CRUSIL 🕫

Manufactured in Poland





SkySil

ADVANCED FILTRATION MEDIA

- SkySil Fe Ammonio 0,8 2,0 mm
- SkySil Fe 1,1 2 mm
- SkySil Mn 0,6 1,2 mm

All media have received the PZH certification, allowing them to come into contact with drinking water.

What is chalcedonite?

Chalcedonite is an organic mineral sourced from an open-pit mine in Inowłódz (the Teofilów deposit). Due to its origin (the skeletons of organisms deposited in shallow seas during the Jurassic era), chalcedonite contains silica with a highly developed pore system.

Chalcedonite, after proper processing, becomes a basis for the production of effective filtration materials. Its physical properties (high porosity) and chemical composition ($SiO_2 > 97\%$) predispose it for use in water treatment technology intended for human consumption.

The most important feature of chalcedonite is its porosity, which can reach up to 30%. This property allows beneficial microorganisms to thrive within the material, playing a key role in the removal of contaminants from water, such as manganese and ammoniumions. Numerous studies confirm that the process of manganese reduction begins specifically in the pores of the filtration medium.

SkySil deposits are highly effective filtration materials that perform excellently in residential filtration systems, as well as in water treatment stations and industrial applications involving process water.

Their unique physicochemical properties provide a significant advantage over other materials. Due to their extensive pore structure, each grain of **SkySil** exhibits both lightness and durability, leading to longer lifespan of the medium and reduced operational costs.



Natural chalcedonite grit from a SEM electron microscope







Each variant of the deposit is characterized by specific properties that contribute to its effectiveness in particular applications:

	SkySil Fe Ammonio	SkySil Fe	SkySil Mn
Removal of Fe (iron)	\checkmark	\checkmark	\checkmark
Removal of Mn (manganese)			\checkmark
Removal NH₄⁺	\checkmark		
Suspension filtration		\checkmark	
Increased efficiency of water treatment	\checkmark	\checkmark	
Improvement of safety and operational stability	\checkmark	\checkmark	\checkmark
Reduction of expenditure on backwash water	\checkmark	\checkmark	\checkmark

The main advantages of SkySil filtration media:

- ✓ Lower iron removal zone up to 30% compared to quartz sand.
- ✓ High effciency in removing iron (up to 98%).
- High bulk capacity allowing for longer filtration cycles and reducing backwashing costs by up to 30%.
- ✓ High filtration velocities up to 20 m/h.
- Efficient hydraulic characteristics characterized by low flow resistance, even after sediment filtration, which helps reduce operating pressure in the system.
- High porosity providing ideal conditions for the colonization of manganese and nitrifying bacteria.
- Low bulk density which reduces the load on the bottom part of filters, particularly important in the case of pressure filters.

	SkySil				
PARAMETER		SkySil Fe Ammonio	SkySil Fe	SkySil Mn	UNIT
	lron removal potential	≤ 20	≤ 20	≤ 15	mg Fe/dm³
	Manganese removal potential	≤ 1,5*	≤ 1,5*	≤ 5,0	mg Mn/dm³
	Ammonium ion removal potential	≤ 2,0*	≤ 2,0**	≤ 2,0**	mg NH4 ⁺ /dm ³

* After prior natural condition **t = 20 ÷ 40 days**

** After prior natural condition **t + 50%**

By choosing **SkySil** filtration media, it is also possible to significantly reduce costs. Its unique properties distinguish it from other filtration materials and contribute to improving the efficiency of water treatment technology. This, in turn, results in substantial savings in the construction, modernization, and operation of Water Treatment Plants.





SkySil Fe

SkySil Fe is a lightweight, porous siliceous cryptocrystalline medium with an increased bulk capacity for suspended solids. It is obtained through the processing of larger fractions of natural chalcedonite. By carefully selecting the grain size distribution curve, **SkySil** achieves excellent results in iron reduction and suspended solids filtration. Moreover, its low bulk density contributes to significant savings in backwash water, optimizing the water treatment processes.

PARAMETER	VALUE	UNIT
Grain sizo	0,6 - 1,2	mm
Uldill Size	1,1 – 2,0	
Bulk density	0,9 – 1,1	kg/dm³
Specific gravity	2,62 - 2,65	kg/dm³
Grain porosity	≤ 20	%
BET specific Surface area	4,5 - 5	m²/g
Uniformity coefficient	≤ 1,5	-





PARAMETER	0,6 - 1,2	1,1 - 2,0	UNIT
Filtration velocity	≤ 15		m/h
Iron removal potential	≤ 20		mg Fe/dm³
Manganese removal potential	≤ 1,5*		mg Mn/dm³
Ammonium ion removal potential	≤ 2,0*		mg NH4+/dm³
Space above the medium	40		%
Air flushing	8,5 - 13 11 - 17		L/Sm ²
Backwashing velocity with water	7,5 - 12	10 -15	L/Sm ²
Filter media expansion	25		%

* After prior natural conditioning

COMPONENT	CONTENT
SiO ₂	97,7 - 98,9
Al ₂ O ₃ , MgO, CaO, Fe ₂ O ₃ , K ₂ O	< 2,0
Organic components	< 0,05

SkySil Fe Ammonio

SkySil Fe Ammonio is a natural chalcedonite used in water treatment technology for many years. Due to its developed pore system, the deposit serves as an excellent substrate for the formation of a biofilm that metabolizes ammonium ions. The development of the biofilm within the pores protects it from complete destruction during the backwashing process.

PARATETER	VALUE	UNII
Grain size	0,8 - 2,0	mm
Bulk density	0,85 – 0,95	kg/dm³
Specfic gravity	2,62 - 2,67	kg/dm³
Grain porosity	≤ 30	%
BET specific surface area	4,5 - 6	m²/g
Uniformity coefficient	≤ 1,5	-

PARAMETER	VALUE	UNIT	
Filtration velocity	≤ 15	m/h	
Iron removal potential	≤ 20	mg Fe/dm³	
Manganese removal potential	≤ 1,5*	mg Mn/dm³	
Ammonium ion removal potential	≤ 2,0*	mg NH⁴⁺/dm³	
Water pH range	6,5 - 9,5	-	
Space above the medium	40	%	
Air flushing	13 - 17	L/Sm ²	
Backwashing velocity with water	12 - 15	L/Sm ²	
Filter media expansion	25	%	
* After prior natural condition			
COMPONENT	CONTENT		
SiO ₂	97,7 - 98,9		
Al ₂ O ₃ , MgO, CaO, Fe ₂ O ₃ , K ₂ O	< 2,0		

< 0,05



Another important feature of **SkySil Fe Ammonio** is its high bulk capacity, which enables the simultaneous removal of iron and other suspended solids. With the appropriate filtration process, its high grain porosity not only accelerates the biological activation of the medium in the elimination of ammonium ions but also reduces the time required to remove manganese compared to traditionally used filtration materials.

Organic components

Packaging: SkySil Fe Ammonio LDPE bags 15 kg 60 bags on a pallet (900 kg)



Natural chalcedonite grit from a SEM electron microscope

SkySil Mn

SkySil Mn is an advanced filtration medium for manganese removal that combines the natural porosity and grain shape of chalcedonite with manganese oxide in the form of Birnessite. The structure and composition of Birnessite facilitate easy redox reactions and exhibit a high adsorption capacity for manganese, providing suitable conditions for further autocatalytic oxidation.

The main advantages of SkySil Mn:

- Does not require disinfectants or activators
- Long lifespan of the medium
- Low operational costs
- High filtration efficiency

PARAMETER	VALUE	UNIT	
Grain size	0,6 - 1,2	mm	
Bulk density	1,0 – 1,1	kg/dm³	
Specfic gravity	2,7 - 2,8	kg/dm³	
Grain porosity	≤ 15	%	
BET specific surface area	3,0 - 3,5	m²/g	
Uniformity coefficient	≤ 1,6	-	



Packaging: SkySil Mn LDPE bags 25 kg 32 bags on a pallet (800 kg) The production process developed by **Crusil** ensures an even coating of the chalcedonite aggregate with manganese, resulting in immediate manganese reduction effects right after the filtration process is initiated. Achieving full effectiveness occurs without the need for special reagents

to activate the medium and without long waiting times for its conditioning. Additionally, the low bulk density of **SkySil Mn** (1.0 – 1.1 Mg/m³) facilitates effective backwashing, even at low pressures, minimizing the risk of clumping and dead zones.

PARAMETER	VALUE	UNIT	
Filtration velocity	≤ 15	m/h	
Iron removal potential	≤ 15	mg Fe/dm³	
Manganese removal potential	≤ 5,0	mg Mn/dm³	
Ammonium ion removal potential	≤ 2,0*	mg NH ⁴ +/dm ³	
Water pH range	6,5 - 9,5	-	
Space above the medium	40	%	
Air flushing	8,5 - 13	L/Sm ²	
Backwashing velocity with water	7,5 – 12	L/Sm ²	
Filter media expansion	25	%	

* After prior natural conditioning

COMPONENT	CONTENT
SiO ₂	91,4 - 97,7
Al ₂ O ₃ , MgO, CaO, Fe ₂ O ₃ , K ₂ O	< 6,0
Manganese oxides coating grains	2,1 - 3,4
Organic components	< 0,05

TANK SIZE	TANK VOLUME [L]	MEDIUM VOLUME [L]	NOMINAL FLOW [m³/h]	MAXMIMUM FLOW [m³/h]	BACKWASHING [m³/h]
10x54	60,7	33	0,5	0,8	1,5
12x52	84	46	0,7	1,1	2,2
13x54	103,1	57	0,9	1,3	2,6
14x65	140	77	1,0	1,5	3,0
16x65	170	94	1,3	1,9	3,9
18x65	250	138	1,6	2,5	4,9
21x60	310	171	2,2	3,4	6,7
24x69	436	240	2,9	4,4	8,8
30x72	712	392	4,6	6,8	13,7
36x72	1072	590	6,6	9,8	19,7

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4