

DIN EN ISO 5167-1:2023-08 (E)

Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full - Part 1: General principles and requirements (ISO 5167-1:2022)

Contents		Page
European foreword		4
Foreword		5
Introduction		6
1 Scope		7
2 Normative references		7
3 Terms and definitions		7
3.1 Pressure measurement		8
3.2 Primary devices		8
3.3 Flow		9
4 Symbols and subscripts		12
4.1 Symbols		12
5 Principle of the method of measurement and computation		13
5.1 Principle of the method of measurement		13
5.2 Method of determination of the required diameter ratio for the selected standard primary device		14
5.3 Computation of flow rate		14
5.4 Determination of density, pressure and temperature		14
5.4.1 General		14
5.4.2 Density		15
5.4.3 Static pressure		15
5.4.4 Temperature		15
5.5 Differential pressure flow measurement system		16
5.5.1 General		16
5.5.2 Primary device		17
5.5.3 Impulse lines and transmitters		18
5.5.4 Impulse line isolation valves and valve manifolds		18
5.5.5 Flow computer		18
5.6 Differential pressure flow measurement system design considerations		18
5.6.1 Flow rate turndown and stacked transmitters		18
5.6.2 Meter calibration		18
5.6.3 Permanent pressure loss		19
5.6.4 Diagnostics and meter verification		20
5.6.5 Overall uncertainty of differential pressure metering system		20
6 General requirements for the measurements		20
6.1 Primary device		20
6.2 Nature of the fluid		21
6.3 Flow conditions		21
7 Installation requirements		21
7.1 General		21
7.2 Minimum upstream and downstream straight lengths		23
7.3 General requirement for flow conditions at the primary device		23
7.3.1 Requirement		23
7.3.2 Swirl-free conditions		23
7.3.3 Good velocity profile conditions		23
7.4 Flow conditioners		23
7.4.1 Compliance testing		23
7.4.2 Specific test		26

8	Uncertainties on the measurement of flow rate	26
8.1	General.....	26
8.2	Definition of uncertainty.....	26
8.3	Practical computation of the uncertainty	27
8.3.1	Component uncertainties.....	27
8.3.2	Practical working formula.....	27
Annex A	(informative) Iterative computations	30
Annex B	(informative) Examples of values of the pipe wall uniform equivalent roughness, k_d	32
Annex C	(informative) Flow conditioners and flow straighteners	33
Annex D	(informative) Differential pressure transmitters, flow range and turndown	35
Annex E	(informative) Example of uncertainty calculation for a differential pressure device	42
Annex F	(informative) Permanent pressure loss example	46
Bibliography	48