

INSTRUCTION

for

EMCOWEDGE Wedge Type Flowmeter

type EWF

Liquid and Gas

Application

EMCOWEDGE is the primary element in liquid, gas or steam flow measurement according to the differential pressure principle.

The fluid must be in one phase and the pipe shall run full in the measuring section. Changes of flow shall be slowly i.e. without pulsation's.

Storage

Before installation the primary element must be kept clean and protected against corrosion and physical damage.

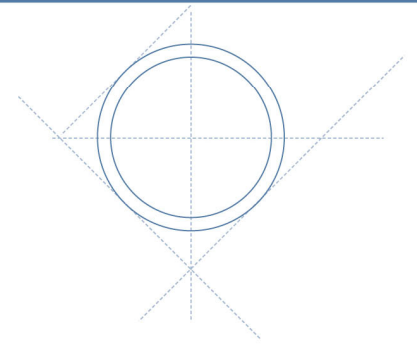
Pipe Run

The EMCOWEDGE type EWF shall be fitted between 2 sections of straight cylindrical pipe of constant cross-sectional area without any obstructions.

The inner pipe diameter D must not vary more than 1% of D used in the h/D or differential pressure calculation.

The required minimum straight lengths of pipe vary according to h/D ratio and the nature of obstruction - bends, reducers etc.

From the table below it can be seen how many times the inner pipe diameter D is required.



Required straight lengths for EMCOWEDGE

Values expressed as multiples of D

h/D ratio	Single 90° bend ^{*)}	Two or more 90° bends in the same plan ^{*)}	Two or more 90° bends in different planes ^{*)**)}	Reducer $3D$ to D over a length of $3,5D$	Expander $0,75D$ to D over a length of D	Full bore ball or gate valve fully open
0,2	5	7	10	5	5	5
0,3	6	8	12	6	6	6
0,4	8	10	14	8	8	8
0,5	10	12	15	10	10	10

NOTES

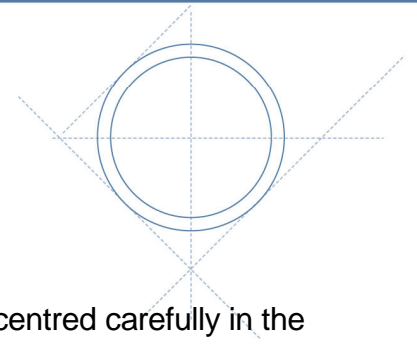
1 The minimum straight lengths required are the lengths between various fittings located upstream of the EMCOWEDGE and the EMCOWEDGE itself. All straight lengths shall be measured from the upstream pressure tapping plane of the EMCOWEDGE. The pipe roughness, at least over the length indicated in this table, shall not exceed that of a smooth, commercially available pipe (approximately $k/D \leq 10^{-3}$).

2 For downstream straight lengths, fittings or other disturbances (as indicated in this table) situated at least $3 \times D$ downstream of the minus pressure tapping plane do not affect the accuracy of the measurement.

It is recommended to use full bore valves upstream the primary element. The valves shall be fully open.

The inside surface of the measuring pipe shall be clean, free from pitting and deposit for at least a length of 4 times D upstream and 1 time D downstream of the EMCOWEDGE. Typical inner pipe wall roughnesses are stated below.

Material	Condition	k , mm
brass, copper, aluminium, plastics, glass	smooth, without sediments	< 0,03
steel	new, seamless cold drawn	< 0,03
	new, seamless hot drawn	0,05 to 0,10
	new, seamless rolled	0,10
	new, welded longitudinally	0,10 to 0,20
	new, welded spirally	0,20 to 0,30
	slightly rusted	0,50 to 2
	rusty	> 2
cast iron	encrusted	0,03 to 0,05
	with heavy encrustation's	0,10 to 0,20
	bituminized, new	0,13
asbestos cement	bituminized, normal	0,25
	galvanised	1,0 to 1,5
	coated and not coated, new	> 1,5
asbestos cement	not coated, normal	0,03 to 0,05
	coated and not coated, new	< 0,03
		0,05



Installation

The EMCOWEDGE type EWF having flange connection must be centred carefully in the pipe line to the mating flanges

Tap location

2 pressure tapings provide the pressure upstream and the pressure downstream. The upstream pressure tapping is marked "+" and the downstream pressure is marked "-".

The 2 pressure tapings are equally spaced from the wedge (restriction).
The "+" tapping is always the tapping on the upstream side.

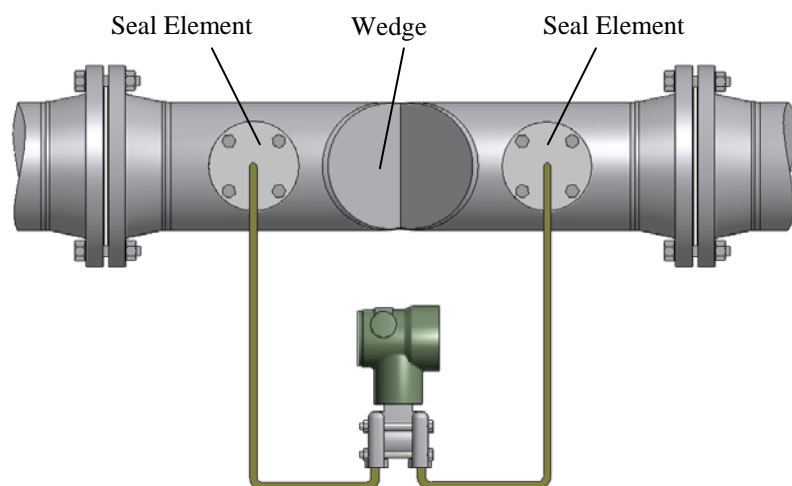
Instrument Connection

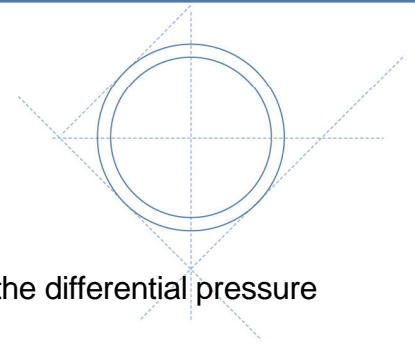
As the EMCOWEDGE is mostly intended for viscous liquids or liquids carrying particles, it is common to use a differential pressure transmitter with chemical seals. But EMCOWEDGE can also be used for clean liquids and gasses in which cases a standard differential pressure pressure transmitter can be used.

Horizontal pipe run

The preferred orientation of the EMCOWEDGE is horizontal with the tapings pointing to the side (90° from the top). This allows gasses in liquid to escape and solids to pass the wedge.

It is recommended to install the differential pressure transmitter below the EMCOWEDGE, a part from gas flow measurement. When using chemical seals the transmitter must always be installed below the flow meter.





The "+" side of the EMCOWEDGE is connected to the "+" side of the differential pressure transmitter and the "-" side is connected.

Vertical pipe run

When the flow meter is mounted vertically, the use of chemical seals will cause an offset due to the difference in hydrostatic heights. It is necessary to reset the transmitter to zero while there is no flow in the pipeline.

Safety

The pipe system, in which the EMCOWEDGE will be part of, must be equipped with a safety device, ensuring that the maximum allowable pressure is not exceeded. The flow meter is not supplied with any safety devices and must not be used for higher pressure, than stated on the name plate.

During operation the outer surface of the flow meter will reach nearly the same temperature as the operating fluid. Hence it is recommended, at elevated temperatures, to insulate the flow meter or ensure that the pipe is inaccessible during operation.

Exposing the flow meter to elevated temperatures may weaken the material. Therefore the flow meter must not be exposed to higher temperatures, than stated on the name plate.

Maintenance

The EMCOWEDGE requires no special maintenance. It is however important that the inside of the EMCOWEDGE and the mating pipe are free from deposits.

References

Shell Flow Meter Engineering Handbook, R.W Miller: Flow Measurement Engineering Handbook, Private information.

