

DIN 19643-3:2023-06 (E)

Treatment of water of swimming pools and baths - Part 3: Combinations of process with ozonization and chlorination

Contents		Page
Foreword		4
1	Scope	6
2	Normative references	6
3	Terms and definitions	7
4	Principles of the process combinations	7
4.1	General	7
4.2	Flocculation - Filtration - Ozonation - Sorption filtration - Chlorination	8
4.3	Flocculation - Ozonation - Multi-layer filtration with sorption - Chlorination	8
5	Process stages	9
5.1	Adjusting the acid neutralizing capacity	9
5.1.1	General	9
5.1.2	Reagents for adjusting the acid neutralizing capacity	9
5.1.3	Values for the acid neutralizing capacity of the raw water	9
5.1.4	Checking the acid neutralizing capacity	10
5.2	pH value adjustment	10
5.3	Flocculation	10
5.3.1	General	10
5.3.2	Flocculants	13
5.3.3	Minimum quantity of flocculant to be added	14
5.3.4	Checking the flocculant dosage	14
5.4	Ozonation	14
5.4.1	General	14
5.4.2	Ozone mass concentration	15
5.4.3	Ozone dosage and ozone reaction time	15
5.4.4	Checking the ozone generation system	16
5.5	Flocculation filtration in the process combination Flocculation - Filtration - Ozonation - Sorption filtration - Chlorination	16
5.5.1	General	16
5.5.3	Checking the filtration	21
5.6	Sorption filtration in the process combination Flocculation - Filtration - Ozonation - Sorption filtration - Chlorination	21
5.6.1	General	21
5.6.2	Particle size ranges, filter bed heights and filtration rates	22
5.6.3	Backwashing of sorption filters	22
5.6.4	Checking the filtration	24
5.7	Multi-layer filtration in the process combination Flocculation - Ozonation - Multi-layer filtration with sorption effect - Chlorination	24
5.7.1	General	24
5.7.2	Filter bed heights, particle size ranges and filtration rates	24
5.7.3	Backwashing multi-layer filters with sorption effect	25
5.7.4	Checking the filtration	28
5.8	Checking the flocculation filtration and sorption filtration	28
5.9	Chlorination	30
5.9.1	General	30
5.9.2	Chlorine concentration	30

6	Load capacity factor k	30
	Annex A (informative) Simplified representation of process combinations (examples)	31
	Bibliography	34

Figures

Figure 1 — Correlation between pipe internal diameter and flow rate.....	13
Figure A.1 — Simplified diagram of the process combination flocculation - filtration - ozonation - sorption filtration - chlorination	31
Figure A.2 — Simplified diagram of the process combination flocculation - ozonation - multi-layer filtration with sorption effect - chlorination (pressurized ozone reaction vessel)	32
Figure A.3 — Simplified diagram of the process combination flocculation - ozonation - multi-layer filtration with sorption effect - chlorination (ozone reaction vessel at atmospheric pressure)	33

Tables

Table 1 — Particle size ranges, filter bed heights and filtration rates for single-layer filters using silica sand.....	20
Table 2 — Particle size range combinations for multi-layer filters.....	20
Table 3 — Filter bed heights and filtration rates for multi-layer filters	21
Table 4 — Particle size ranges, filter bed heights and filtration rates for sorption filters	22
Table 5 — Particle size ranges, filter bed heights and filtration rates of multi-layer filters with sorption effect.....	25
Table 6 — Sample Backwashing programme for multi-layer filters with sorption effect as listed in Table 5.....	27
Table 7 — Specifications for checking filtration.....	28