DIN EN ISO 5167-4:2023-08 (E)

Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full - Part 4: Venturi tubes (ISO 5167-4:2022)

Contents

Page

European foreword ... **4**

Foreword ... **5**

Introduction ... **6**

1 Scope ... **7**

2 Normative references ... **7**

3 Terms and definitions ... **8**

4 Principles of the method of measurement and computation ... **8**

5 Classical Venturi tubes ... **8**

5.1 Field of application ... 8
5.1.1 General ... 8
5.1.2 Classical Venturi tube with an “as cast” convergent section ... 9
5.1.3 Classical Venturi tube with a machined convergent section ... 9
5.1.4 Classical Venturi tube with a fabricated convergent section ... 9
5.2 General shape ... 9
5.2.1 General ... 9
5.2.2 Entrance cylinder ... 9
5.2.3 Convergent section ... 10
5.2.4 Throat ... 10
5.2.5 Divergent section ... 11
5.2.6 Truncated Venturi tube ... 11
5.2.7 Roughness ... 11
5.2.8 Classical Venturi tube with an “as cast” convergent section ... 11
5.2.9 Classical Venturi tube with a machined convergent section ... 12
5.2.10 Classical Venturi tube with a fabricated convergent section ... 12
5.3 Material and manufacture ... 13
5.4 Pressure tappings ... 13
5.5 Discharge coefficient, C ... 14
5.5.1 Limits of use ... 14
5.5.2 Discharge coefficient of the classical Venturi tube with an “as cast” convergent section ... 14
5.5.3 Discharge coefficient of the classical Venturi tube with a machined convergent section ... 15
5.5.4 Discharge coefficient of the classical Venturi tube with a fabricated convergent section ... 15
5.6 Expansibility [expansion] factor, ε ... 15
5.7 Uncertainty of the discharge coefficient, C ... 15
5.7.1 Classical Venturi tube with an “as cast” convergent section ... 15
5.7.2 Classical Venturi tube with a machined convergent section ... 15
5.7.3 Classical Venturi tube with a fabricated convergent section ... 16
5.8 Uncertainty of the expansibility [expansion] factor, ε ... 16
5.9 Pressure loss ... 16
5.9.1 Definition of the pressure loss ... 16
5.9.2 Relative pressure loss ... 16

6 Installation requirements **17**
6.1 General 17
6.2 Minimum upstream and downstream straight lengths for installation between various fittings and the Venturi tube 18
6.3 Flow conditioners 22
6.4 Additional specific installation requirements for classical Venturi tubes 22
6.4.1 Circularity and cylindricality of the pipe and alignment of the classical Venturi tube 22
6.4.2 Roughness of the upstream pipe 23

7 Flow calibration of Venturi tubes **23**
7.1 General 23
7.2 Test facility 23
7.3 Meter installation 24
7.4 Design of the test programme 24
7.5 Reporting the calibration results 24
7.6 Uncertainty analysis of the calibration 24
7.6.1 General 24
7.6.2 Uncertainty of the test facility 24
7.6.3 Uncertainty of the Venturi tube 25

Annex A (informative) **Table of expansibility [expansion] factor** **26**

Annex B (informative) **Classical Venturi tubes used outside the scope of ISO 5167-4** **27**

Annex C (informative) **Pressure loss in a classical Venturi tube** **30**

Bibliography **32**