND		SINGLE 45° BEND TWO 45° BENDS IN THE SAME PLANE S-CONFIGUR-ATION (S ≥ 2D) a		CONCENTRIC REDUCER 2D TO D OVER A LENGTH OF 1.5D TO 3D		CONCENTRIC EXPANDER 0.5D TO D OVER A LENGTH OF D TO 2D		FULL BORE BALL VALVE OR GATE VALVE FULLY OPEN		ABRUPT SYMMENTRICAL REDUCTION		THERMOMETER POCKET OR WELL [c] OF DIAMETER ≤ 0.03D [d]		FITTINGS (COLUMNS 2 TO 11) AND THE DENSITO-METER POCKET	
1	2		3		4		5		6		7		8		9		10		11		12		13		14	
---	A [e]	B [f]	A [e]	B [f]	A [e]	B [f]	A [e]	B [f]	A [e]	B [f]	A [e]	B [f]	A [e]	B [f]	A [e]	B [f]	A [e]	B [f]	A [e]	B [f]	A [e]	B [f]	A [e]	B [f]	A [e]	B [f]
≤ 0.2	6	3	10	g	10	g	19	18	34	17	3	9	7	g	5	g	6	g	12	6	30	15	5	3	4	2
0.40	16	3	10	g	10	g	44	18	50	25	9	3	30	9	5	g	12	8	12	6	30	15	5	3	6	3
0.50	22	9	18	10	22	10	44	18	75	34	19	9	30	18	8	5	20	9	12	6	30	15	5	3	6	3
0.60	42	13	30	18	42	18	44	18	65 [h]	25	29	18	30	18	9	5	26	11	14	7	30	15	5	3	7	3,5
0.67	44	20	44	18	44	20	44	20	60	18	36	18	44	18	12	6	28	14	18	9	30	15	5	3	7	3,5
0.75	44	20	44	18	44	22	44	20	75	18	44	18	44	18	13	8	36	18	24	12	30	15	5	3	8	4

NOTE-1
THE MINIMUM STRAIGHT LENGTHS REQUIRED ARE THE LENGTHS BETWEEN VARIOUS FITTINGS LOCATED UPSTREAM OR DOWNSTREAM OF THE ORIFICE PLATE AND THE ORIFICE PLATE ITSELF. STRAIGHT LENGTHS SHALL BE MEASURED FROM THE DOWNSTREAM END OF THE CURVED PORTION OF THE NEAREST (OR ONLY) BEND OR OF THE TEE OR THE DOWNSTREAM END OF THE CURVED OR CONICAL PORTION OF THE REDUCER OR THE EXPANDER.

NOTE-2
MOST OF THE BENDS ON WHICH THE LENGTHS IN THIS TABLE ARE BASED HAD A RADIUS OF CURVATURE EQUAL TO 1.5D

a S IS THE SEPERATION BETWEEN THE TWO BENDS MEASURED FROM THE DOWNSTREAM END OF THE CURVED PORTION OF THE UPSTREAM BEND TO THE ORIFICE PLATE AND THE ORIFICE PLATE ITSELF.
b THIS IS NOT A GOOD UPSTREAM INSTALLATION : A FLOW CONDITIONER SHOULD BE USED WHERE POSSIBLE.
c THIS INSTALLATION OF THERMOMETER POCKETS OR WELLS WILL NOT ALTER THE REQUIRED MINIMUM UPSTREAM STRAIGHT LENGTHS FOR THE OTHER FITTINGS.
d A THERMOMETER POCKET OR WELL OF DIAMETER BETWEEN 0.03D AND 0.13D MAY BE INSTALLED PROVIDED THAT THE VALUES IN COLUMNS A AND B ARE INCREASED TO 20 AND 10 RESPECTIVELY. SUCH AN INSTALLATION IS NOT, HOWEVER, RECOMMENEDED.
e COLUMN A FOR EACH FITTING GIVES LENGTHS CORRESPONDING TO " ZERO ADDITIONAL UNCERTAINTY" VALUES.
f COLUMN B FOR EACH FITTING GIVES LENGTHS CORRESPONDING TO " 0.5% ADDITIONAL UNCERTAINTY" VALUE.
g THE STRAIGHT LENGTH IN COLUMN A GIVES ZERO ADDITIONAL UNCERTAINTY; DATA ARE NOT AVAILABLE FOR SHORTER STRAIGHT LENGTHS WHICH COULD BE USED TO GIVE THE REQUIRED STRAIGHT LENGTHS FOR COLUMN B.
h 95D IS REQUIRED FOR ReD > 2 X 10^6 IF S < 2D

REMARKS :
THIS CHART IS FOR GUIDANCE . USER MAY REFER TO THE LATEST VERSION OF STANDARD