

Cooling Water
Risks for health and costs
by “Bio films”



Save and economical
Disinfection with Duzon 100 L

„ Simply the best“

Duozon[®]

Others would like to have **our idea**, too.



A patent will be granted if an invention is a technical (chemical) improvement.

Our patent formula cannot easily be copied – and you profit from lots of advantages.

When used in circulating water Duozon 100 L causes enormous savings of water-, energy- and sewage-costs by less fresh water addition, longer filter runnings, less chemical costs.

Bio films, trihalogenmethanes, chloramines, E.coli, legionellas and other microorganisms will be eliminated.

The AOX-content, too, a dutiable parameter in waste water, will be considerably reduced by Duozon 100 L

**Progress is a measurable matter of fact
and will save your costs!**

Liquid chlorine oxides ClO₂ (Duozon 100 L) for super oxidation are also protected internationally by patents



**YOUR
WATEREXPERTS**

cealin[®]

Cealin, chem. Factory GmbH
Foreign trade department
Paul – Keller – Str. 8
D – 31 139 Hildesheim
Tel.: 0049 – 5121 – 517264
e-Mail: cealcermak@aol.com



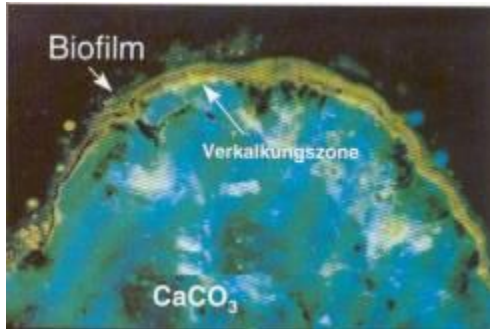
Risks caused by microbiology in cooling waters (bio films)

In all water systems there is a fundamental danger of colonization of various microorganisms. They accumulate together as structures, as slimy bio films, being extremely resistant.

Bio films cause considerable damages. In form of obinate covering they block filters and pipe lines, disturb the heat exchange in cooling towers, lead to corrosion of concrete, steel and plastic.

Only the growing-over in heat exchangers causes appr. 3 bill. Dollars costs per year worldwide.

It is also aggravating that in bio films pathogene microorganisms like amebia, E. coli, legionella, protozoa and so on have been proved



Bio films are able to grow to a dimension of several millimeters and to deteriorate heat transfer as long as the cooler is not working any more.

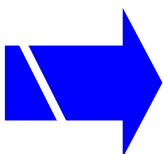
Already a bio film of 1 millimeter leads to losses of heat transfer of more than 30%!

The growth of bio films depends on the dimension and condition of the watercontacted surfaces. The rougher they are (corroding pipe lines, calcerous sediments) and the bigger their surface is, the easier is a colonization. However the growth is not depending on light. Oxygen and foot are nearly always sufficient available in water. At temperatures from 30°C to 60°C they colonize the surfaces and build slimecoats (bio films).

The main problem of controlling these microorganisms is that the bio films build a protection against disinfectants. So a lot of microorganisms are not to be controlld effectively by using customary products and UV-rays. These metods predominantly only work on microorganisms in the waterphase and in higher areas. Deeper areas are not covered. Out of deep areas mikroorganisms always can grow again and enter the passing water. So the next wave of contamination begins!

The disinfection wit **Duozon 100 L** developes in a different way. Because of its high redox properties in comnation with an extreme strong potential of oxidation it belongs to one of the most effective disinfection products. This results in the excellent effectiveness againts nearly all microorganisms (germs, bacteria, algae, viruses fungi, yeasts and protozoa). Especially in circulating waters you can save enormous costs of water, energy and waste water due to longer times of filter-standings-and runnings. Forming of resistances of microorganisms are excluded by application of **Duozon 100 L**. Moreover there is a good material compatibility in the applikation – concentrations so the product is nearly applicable everywhere. Waste water relevant criterias are fulfilled with the application of **Duozon 100 L**. Because of its different chemikal behaviour **Duozon 100 L** does not work like chlorine chloridizing but first of all oxidizing. This property and the enormous strenght of oxidation by application in loaded water, in opposite to chlorine products, will build evident less trihalogenmethanes (THM). The AOX-contend, too, a dutiable parameter in waste water, will be considerably reduced with Duozon. Therefore additional costs can be saved. The lawgiver in valid regulations take the eminent effects of ClO₂ more often into consideration. In the seventh report of FAO / WHO Expert Committee on Food Aditives, FAO Nutrition Meetings Report Series, No.35 of the Word Health Organisation, Geneva, chlorine dioxide is recommended. Duozon 100 L not only eliminates dangerous bio films but also helps the user to lower his operating costs and to relieve our environment.

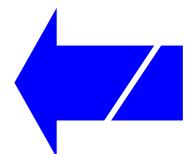
Liquid chlorine oxides ClO₂ (Duozon 100 L) for super oxidation are also protected internationall by patents.



**YOUR
WATEREXPERTS**

cealin[®]

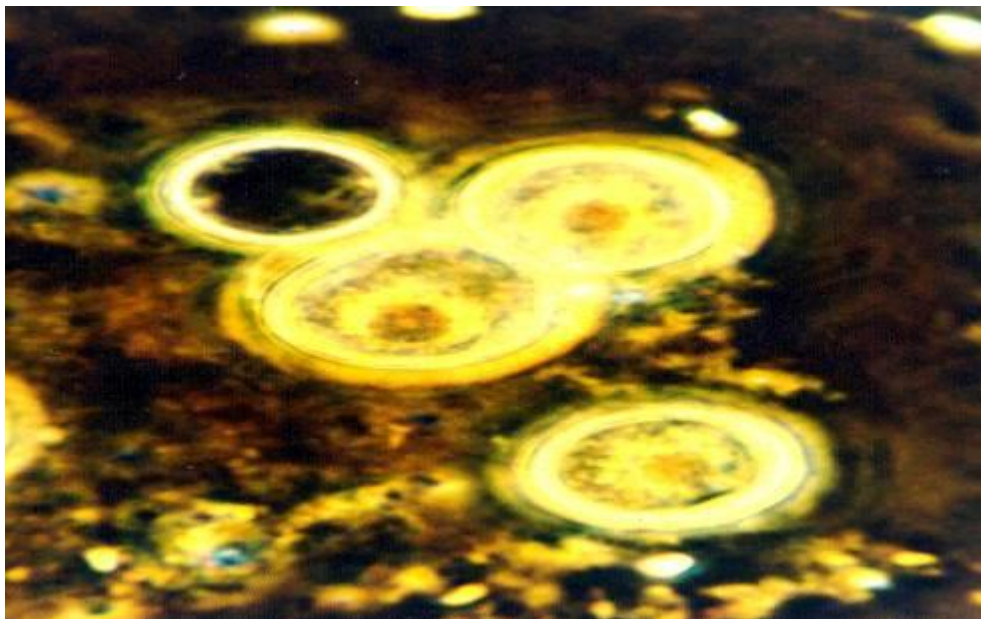
Cealin chem. Factory GmbH
Foreign trade department
Paul – Keller – Str. 8
D – 31 139 Hildesheim
Tel.: 0049 – 5121 – 517264
e-Mail: cealcermak@aol.com



Bio film and substance



Biomass in the outflow of a cooling water-system

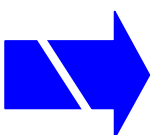


Bacteria under microscope.

Microorganisms are able to release **meningitis** through nose-pharynx-muco-membrane by „Drop-Transfer“.

**Mikroorganismen können definitiv
eliminiert werden durch **DUOZON 100 L!****

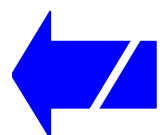
Liquid chlorine oxides ClO_2 (DUOZON 100 L) for super oxidation are also protected internationally by patents.



**YOUR
WATEREXPERTS**

cealin[®]

CEALIN chem. Factory GmbH
Foreign trade department
Paul – Keller – Str. 8
D - 31 139 Hildesheim
Telefax: +49 – 5121 – 517264
e-Mail: cealcermak@aol.com



Duozon 100 L

liquid oxidation product

1. General information

Oxidation is the accumulation of oxygen, electron transaction and combustion. **DUOZON 100 L** works by oxygen separation and thus by pure oxidation.

2. Characteristics

DUOZON 100 L is a liquid chlorine oxygen compound, inorganic, to be mixed easily with water, residue-free, and it is storable. **DUOZON 100 L** is suited for application in a sour, neutral and alkaline milieu (pH from 5 to 9) and for special tasks.

a) Killing of microorganisms

Duozon 100 L kills bacteria, yeast, fungi, spores, and algae by oxidation. Virus will be inactivated.

b) Odor removal

By oxidation of odor-forming compounds, e.g. aminos and hydrogen sulfides, etc.

c) Taste improvement

By oxidation of aminos (chloramines) and phenols.

d) Reduction of organic compounds

By oxidation of organic substances, as e.g. halogenated hydrocarbons.

e) CSB/TOC/BSB – reduction

By oxidation of water-loading material and by enriching of oxygen.

f) Elimination of fecal substances

By oxidation of nitrogenous compounds (ammonia, urea, etc.).

g) Fat splitting

By oxidation into short-chained carboxylic acids.

h) Decontamination

By oxidation of e.g. cyanides into cyanates. Nitrite will be oxidized into nitrate.

i) Desulfurization

By oxidation of sulfuric compounds (sulfides, sulfites) into sulfates.

j) Elimination of iron, manganese and other metals

By oxidation metal cations will be converted into the maximum valence, whereas the metal cations will be precipitated-depending on the pH-value- as insoluble oxides or hydroxides resp. they can be filtered.

k) Reduction of potassium permanganate consumption

By oxidation of water loading materials. Increase of redox-potential.

l) Increase of redox-potential

By introduction of a high oxidation potential.

3. Oxidativ and biocidal effect

During the several reactions of **DUOZON 100 L** the oxygen agglomerates to the reaction partner. Anions like sulfites are converted directly into the maximum valence. Organic compounds can be converted – depending on their structure either into oxygen derivatives or into carboxylic acids, which further hydrolyzes into carbon dioxide and water, depending on pH-value.

Our specialist are at your disposal for further information, our laboratories for your analyses requirements.



**YOUR
WATEREXPERT**

cealin[®]

CEALIN chem. factory GmbH
Foreign trade department
Paul – Keller – Str. 8
31 139 Hildesheim
Telefax: +49 – 5121 - 517264
e-Mail: cealcermak@aol.com



The biocidal effect results from the displacement of the redox potential of the water, treated with **DUOZON 100 L** and from the oxidative interruption of the protein-structure-synthesis. The algicidale effect results from the oxidation of the chlorophyll. **DUOZON 100 L** is effective against pathogenic and non-pathogenic bacteria, yeasts, spore-formers, algae, and virus.

4. Physical and chemical properties

Appearance:	liquid green-yellow solution with typical own odor
Freezing point:	-25°C
“Hazen”colour-value (APHA):	37
Density at 20°C:	1.2 g/ml
Solubility in water at 20°C:	unlimited
pH-value (at 10 g/l, 25°C):	10.8
Conductivity (undiluted):	app. 295,000 µS/cm
Normal potential E0/25°C:	+ 1460 mV
EPA Reg:	59055-1

5. Application

Data of optimal application vary greatly regarding the various areas of application. Practical results have shown that the dosage can waver from

- 1 - 10 ml / m³ in drinking water
- 3 - 25 ml / m³ in swimming-pool-water
- 1 - 50 ml / m³ in cooling water
- 1 - 20 l per filter for disinfection

depending on conditions of operation and water pollution.

6. Concentration control

Lab-independent, for continuous control:
Colour comparison determination with DPD - reagents.

Attention: Due to the enormous oxidation potential the measurement has to be made bei using the chlorine DPD-reagent D (Glycine).

7. Special application hints

DUOZON 100 L allows direct dosage from the supplier by a dosing pump but also manual. A pre-dilution is not necessary. If diluted solutions will be applicated it is to be stated, that they are stable for only maximal 48 hours. When prediluted there will be moreover a reduction in active component (oxygen-splitting-off). **Before application of Duozon 100 L please read the product information as well as the badge for using the biozid in a safe way.**

8. Handling and storage:

DUOZON 100 L should be stored in closed containers and be protected againts warmth. **Duozon 100 L** itself is not combustible, having been leaked and dried it may flash combustible materials. **Duozon 100 L** is storable appr. 1/2 year at a range of temperature of 0° - +35°C. After this time there will be a reduction in active components.

9. Packing units:

25/60-kgs-one-way-staple-container, 220-kgs-plastic-barrel, 1000-kgs-Container;

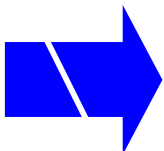
These data are basing on the present date of our knowledge. They are showinginformally the application of our produceres. **Reprint – also in extracts – is not allowed ©**

Practice example of **Duozon 100 L**



As shown on the foto you only need a fractionating pump
and a suction lance with fitting for dosing **Duozon 100 L**

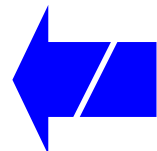
Liquid chlorine oxides ClO_2 (Duozon 100 L) for super oxidation are also protected internationally by patents.



**YOUR
WATEREXPETS**

cealin[®]

CEALIN, chem. Factory GmbH
Foreign trade department
Paul – Keller – Str. 8
D – 31 139 Hildesheim
Tel. 0049 – 5121 – 517264
e- Mail: cealin-cermak@web.de



Essences of various decrees in water treatment for Chlorine oxides = ClO₂

Seventh Report
of the FAO/WHO Expert Committee on
Food Additives



Published jointly by
FAO and WHO
and issued also as

FAO Nutrition Meetings Report, Series No. 35



WORLD HEALTH ORGANIZATION
GENEVA

SEVENTH REPORT

CHLORINE DIOXIDE

Synonyms **Chlorine (IV) oxide**

Chemikal name Chlorine dioxide

Chemical formula ClO₂

Zusatzstoffe in Lebensmitteln

9.6 ALLE ANDEREN ZUGELASSENEN ZUSATZSTOFFE MIT EWG – NUMMERN

E 421	Mannit	554	Aluminiumsilicate	921	L-Cystin
E 422	Glycerin	558	Betonit	925	Chlor
		570	*Stearinsäure	926	Chlordioxid
500	Natriumcarbonate	572	Magnesiumstearat		

3928 Bundesgesetzblatt Jahrgang 1998 Teil I Nr. 86, ausgegeben zu Bonn am 29. Dezember 1998

Anhang 18

Zuckerherstellung

B Allgemeine Anforderungen

Im Abwasser dürfen organisch gebundene Halogene, die aus dem Einsatz vom Chlor oder chlorabspaltenden Verbindungen, ausgenommen **Chlordioxid**, im Fallwasserkreislauf stammen, nicht enthalten sind. Der Nachweis, dass die Anforderung eingehalten ist, kann dadurch erbracht werden, dass die eingesetzten Betriebs- und Hilfsstoffe in einem Betriebstagebuch aufgeführt sind und nach Angaben des Herstellers keine der genannten Stoffe oder Stoffgruppen enthalten.

1149 Bundesgesetzblatt Jahrgang 2004 Teil I Nr. 28, ausgegeben zu Bon am 22. Juni 2004

Anhang 31

Wasseraufbereitung, Kühlsysteme, Dampferzeugung

E Anforderung an das Abwasser für den Ort des Anfalls

(1) An das Abwasser aus einem der folgenden Bereiche werde folgende Anforderung nach Durchführung einer Stoßbehandlung mit mikrobioziden Wirkstoffen gestellt:

		Abwasser aus der Frisch wasserkühlung von industriellen und gewerblichen Prozessen und von Kraftwerken im Ablauf	Abflutung von Hauptkühlkreisläufen von Kraftwerken (Abflutwasser aus der Umlaufkühlung)	Abflutung sonstiger Kühlkreisläufe
		Stichprobe		
Adsorbierbare organisch gebundene Halogene (AOX)	mg / l	0,15	0,15	0,5
Chlordioxid und andere Oxidanten Angegebenen als Chlor	mg / l	0,2	0,3	0,3
Giftigkeit gegenüber Leuchtbakterien (G _L)			12	12

Safety data Sheet

according to (EG) Nr. 1907/2006

Datum: Febr. 8 th, 2008

1. Material-/preparation- and Company

Tradename: Duozone 100 L
Use: Biocide und oxidation product in water treatment
Company: CEALIN – chemische Fabrik GmbH
Am Kälberkamp 5 – 8
D - 31 157 Sarstedt
Foreign trade department
Paul Keller Str. 8, 31 139 Hildesheim, BRD
Telefax: + 49 – 5121 – 51 72 64

Connection in this need: Tel. + 49 – 5066 – 8092/0

2. Compounds / ingredients

Dangerous ingredients: Chlorine oxides (ClO₂) w = > 10% < 25%

EG – No.:	233-162-8	INDEX-No.:	006-089-01-X
Dangersymbol:	C; N	R – Sets:	R 22-31-34-52
UN – No.:	3098	CAS – Nr.:	10049-04-4

Other datas: The wording of the dangerous references you find in chapter 15

3. Possible dangers

Characteritiation of danger: ecologically dangerous (corroding), (only undiluted product)

Special danger references:

- injurious to health when swallowed
- causes corrosions
- developes toxic gases by contating acids
- harmful for water organisms

4. First aid measures

General hints: Remove immediately contaminated clothes

After skin contact: Flush immediately with plenty of water, if necessary obtain medical attention

After eye contacts: Flush immediately for 15 minutes with gently flowing water, obtain medical attention

After having swallowed: Flush immediately the mouth and drink plenty of water. Do not induce vomiting. Obtain medical attention immediately.

5. Measures for fire fighting

Suitable extinguishing substances: water

Unsuitable for quenching: unknown

Special hazards by the material, its combustion products or arising gases:

Chlorine dioxide development

Special protecting clothes during fire fighting:

Do not inhale fire gases during fire fighting, use gas mask, independent from circulating air.

Further information:

Fire residuals and contaminated tempering water are to be removed concerning authority regulations

6. Measures when released unintentionally**Preventative measures:** Suitable protective clothes, keep away from persons, not protected**Environmental protective measures:** Do not allow chemical to enter sewers or water ways**Cleaning procedures:** Pump larger amounts into PE-container-pumps. Dilute residue with water, then remove with absorbent material (sand), and remove concerning regulations

7. Handling and storage**Handling:** Leaflets BG – Chemie: M004, T015**Storage:** Store in closed original container in dry and well-ventilated areas, avoid contact with acids (gas-development), or metals (corrosion) protect against heat, UV, and frost

8. Exposition limit and personal protective equipment**Additional hints for technical equipments:**

Leaflets BG-Chemie: M 004, T015

Components with limit values to be controlled concerning workplace:Workplace limiting value according to TRGS900 for chlorine dioxide: 0,1 ml/m³ resp. 0,28 mg/m³**Personal protective equipment****Gas mask:** If gas / steam occur put on gas mask (gas filter B/grey)**Handguard:** PVC / PE – gloves (no rubber)**Eyeguard:** Safety goggles**Bodyguard:** Protective clothing**General protective hygiene measures:** When handling with chemicals observe general protective measures

9. Physical and chemical characteristics**Physical state:** Liquid**Colour:** Yellowish**Odour:** Lightly stinging own odour

State changes

Boiling point / boiling area:		103°C
Melting point / metling area:		-25°C
Flasch point:		./.
Ignition:	The products has no pyrophorous properties	
Explosionsgrenzen:	lower: n.a.	upper: n.a.
Fire promoting properties:	By chlorine oxides fire promoting (only dry product)	
Steam pressure:	(20°C)	appr. 14 mbar
Relative density:	(20°C)	1,20
Solubility in water:	(20°C)	mixable
pH - value:	(20°C)	> 11
Viscosity:	(25°C)	appr. 2,4 mPa.s

10. Stability and reactivity

Conditions to be avoided:	Protect agains heat and UV-radiation
Materials to be avoided:	The product reacts corrosively with metals
Dangerous decomposition products:	ClO ₂
Further information:	Reacts with acids under gase development

11. Toxicological data

Mutagenity:	Test over 4 generations – non mutagen –
Subacute toxicity:	No toxic reaktionen at 100 ppm as ClO ₂
Chronic toxicity:	No toxic effects at 25 ppm during 2 years (mouse)
Further information:	Duozon 100 L acts strongly corrosive on skin, eyes, and mucous membranes. When chlorine oxides are released, respiratory ducts can be strongly irritated or corroded.

12. Ecology information**Mobility and bio accumulation potential:**

Duozon will be used in big quantities in open plants.
 Duozon is water-soluble.
 LID = 1 in application concentration of 30 mg / l.

Ecotoxicological effects:

Duozon will be almost completely decomposed in the biological cleaning stage.

General references:

Duozon 100 L is a strong oxidation product, it is allowed to get in pre-flooders oder fish waters only prediluted.

Other references:

The product is decomposing fastly in water and soil.

13. Waste disposal hints

Product:

Little amounts can be released into canalization when diluted with water.

Unsuitable packing:

Unsuitable empty containers are to be eliminated concerning authority regulations.

14. Transportation information

Classification according to ADR / GGVS and RID / GGVE:

Class: 5.1(8) **UN – Nr:** 3098 **Class code:** OC 1 **Packing category:** II

Further information: DUOZON 100 L is not in the GGVS/ADR-register, it is listed independently .

15. Regulations

Marking according to EU-regulations

Danger symbol: C; N

Danger marking: Corrosive, dangerous for the environment

Contains: Chlorine oxides (ClO₂) w = > 10% < 25%

R – Sets: 22-31-34-52 Harmful if swallowed
Contact with acid liberates toxic gas
Causes burns
Harmful to aquatic organisms

S – Sets: 2-23-26-28 Keep out of the reach of children
36/37/39- Do not breathe gas/fumes/vapour/spray. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
45-61 After contact with skin, wash immediately with plenty of water.
Wear suitable protective clothing, gloves and eye/face protection
In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
Avoid release to the environment. Refer to special instructions / safety data sheets.

National regulations:

Water danger class:: 2 (self classification)

16. Further information

Duozone 100 L is Listed in EU Added-Substances-Regulation (food-supplementary-substances) under No.926
Conforming to raw material with EN 12671:2000. Baua: Reg.-Nr.:N-22565, N-22636, N-22638, N-22924

The a. M. Data are basing on the present date of our knowledge. They are showing – not binding – the application of our procedures. Existing rules and specifications have to be observed responsibly by the receiver of our product.

cealin - customers



Volkswagen



TUI

Aktiengesellschaft

Nordzucker

MAHLE



L'ORÉAL

SIHI

PHILIPS

BUNDESWEHR



VOITH TURBO
ANTRIEBSTECHNIK

BEHR

VEGLA

ECKES granini

Fresenius



Nestlé

YTONG

SIEMENS



CHEMIE AG
Bitterfeld-Wolfen

Panasonic

SAARBERG

KNORR-BREMSE

Deutsche Bahn

DaimlerChrysler AG

Shell

Universitätskrankenhaus
Hamburg-Eppendorf





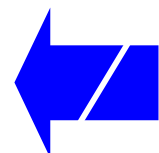
Liquid chlorine oxides ClO_2 (Duozon 100 L) for super oxidation are also protected internationally by patents.



**YOUR
WATEREXPERTS**

cealin[®]

Cealin chem. Factory GmbH
Foreign trade department
Paul – Keller – Str. 8
D – 31 139 Hildesheim
Tel.: 0049 – 5121 – 517264
e-Mail: cealcermak@ail.com





YOUR WATEREXPERTS

..... with a lot of waters washed

**Drinking water
Cooling water
Industrial water
Schwimming water
Circulation water**

**Foot water
Process water
Drink water
Sewage
Fish stock**

.... guarantees

**High quality stand manner
Environment conscious produktion
Economical
Simple handling**

and

**Professional advice
Free water analytics
High delivering readines
appointment faithfulness**

..... waters make after your wishes

We work locally and globally



Chemical factory GmbH
Foreign trade department
Paul – Keller – Str. 8
D – 31 139 Hildesheim
Germany

Telefon: 0049 – 5121 – 517264

e- Mail: cealin-cermak@web.de