

# ISO 20486:2017-12 (E)

## Non-destructive testing - Leak testing - Calibration of reference leaks for gases

---

<b>Contents</b>		<b>Page</b>
Foreword .....		v
<b>1</b>	<b>Scope .....</b>	<b>1</b>
<b>2</b>	<b>Normative references .....</b>	<b>2</b>
<b>3</b>	<b>Terms and definitions .....</b>	<b>2</b>
<b>4</b>	<b>Nominal leakage rates .....</b>	<b>3</b>
<b>5</b>	<b>Classification of leaks .....</b>	<b>3</b>
5.1	Permeation leak .....	3
5.2	Conductance leaks .....	3
5.2.1	Capillary leak .....	3
5.2.2	Aperture leak (orifice) .....	4
5.2.3	Compressed powder leak .....	4
<b>6</b>	<b>Calibration by comparison .....</b>	<b>4</b>
6.1	Methods A, As, B and Bs .....	4
6.2	Applicability of comparison methods .....	4
6.3	Preparation of leaks and apparatus .....	5
6.3.1	Leak detector .....	5
6.3.2	Connection to the leak detector .....	5
6.3.3	Temperature accommodation .....	7
6.4	Measurement .....	7
6.4.1	Set-up .....	7
6.4.2	General measurement sequence .....	7
6.5	Evaluation for methods A, As, B and Bs (Comparison) .....	8
6.5.1	Determination of leakage rate .....	8
6.5.2	Influence factors to measurement uncertainty .....	9
<b>7</b>	<b>Volumetric calibration .....</b>	<b>10</b>
7.1	Direct flow (Method C) .....	10
7.1.1	General .....	10
7.1.2	Equipment .....	10
7.1.3	Preparation of leaks and apparatus .....	10
7.1.4	Measurement .....	11
7.1.5	Evaluation for Method C (direct flow measurement) .....	13
7.2	Leak measurement under water (Method D) .....	14
7.2.1	General .....	14
7.2.2	Equipment .....	14
7.2.3	Preparation of leaks and apparatus .....	14
7.2.4	Measurement .....	15
7.2.5	Evaluation for Method D .....	16
7.2.6	Influence factors to measurement uncertainty .....	17
7.3	Calibration by (volumetric) gas meter (Method E) .....	17
7.3.1	General .....	17
7.3.2	Equipment .....	18
7.3.3	Preparation of leaks and apparatus .....	18
7.3.4	Measurement .....	18
7.3.5	Evaluation for Method E (gas meter) .....	18
7.3.6	Influence factors to measurement uncertainty .....	19

7.4	Calibration by pressure change in a known volume (Method F) .....	19
7.4.1	General .....	19
7.4.2	Preparation of leaks and apparatus .....	20
7.4.3	Measurement .....	22
7.4.4	Special situation in vacuum chambers .....	23
7.4.5	Evaluation for Method F (pressure change) .....	25
7.4.6	Influence factors to measurement uncertainty .....	25
7.5	Calibration by volume change at constant pressure (Method G) .....	26
7.5.1	Equipment .....	26
7.5.2	Preparation of leaks and apparatus .....	26
7.5.3	Measurement .....	26
7.5.4	Evaluation for Method G (volume change at constant pressure) .....	27
8	General influences .....	28
9	Report .....	28
10	Labelling of reference leaks .....	29
11	Handling of reference leaks .....	29
11.1	General .....	29
11.2	Permeation leaks (normally with reservoir fitted the leak outlet) .....	29
11.3	Conductance leaks (normally without reservoir) .....	29
Annex A (informative)	Calculation of leakage rate decrease due to tracer gas depletion in the reservoir .....	30
Bibliography	.....	32