

DIN EN ISO 10524-1:2024-01 (E)

Pressure regulators for use with medical gases - Part 1: Pressure regulators and pressure regulators with flow-metering devices (ISO 10524-1:2018 + Amd 1:2023) (includes Amendment A1:2023)

Contents		Page
European foreword		4
[A1] European foreword to Amendment [A1]		5
Foreword		6
[A1] Foreword to Amendment [A1]		7
Introduction		8
1	Scope	9
2	Normative references	9
3	Terms and definitions	10
4	Nomenclature	12
5	General requirements	12
5.1	Safety	12
5.2	Usability	12
5.3	Alternative construction	12
5.4	Materials	12
6	Design requirements	13
6.1	General	13
6.2	Indicator for cylinder pressure or cylinder content	14
6.2.1	General	14
6.2.2	PRESSURE GAUGES, pressure indicators, and FLOWGAUGES	14
6.3	Integrated electronic device	14
6.4	Connections	14
6.4.1	Inlet connector	14
6.4.2	Outlet connectors	15
6.5	* Requirements for outlet pressure	15
6.5.1	PRESSURE OUTLET	15
6.5.2	FLOW OUTLET	16
6.6	Flow-metering device	16
6.7	Flow control and indication	16
6.8	Pressure-adjusting device	16
6.9	* Filtration	17
6.10	* PRESSURE-RELIEF DEVICE	17
6.11	Leakage	17
6.12	Mechanical strength	18
6.12.1	Resistance of the high-pressure side	18
6.12.2	Resistance of the low-pressure side to pneumatic pressure	18
6.12.3	Resistance of the low-pressure side to inlet pressure, P_1	18
6.13	* Resistance to ignition	18
6.14	Requirements for PRESSURE REGULATORS with FLOWMETERS	18
6.14.1	Calibration	18
6.14.2	ACCURACY OF FLOW	18
6.14.3	Stability of flow	19
6.14.4	Legibility	19
6.14.5	Flow control device	19

6.15	Requirements for PRESSURE REGULATORS fitted with FLOWGAUGES.....	19
6.15.1	Calibration.....	19
6.15.2	ACCURACY OF FLOW	19
6.15.3	Stability of flow	19
6.16	Requirements for PRESSURE REGULATORS fitted with fixed ORIFICES	20
6.16.1	Stability and ACCURACY OF FLOW	20
6.16.2	* Flow setting torque.....	20
6.16.3	Removal of a fixed ORIFICE.....	20
6.16.4	Legibility	20
6.17	Endurance.....	20
6.17.1	FLOW SELECTOR.....	20
6.17.2	PRESSURE REGULATOR	21
7	Construction requirements.....	21
7.1	* Cleanliness.....	21
7.2	Lubricants.....	21
7.3	Loosening torques.....	21
8	Test methods for type tests.....	22
8.1	General conditions.....	22
8.1.1	General.....	22
8.1.2	Ambient conditions	22
8.1.3	Test gas.....	22
8.1.4	Reference conditions.....	22
8.2	Test schedule.....	22
8.3	Test methods for outlet pressure.....	24
8.3.1	Test equipment.....	24
8.3.2	Test methods for determining outlet pressure limits for a PRESSURE REGULATOR fitted with a PRESSURE OUTLET.....	25
8.3.3	Test method for determining the outlet pressure limit for a PRESSURE REGULATOR fitted with a FLOW OUTLET	26
8.4	Test method for a PRESSURE-RELIEF DEVICE.....	26
8.5	Test methods for leakage.....	26
8.5.1	External leakage.....	26
8.5.2	Internal leakage.....	27
8.6	Test method for mechanical strength.....	27
8.6.1	Test method for the high-pressure side.....	27
8.6.2	Test method for resistance of the low-pressure side to pneumatic pressure	27
8.6.3	Test method for the resistance of the low pressure side to P_1	27
8.7	Test method for resistance to ignition.....	28
8.7.1	General.....	28
8.7.2	Test procedure for ADJUSTABLE and PRE-SET PRESSURE REGULATORS.....	28
8.8	Test method for ACCURACY OF FLOW of PRESSURE REGULATORS fitted with FLOWMETERS or FLOWGAUGES.....	28
8.9	Test method for the stability of flow of PRESSURE REGULATOR fitted with FLOWMETERS or FLOWGAUGES.....	28
8.10	Test method for stability and ACCURACY OF FLOW of PRESSURE REGULATORS fitted with fixed ORIFICES	29
8.11	Test method for flow setting and loosening torques.....	29
8.11.1	General.....	29
8.11.2	Test method for verifying no stable position between two settings.....	29
8.12	Test method for durability of markings and colour coding.....	29
8.13	*FLOW SELECTOR endurance test.....	29
8.14	PRESSURE REGULATOR endurance test	30
9	Marking, colour coding, and packaging.....	30
9.1	Marking.....	30
9.2	Colour coding.....	32
9.3	Packaging.....	32

10	Information to be supplied by the manufacturer	32
	Annex A (informative) Rationale	34
	Annex B (informative) Reported regional and national deviations of colour coding and nomenclature for medical gases	39
	Bibliography	41