Aerated Grit Chamber Sizing, Air Supply and Grit Quantity

Peak design flow, chamber volume and dimensions from detention time and width-to-depth ratio, average detention, diffuser air and daily grit volume.

Input parameters

Unit system: SI

Parameter	Value	Unit
Average flow	180.00	m³/h
Peaking factor for design	3.0000	
Number of chambers	1.0000	
Detention time at peak flow	4.0000	min
Water depth	2.5000	m
Width-to-depth ratio	1.0000	
Air per metre of chamber length	0.40000	m³/(min·m)
Grit per volume of wastewater (m³ per 10³ m³)	0.030000	

Calculated results

Parameter	Value	Unit
Peak design flow	0.15000	m³/s
Volume of each chamber	36.000	m³
Width	2.5000	m
Length	5.7600	m
Detention at average flow	12.000	min
Total air	2.3040	m³/min
Grit removed	0.12960	m³/d

Notes for this case

• The typical values: 2-5 min detention at peak flow, depth 2-5 m, width-to-depth 1:1 to 5:1, air 0.2-0.5 m³/min per metre of length and 0.004-0.2 m³ of grit per 10³ m³ of wastewater. Two chambers let one be drained for maintenance.

Formula and method

$$Q_p = PF \cdot Q_{avg}, \quad V = \frac{Q_p}{n} t_p, \quad W = (W/d)\, d, \quad L = \frac{V}{Wd}, \quad Q_{air} = q_a L n$$

Variables

Q_{avg}	Average flow	m³/s
PF	Peaking factor for design	-
n	Number of chambers	-
t_p	Detention time at peak flow	s
d	Water depth	m
W/d	Width-to-depth ratio	-
q_a	Air per metre of chamber length	m³/(s·m)
g_r	Grit per volume of wastewater (m³ per 10³ m³)	-
Q_p	Peak design flow	m³/s
V	Volume of each chamber	m³

W	Width	m
L	Length	m
t_a	Detention at average flow	s
Q_{air}	Total air	m³/s
V_g	Grit removed	m³/s

Method and standards

Aerated grit chamber design.

Assumptions and limits

- Typical-value design; grit quantity varies widely with sewer system.

Report details

Report reference	FCC-NQAP-QA7T (the same inputs always give the same reference)
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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/environmental/wastewater/aerated-grit-chamber-design

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.