

# DIN EN ISO 16890-2:2017-08 (E)

## Air filters for general ventilation - Part 2: Measurement of fractional efficiency and air flow resistance (ISO 16890 -2:2016)

---

<b>Contents</b>		<b>Page</b>
<b>European foreword</b>		4
<b>Foreword</b>		5
<b>Introduction</b>		6
<b>1</b>	<b>Scope</b>	8
<b>2</b>	<b>Normative references</b>	8
<b>3</b>	<b>Terms and definitions</b>	9
<b>4</b>	<b>Symbols and abbreviated terms</b>	11
4.1	Symbols	11
4.2	Abbreviated terms	13
<b>5</b>	<b>General test requirements</b>	13
5.1	Test device requirements	13
5.2	Test device installation	13
5.3	Test rig requirements	13
<b>6</b>	<b>Test materials</b>	14
6.1	Liquid phase aerosol	14
6.1.1	DEHS test aerosol	14
6.1.2	DEHS/DES/DOS - formula	14
6.1.3	DEHS properties	14
6.1.4	Liquid phase aerosol generation	14
6.2	Solid phase aerosol	15
6.2.1	Potassium chloride (KCl) test aerosol	15
6.2.2	KCl - formula	15
6.2.3	KCl properties	15
6.2.4	Solid phase aerosol generation	16
6.3	Reference aerosols	17
6.3.1	Reference aerosol for 0,3 µm to 1,0 µm	17
6.3.2	Reference aerosol for 1,0 µm to 10,0 µm	17
6.3.3	Other reference aerosols	17
6.3.4	Matching criteria	18
6.4	Aerosol loading	18
<b>7</b>	<b>Test equipment</b>	18
7.1	Test rig	18
7.1.1	Dimensions	18
7.1.2	Construction materials	19
7.1.3	Test rig shape	19
7.1.4	Test rig air supply	20
7.1.5	Test rig isolation	20
7.1.6	D/S mixing orifice	20
7.1.7	Aerosol sampling	21
7.1.8	Test rig air flow rate measurement	23
7.1.9	Resistance to air flow measurement	23
7.1.10	Non 610 mm × 610 mm (24,0 inch × 24,0 inch) test devices	24
7.1.11	Dust injection testing	25
7.2	Aerosol particle counter	25
7.2.1	General	25
7.2.2	OPC sampled size range	25
7.2.3	OPC particle size ranges	25

7.2.4	Sizing resolution.....	26
7.2.5	Calibration.....	26
7.2.6	Air flow rate .....	26
7.2.7	Zero counting.....	26
7.2.8	Dual OPC(s) .....	26
7.3	Temperature, relative humidity .....	27
<b>8</b>	<b>Qualification of test rig and apparatus.....</b>	<b>27</b>
8.1	Schedule of qualification testing requirements.....	27
8.1.1	General.....	27
8.1.2	Qualification testing .....	27
8.1.3	Qualification documentation.....	27
8.2	Qualification testing .....	28
8.2.1	Test rig — Pressure system testing .....	28
8.2.2	OPC — Air flow rate stability test .....	29
8.2.3	OPC — Zero test.....	29
8.2.4	OPC — Sizing accuracy .....	30
8.2.5	OPC — Overload test.....	30
8.2.6	Aerosol generator — Response time.....	31
8.2.7	Aerosol generator — Neutralizer .....	31
8.2.8	Test rig — Air leakage test.....	32
8.2.9	Test rig — Air velocity uniformity .....	33
8.2.10	Test rig — Aerosol uniformity.....	34
8.2.11	Test rig — Downstream mixing .....	35
8.2.12	Test rig — Empty test device section pressure .....	36
8.2.13	Test rig — 100 % efficiency test and purge time .....	37
8.2.14	Test rig — Correlation ratio .....	37
8.3	Maintenance .....	37
8.3.1	General.....	37
8.3.2	Test rig — Background counts.....	38
8.3.3	Test rig — Reference filter test.....	39
8.3.4	Test rig — Pressure reference test .....	40
8.3.5	Test rig — Final filter resistance .....	40
<b>9</b>	<b>Test methods.....</b>	<b>40</b>
9.1	Air flow rate .....	40
9.2	Measurement of resistance to air flow .....	40
9.3	Measurement of fractional efficiency.....	40
9.3.1	Aerosol sampling protocol .....	40
9.3.2	Background sampling.....	40
9.3.3	Testing sequence for a single OPC .....	41
9.3.4	Testing sequence for dual OPC testing .....	43
<b>10</b>	<b>Data reduction and calculations .....</b>	<b>45</b>
10.1	Correlation ratio .....	45
10.1.1	Correlation ratio general.....	45
10.1.2	Correlation ratio data reduction .....	45
10.2	Penetration and fractional efficiency .....	47
10.2.1	Penetration and fractional efficiency general .....	47
10.2.2	Penetration data reduction .....	47
10.3	Data quality requirements .....	50
10.3.1	Correlation background counts .....	50
10.3.2	Efficiency background counts .....	50
10.3.3	Correlation ratio .....	50
10.3.4	Penetration .....	51
10.4	Fractional efficiency calculation .....	51
<b>11</b>	<b>Reporting results .....</b>	<b>52</b>
11.1	General .....	52
11.2	Required reporting elements .....	52
11.2.1	Report general .....	52
11.2.2	Report values .....	52
11.2.3	Report summary .....	52
11.2.4	Report details .....	54
<b>Annex A (informative) Example .....</b>	<b>57</b>	
<b>Annex B (informative) Resistance to air flow calculation .....</b>	<b>64</b>	
<b>Bibliography .....</b>	<b>66</b>	