



Parameters of water quality in circulation of DH systems

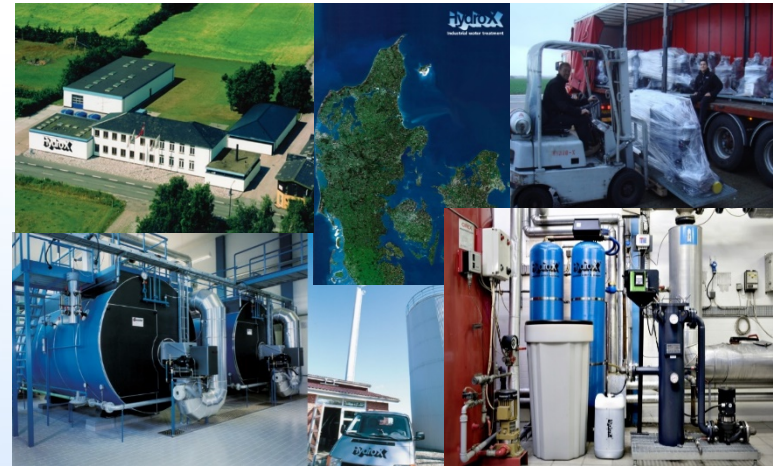
Danish Croatian District Heating Days, 22-24 September 2021
Smart Heating 2021

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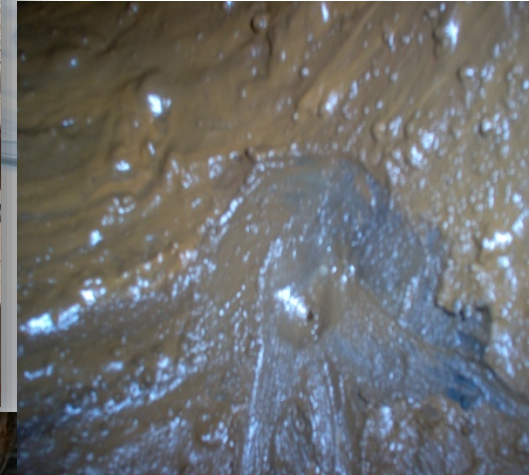
HYDRO-X INTERNATIONAL A/S DENMARK



- Founded in Denmark in 1940
- Activities in the region since 1990
- Operation in over 34 countries around the world
- Production facilities in 6 countries
- Manufactures chemical products and equipment for water treatment and conditioning
- FDA, ISO 9001 \ 14001 \ 18001 Certifications of Quality Environmental Management Certificates and Occupation Health and Safety Management system
- Participated in many international projects with the World Bank, Asian Development Bank, EBRD, KfW, DANIDA etc.



What are the reasons for water treatment? **HydroX**



Step by step genesys of parameters

- Color, appearance
- Hardness- scale
- Corrosion - leakage
- Sludge- leakage – reduced flow
- Smell – easy bacteria indication



Efficiency of the plant



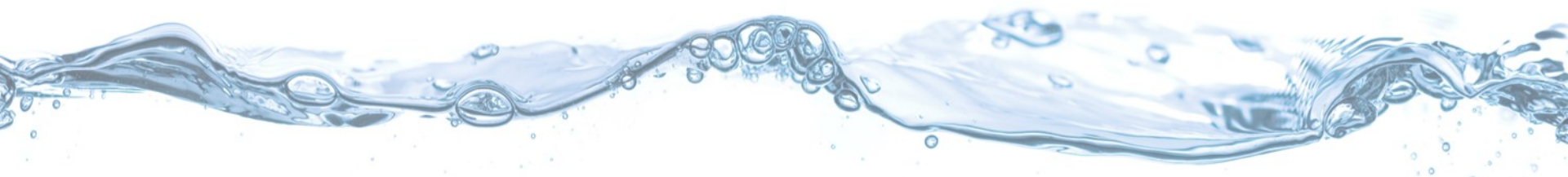
- Return of investment!
- Life span of the plant!
- Operational costs!

WATER

Reducing efficiency of the plant



Where do we identify energy loss?

- 
1. Leakage
 2. Not functional water treatment plant
 3. Lack or inadequate chemical conditioning
 4. Lack or inadequate of filtration

Water quality guidelines				
Feed water		Parameters	Circulation water	
Omekšana voda	Demineralizovana voda		Omekšana voda	Demineralizovana voda
Clear, no color	Clear, no color		Clear, no color	Clear, no color
none	none	Smell	none	none
< 5 mg/l	< 1 mg/l	Patricles	< 10 mg/l	< 1 mg/l
9,8 ± 0,2	9,8 ± 0,2	pH value (*)	9,8 ± 0,2	9,8 ± 0,2
cca. Like raw water	< 10	Conductivity µS/cm	< 1500	< 25
< 0,1	< 0,01	Hardness °dH	< 0,5	< 0,1
< 0,1/10 mg/l	< 0,1/10 mg/l	Disolved oxygen/carbon-dioxyde	< 0,02 mg/l	< 0,02 mg/l
none	none	Oil/grease	< 1 mg/l	< 1 mg/l
< 300 mg/l	< 0,1 mg/l	Chlorides Cl ⁻ (**)	< 300 mg/l	< 3,0 mg/l
---	< 0,1 mg/l	Sulphate SO ₄ ⁻	---	< 1,0 mg/l
< 0,05 mg/l		Dissolved iron Fe _{uk.}	< 0,1 mg/l	< 0,05 mg/l
< 0,05 mg/l	< 0,01 mg/l	Dissolved copper Cu _{uk.}	< 0,02 mg/l	< 0,01 mg/l
No official standard	No official standard	Bacteriological limit (***)	No official standard	No official standard
* is not recommended to regulate the pH value with ammonia because corrosion of copper and copper alloys increases rapidly at pH values above 9.0.				
** As stainless steel is often used in district heating systems today, it should be emphasized that the chloride content above 7 mg / l at temperatures (94 ° C and 108 ° C) will cause corrosion on AISI 304 and 316 steels.				
*** Pay attention if the water smells of waste, if sludge appears in the filters or an unusual increase in the consumption of chemicals is noticed.				
**** Filter the circulating water through micron filters which should have a magnetic part				
***** Flush the newly built system or the newly connected part of the system before commissioning				

WATER TREATMENT PLANT

- Softening
- Decarbonisation
- Demineralisation-reverse osmosis



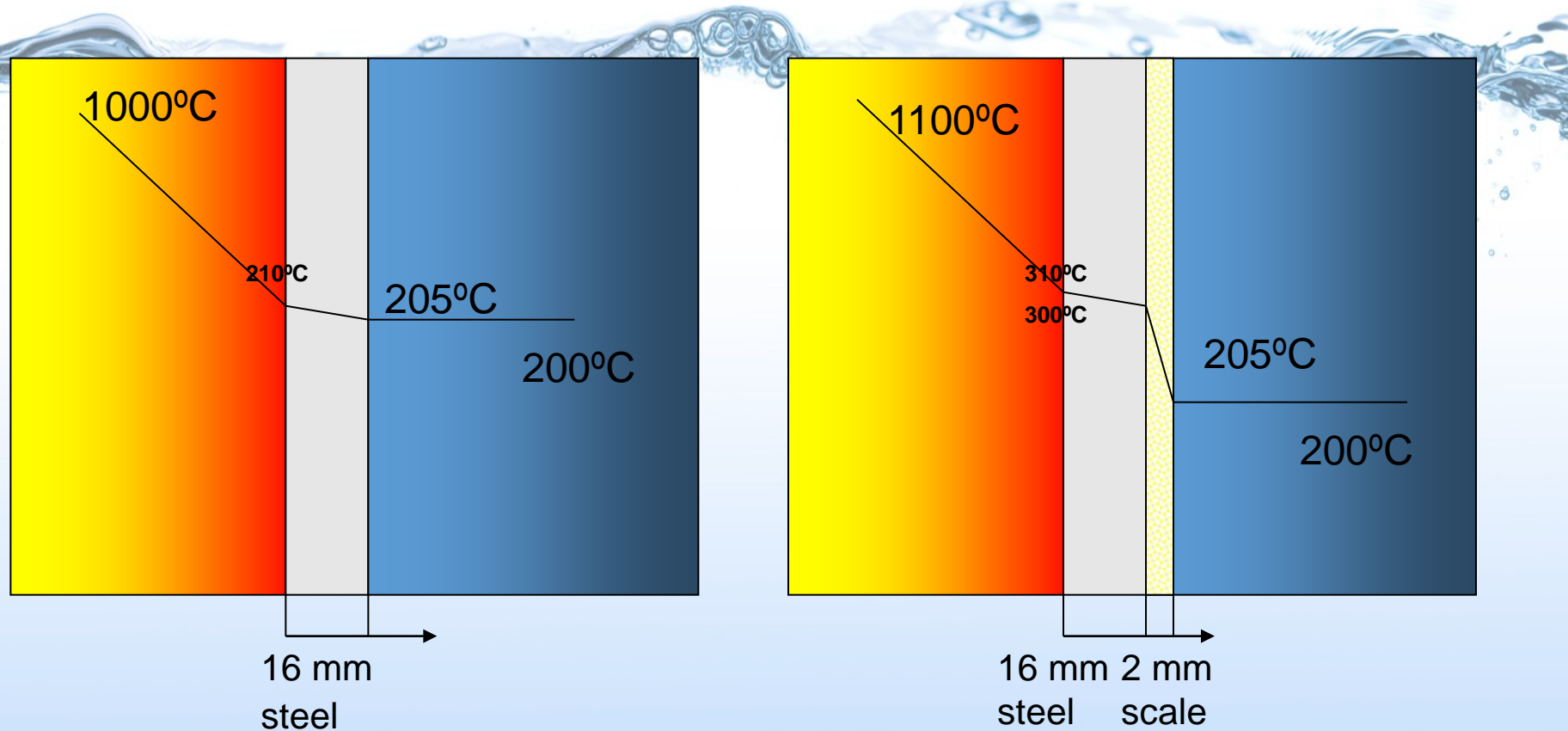
HydroX

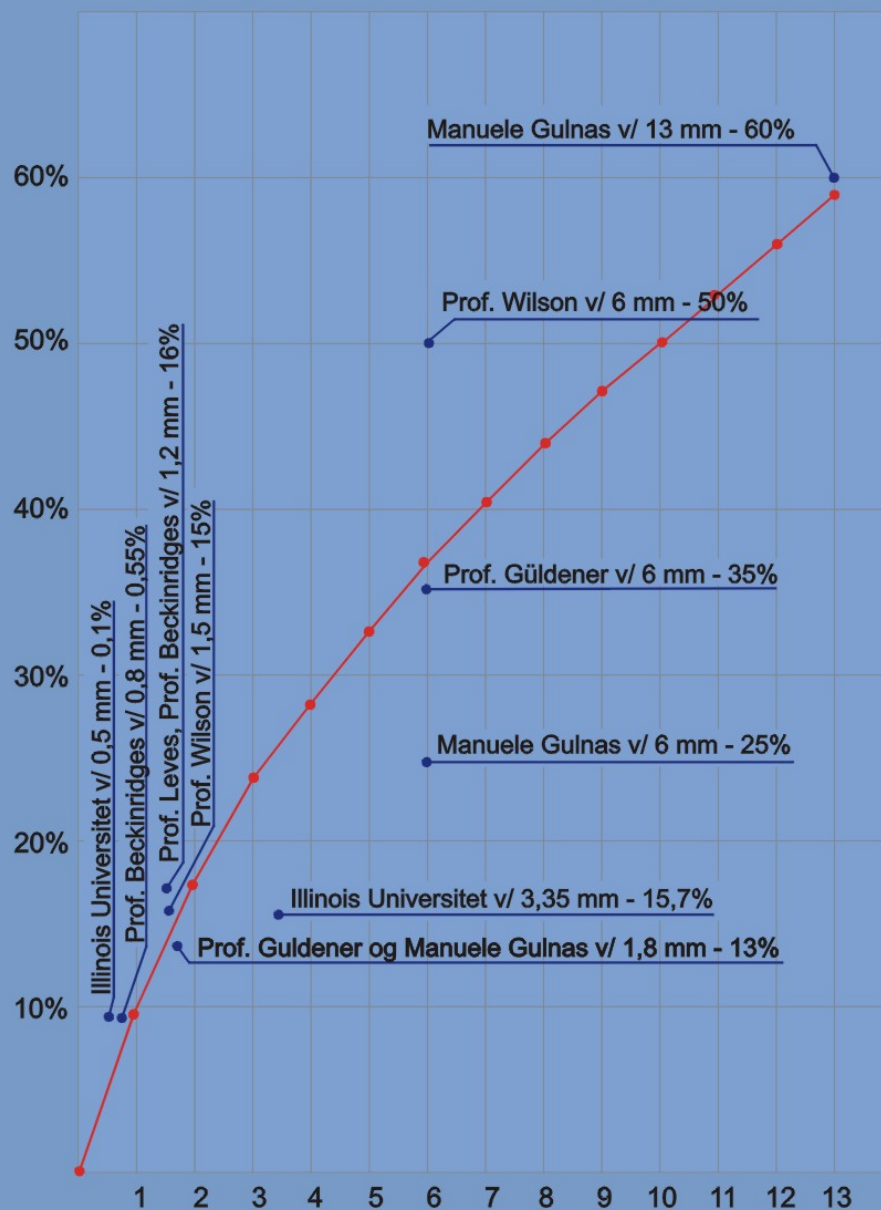


Missing WTP...

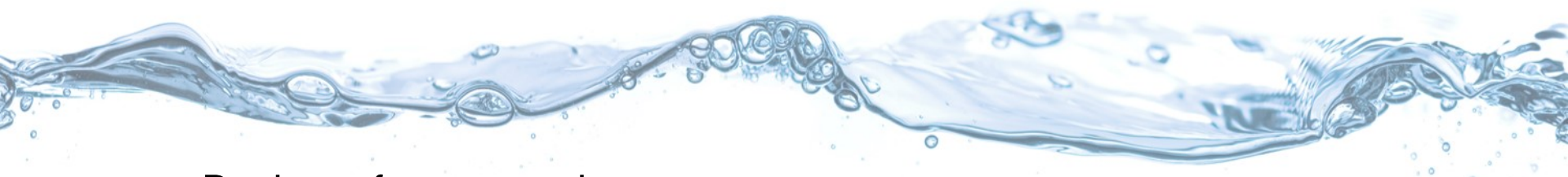


Scale effect



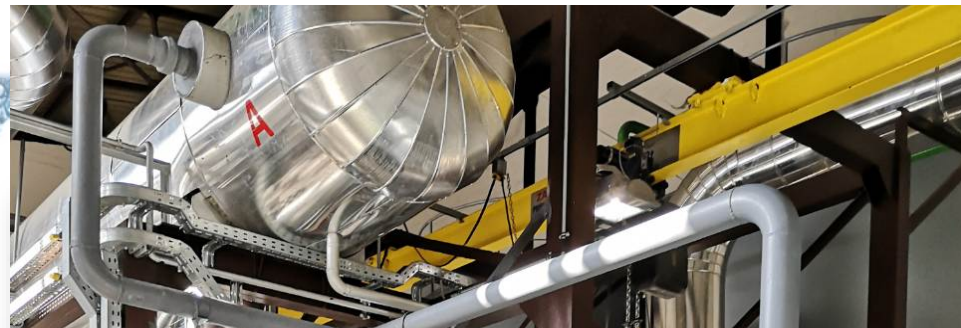
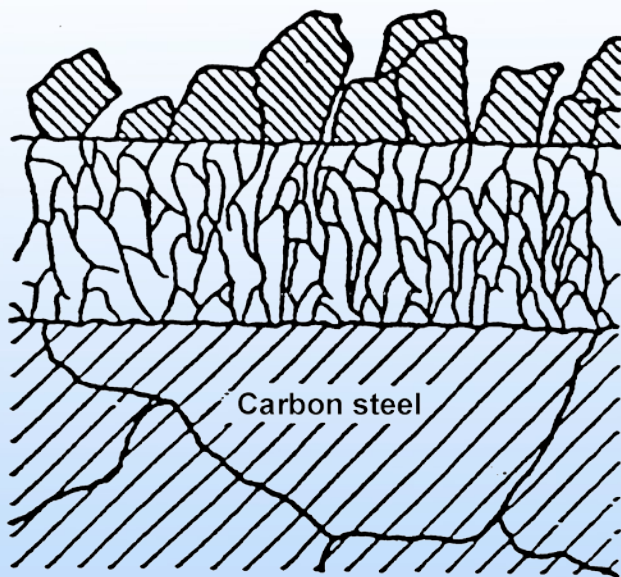


Corrosion types

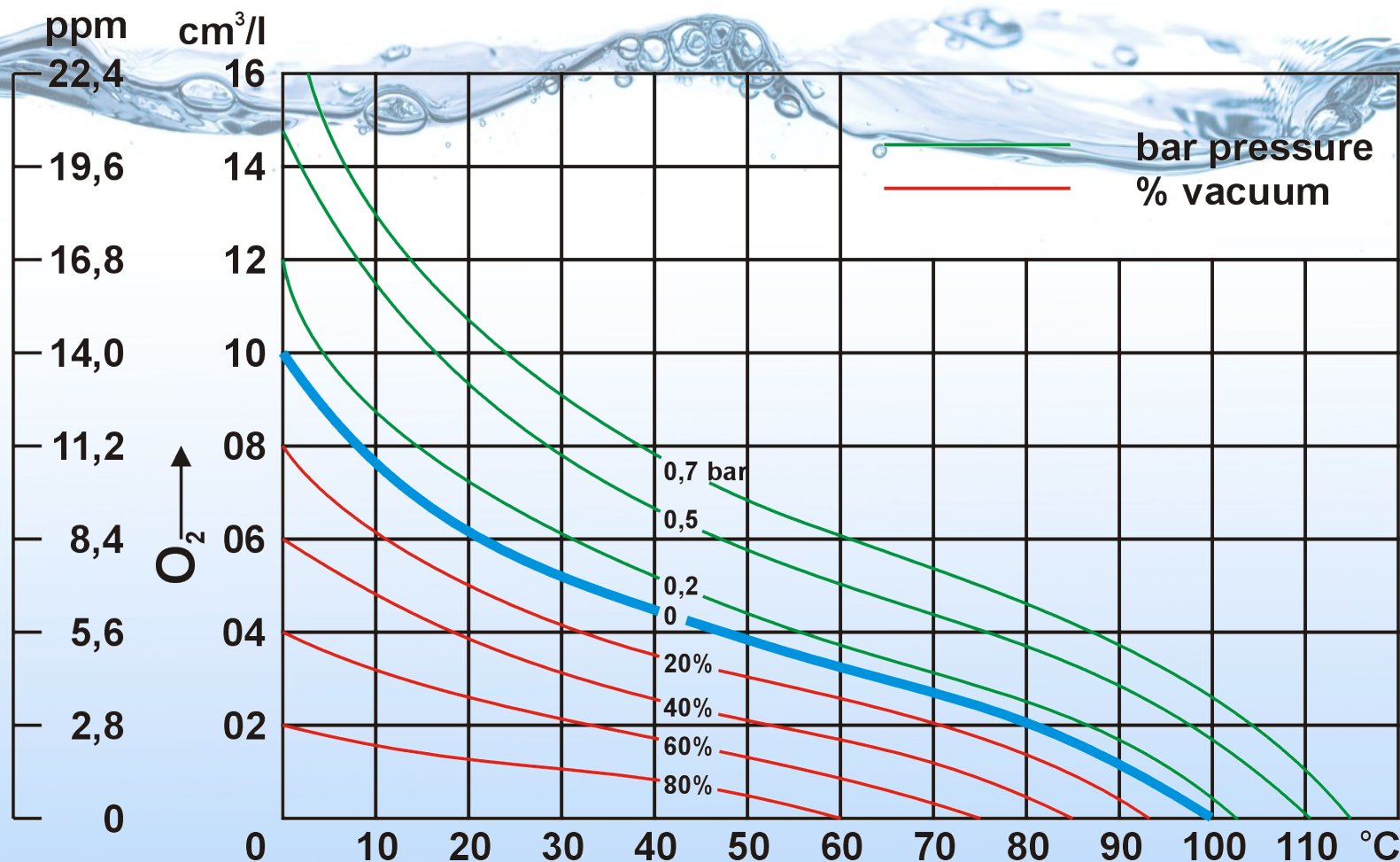
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- Basic surface corrosion
 - Local corrosion
 - Pitting
 - Selective corrosion
 - Inter-crystalline corrosion (Caustic embrittlement)
 - Corrosion due to solid deposits
 - Corrosion due to erosion
 - Galvanic corrosion
 - Bacteriological corrosion

What kind of filter you need?

- Micron bag filter
- Magnetic filter



Sadržaj kiseonika u funkciji temperature

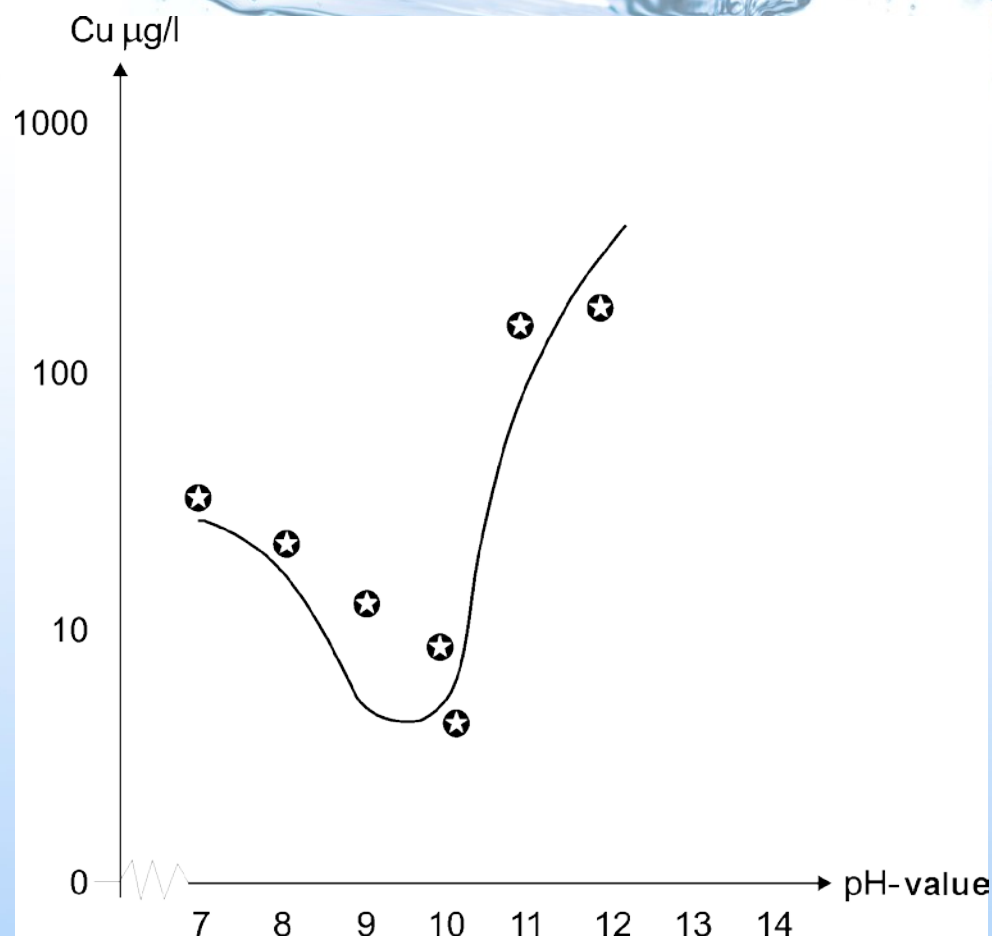
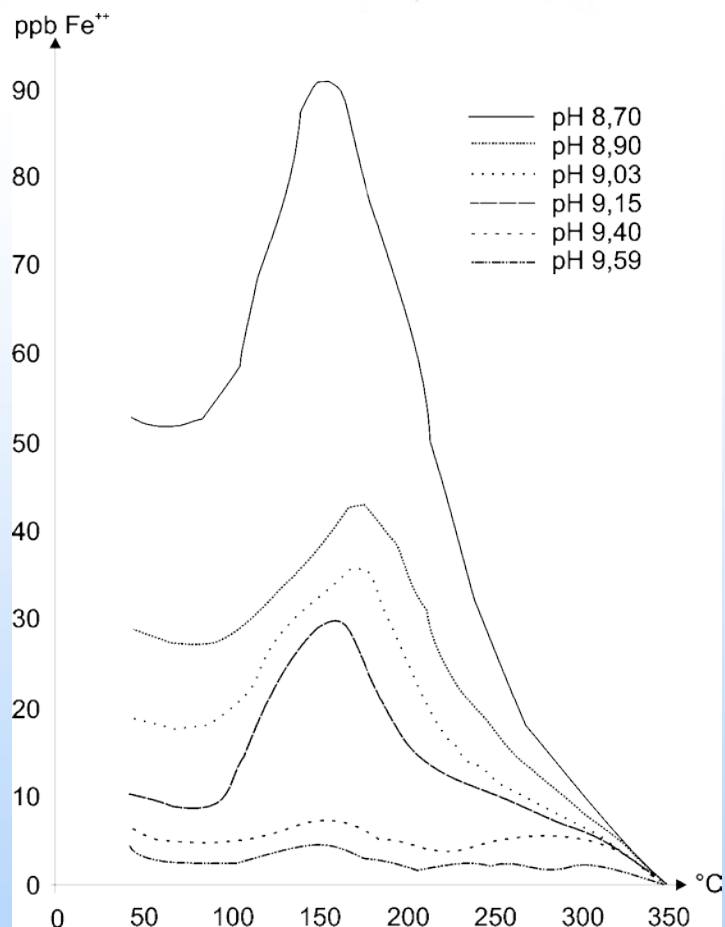


ISO 5814

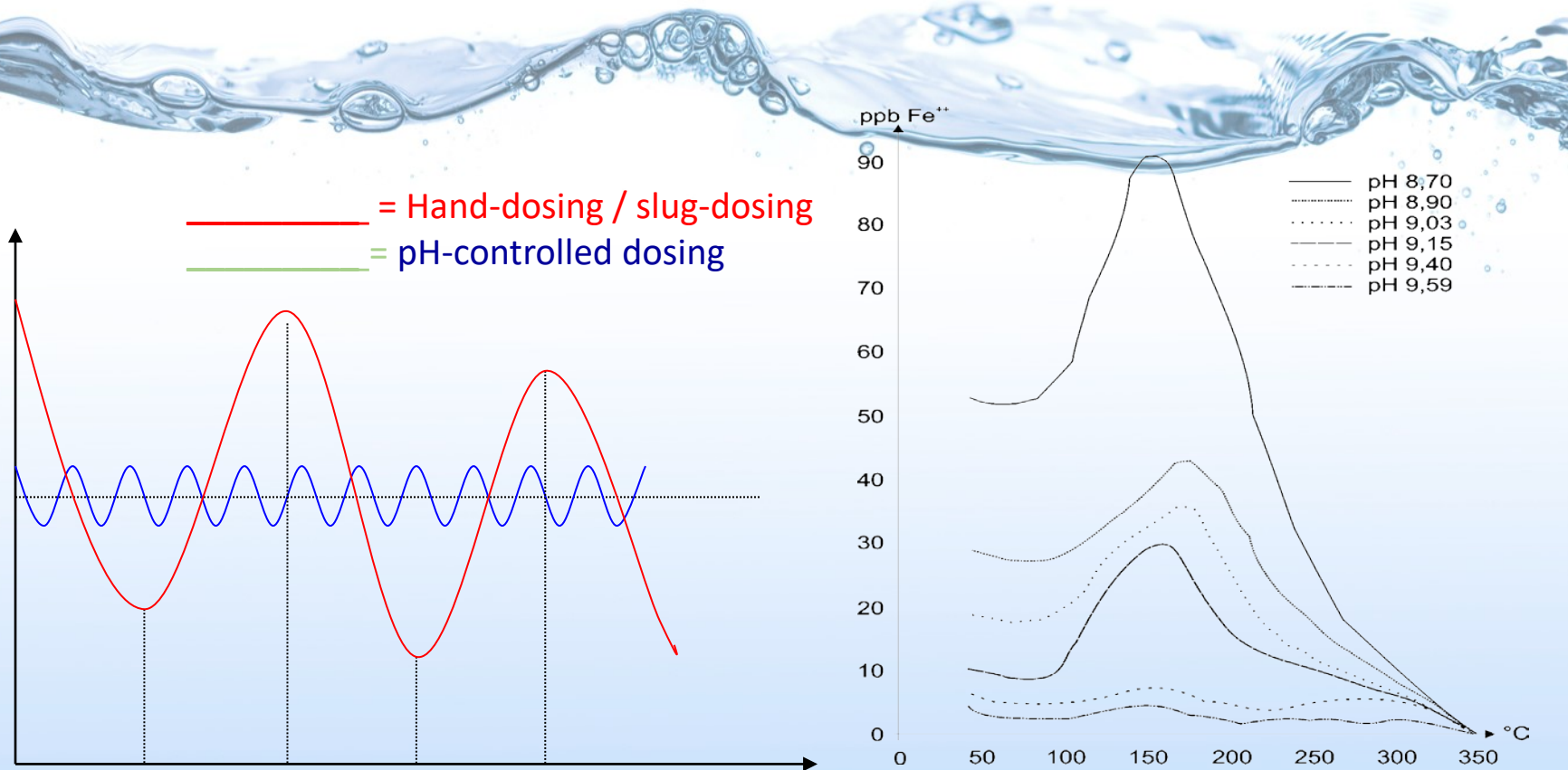


- Oxygen measurement

Impact of pH value



Dosing options – water quality oscilation



Adequate water conditioning chemical

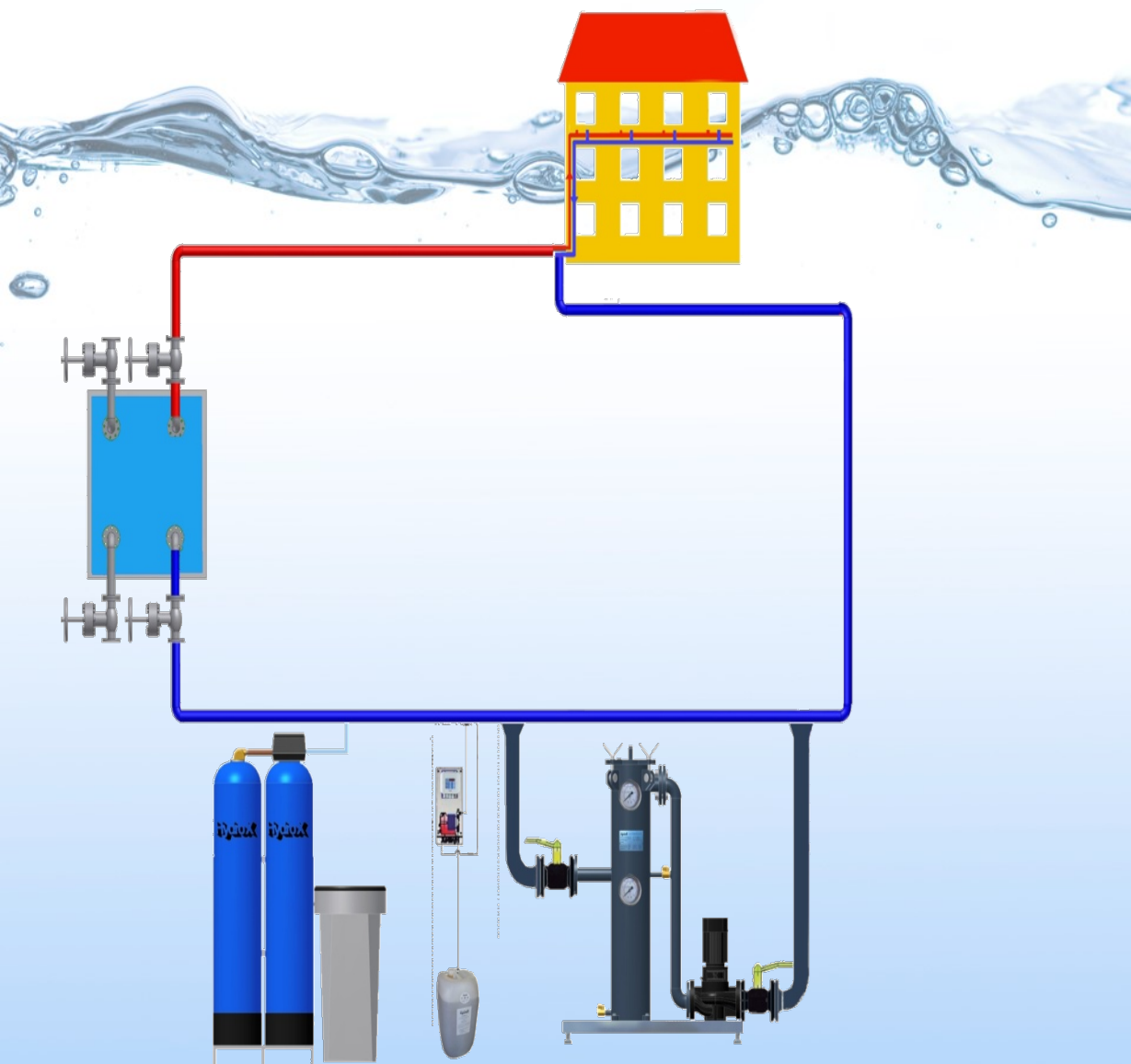


- Removes existing scale without stopping the plant
- Prevents the formation of new scale deposits
- It absorbs oxygen and forms the protective passivation film
- Provides the formation of magnetite and a protective coating film
- It cleans water completely by precipitating solid particles and other salts such as iron, chlorides, silicates, etc.
- Prevents the formation of foam
- Conditions sludge for easy removal
- Eliminates rust and corrosion in the boiler system
- It raises the pH value in balance with other effects
- It does not contain harmful components and is dosed over pH

Complete concept



Efficiency of substation



Circulating water	Softened water
Appearance	Clear
Smell	None
Particles	< 10 mg/l
pH-value	9,8 +/- 0,2
Conductivity $\mu\text{S/cm}$	< 1500
Hardness dH°	< 0,5
Oxygen content	< 0,02 mg/l
Oil and fat content	< 1 mg/l
Chloride content Cl^- (**)	< 300 mg/l
Suiphate content SO_4^{--}	-
Total iron Fe_{total}	< 0,1 mg/l
Total copper Cu_{total}	< 0,02 mg/l
Ammonia content NH_3	< 10 mg/l
Bacteriological limit (***)	no official standard

No filter?

- Than you can use HE....



Hydro-X on a regional market



- Technical-technological analysis and diagnostics
- Development of technical-technological solution
- Delivery of complete equipment and range of chemical products
- Installation instructions and supervision
- Commissioning and preparation of documentation
- Training of staff in the plant
- Regular water quality controls, equipment maintenance and servicing

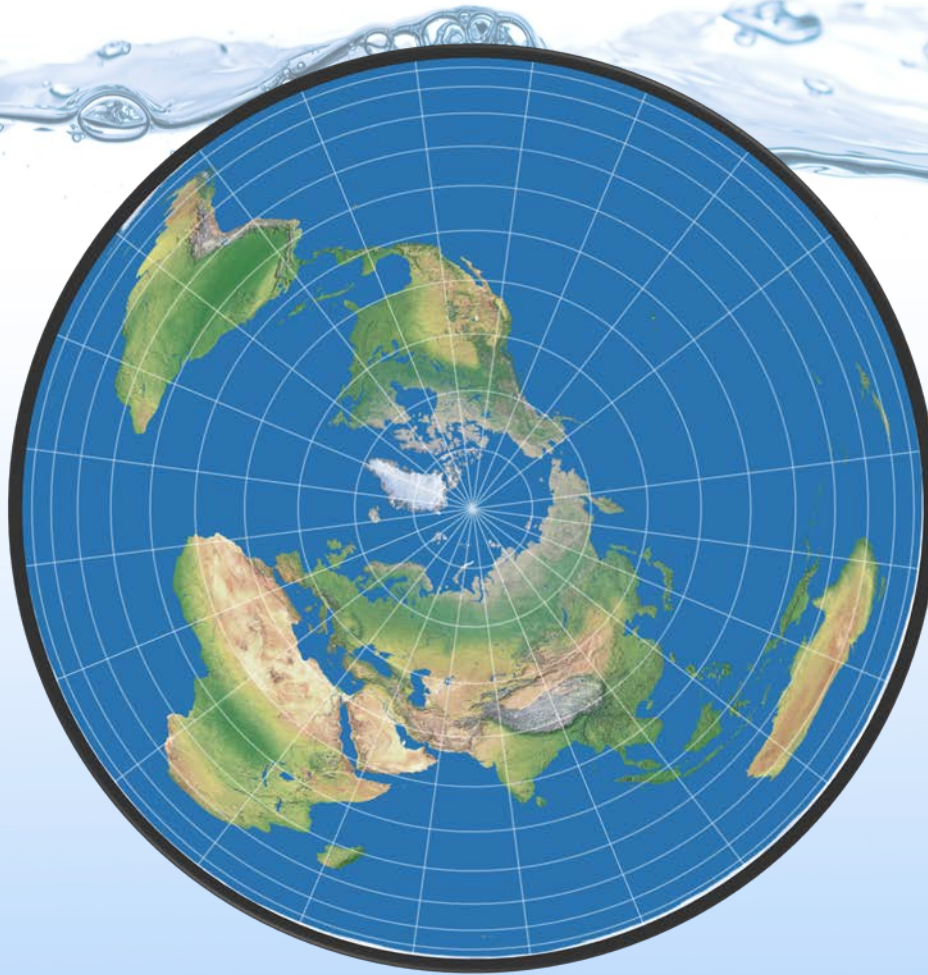
Largest plant in the world – using our products BEIJING DISTRICT HEATING



UlaanBaatar, Mongolia " COLDEST CITY IN THE WORLD"



A company that provides results for a better future.



THANK YOU