

#### **SOFT DEPOSITS**

In all cooling water applications, layers of fouling, such as slime, mud or silt, form on the inner surface of condenser and heat exchanger tubes even with cooling water velocities of 2m/s.

#### **HARD DEPOSITS**

In cooling towers or other open evaporative cooling water systems the water becomes highly concentrated with certain chemicals.

The solubility limit is exceeded and hard crystalline deposits, such as scaling, form on the tube surface.

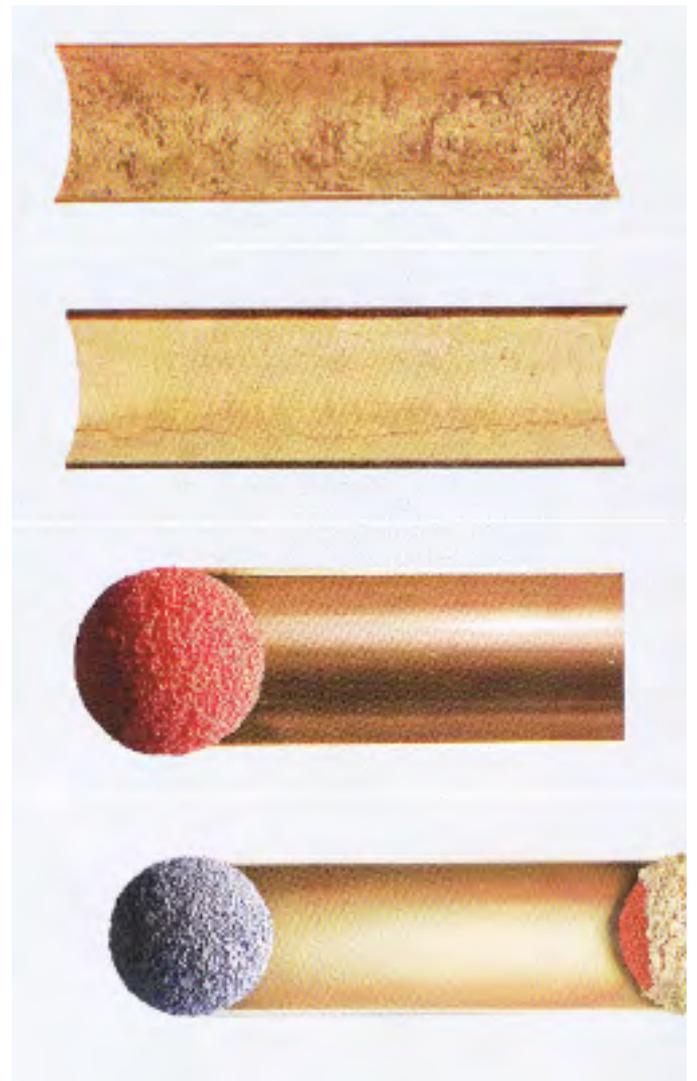
#### **ARTIFICIAL PROTECTIVE FILMS**

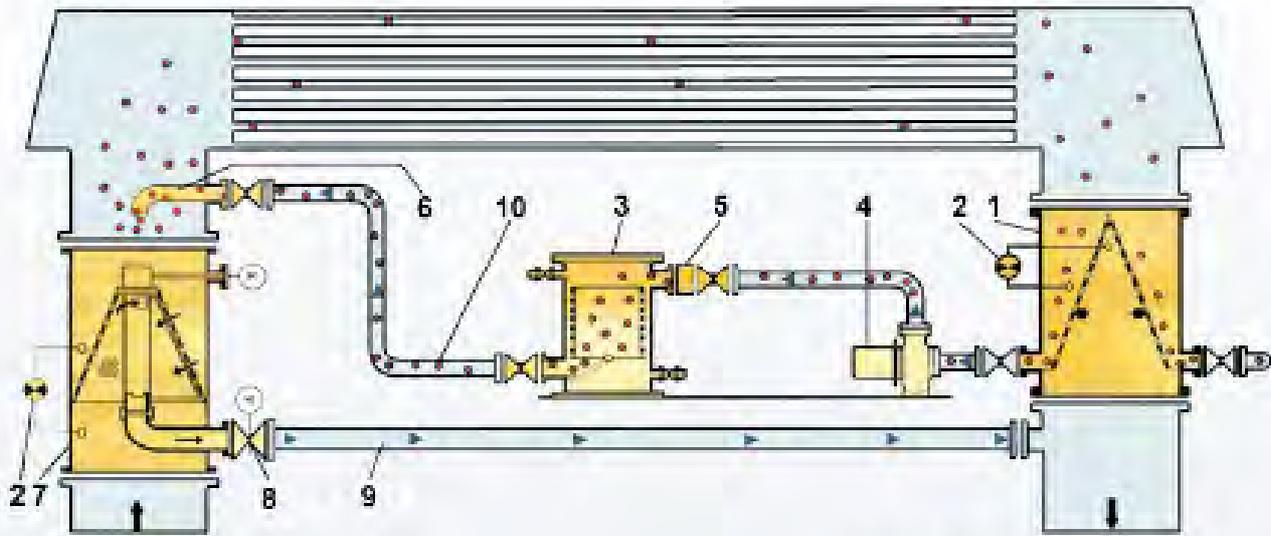
Copper alloys have marginal corrosive resistance in seawater. Although artificial protective films can be formed by using ferrous sulfate, excessive sponge ball cleaning produces lacquer like films which easily flake away on drying.

#### **CORROSION RESISTANT MATERIALS**

Although titanium and high performance stainless steels have excellent resistance to corrosion they are more susceptible to fouling than copper alloys.

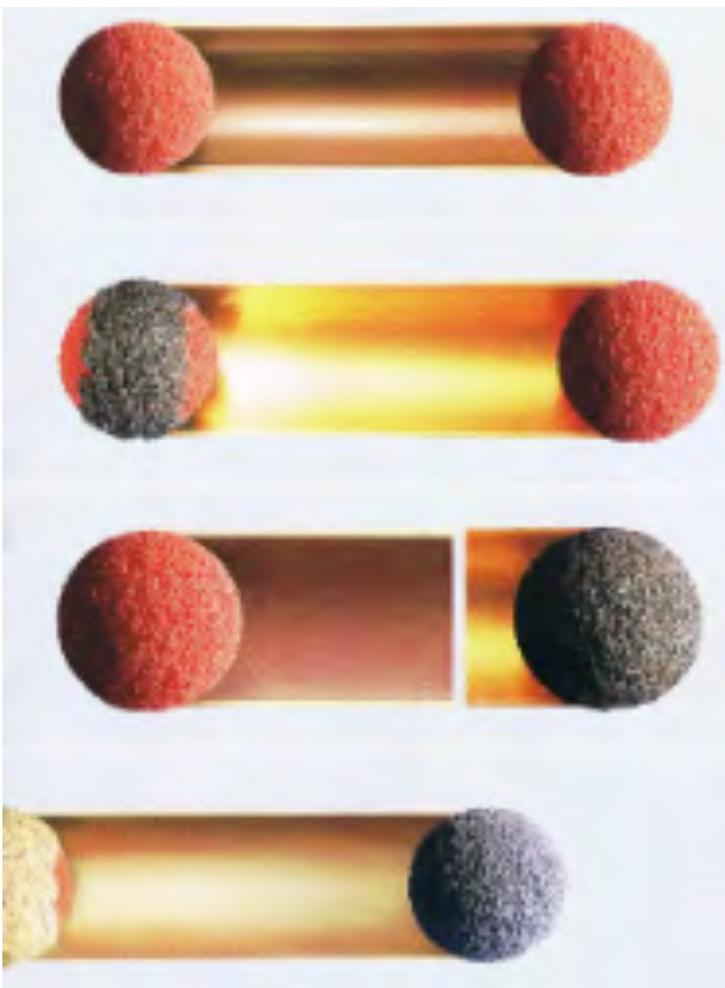
This can be attributed to the lack of copper ions, which are toxic and tend to hinder the formation of biological fouling.





- 1. Strainer Section
- 2. Screen Monitor
- 3. Ball Collector
- 4. Ball Recirculation Pump
- 5. Ball circulation Monitor

- 6. Ball Injection nozzle
- 7. Debris Filter
- 8. Waste Water Valve
- 9. Waste Water Pipe
- 10. Ball recirculating pipe



### SOFT DEPOSITS

SCHMITZ normally recommends Type RS open pore structure sponge rubber cleaning balls for continuous cleaning with 8 to 12 cleaning ball passes per tube per hour.

### HARD DEPOSITS

SCHMITZ ring coated abrasive cleaning balls Type RA are first used to clean fouled tubes, typically for a period of a few weeks. Continuous cleaning with Schmitz cleaning balls without abrasive layer then hinders the growth of nuclei.

### ARTIFICIAL PROTECTIVE FILM

SCHMITZ recommends the use of cleaning balls without an abrasive coating Type RS for 1 hour per day immediately prior ferrous sulfate dosing. This produces compact, matt brown films, giving an optimum combination of heat transfer and corrosion resistance. Abrasive balls fully coated Type RAT is effective for removing such films.

### CORROSION RESISTANT MATERIALS

SCHMITZ recommends continuous cleaning, Type RB scouring balls with 8 to 12 cleaning ball passes per tube per hour. Additionally, a basic charge of granulated balls Type RG should be circulated every few months to avoid a possible build-up of strongly adherent fouled layers.

## APPLICATION AND RANGE

FOR SEA WATER AND FRESH WATER WITH TEMPERATURE UP TO 80°C (176°F)



Removal of soft deposits.  
For copper tubes, copper alloy tubes  
and brass tubes.



Lower sinking velocity



Removal of hard deposits ( $\text{CaCO}_3$ ).  
For copper tubes, copper alloy tubes  
and brass tubes.



Lower sinking velocity



Removal of soft scales  $\text{Mg}(\text{OH})_2$ .  
For welded copper tubes, copper alloy  
tubes and brass tubes.



For stainless steel, titanium tubes.  
RB scouring balls for removal of bio  
fouled layers.  
RG for removing highly adherent bio  
fouled layers.



## APPLICATION AND RANGE

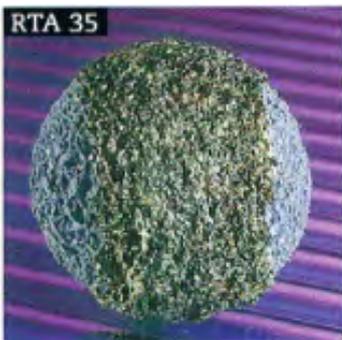
FOR SEA WATER AND BRINE FLUID WITH TEMPERATURE UP TO 140°C (284°F)



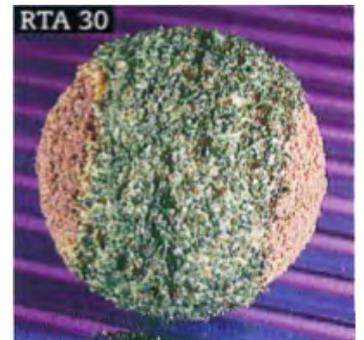
Removal of soft deposits.  
For cupronickel and stainless steel tubes.



Lower sinking velocity



Removal of hard deposits  $\text{CaCO}_3$ .  
For cupronickel and stainless steel tubes.



Lower sinking velocity



Removal of soft scale deposits  
 $\text{Mg}(\text{OH})_2$ .  
For cupronickel and stainless steel tubes.





## ORDERING DATA EXAMPLE

25 RS 15 M 0

Nominal cleaning ball diameter [mm] = 25

Cleaning ball type RS = standard

Mixture color 15 = red

Cleaning ball texture M = medium

Cleaning ball tolerance range 0 = dia + 1mm  
- 0

**NOMINAL DIAMETER:** Cleaning ball size is from 15 mm to 45 mm diameter in 1 mm steps. For ring coated cleaning balls, coating of 1 mm to 2 mm will be added to the nominal diameter.

CLEANING BALL TYPE	MIXTURE	CLEANING BALL TEXTURE	TOLERANCE RANGE
<b>Temperature up to 80°C</b> Copper, Copper-Alloy and Brass Tubes RS- Standard Ball RA- Ring Coated Abrasive RAT- Fully Coated Abrasive	15 - red 10* - Yellow	S - soft MS – medium soft	0 +1.0 mm - 0
Titanium and Stainless Steel RB- Scouring Ball RTA- Ring Coated with fine granulated plastic	20 - blue 15 - red	M – medium MH – medium hard	1** +0.5 mm - 0 2** +1.0 mm +0.5 mm
<b>Temperature up to 140°C</b> RT- Standard Ball RTA- Ring Coated Abrasive RATT- Fully Coated Abrasive	35 – dark blue 30* - brown	H – hard SH – super hard	



#### **BASIC CHARGE**

Basic charge or the number of cleaning balls per system is calculated from the number of tubes per pass and the estimated time interval taken by a cleaning ball between two passes of a tube. It is recommended that each tube is cleaned by a cleaning ball at an interval of 5 minutes. For general guidelines, the number of cleaning balls to be charged per system is usually around 10% of the total number of tubes per pass. For batch cleaning systems as applicable for MSF desalination plants, the basic charge is commonly between 30% to 50% of the number of tubes per evaporator.

#### **SELECTION OF BALL SIZE**

The nominal diameter of the cleaning ball selected is usually 1 mm to 2 mm oversized in diameter to the inner diameter of the tube. However, the oversize of the cleaning ball selected depends on the available pressure drop across the condenser tube.

#### **BALL DISTRIBUTION**

Distribution of cleaning balls in the condenser / heat exchanger is influenced by factors such as ball injection into the cooling water inlet, the cooling water flow pattern in the waterbox and the type of SCHMITZ cleaning ball chosen.

#### **BALL TEXTURE**

The choice of optimum cleaning ball hardness is dictated by the need to be able to retrieve the cleaning balls from the screens of the ball strainer, recirculate them and providing a decent operating life of the cleaning balls.

The most commonly used cleaning ball is the "medium" grade.

#### **BALL LIFE**

The cleaning ball life depends on the cleaning frequency, oversize and the surface condition of the tubes to be cleaned. It is typically 4 weeks, but can be much longer depending on local conditions and frequency of cleaning. Scaled and corroded surfaces have a particularly detrimental effect on cleaning ball life. The use of other types of cleaning balls e.g. abrasive cleaning balls to polish roughened surfaces might be considered in case of excessive cleaning ball wear.

#### **STORAGE**

It is important that cleaning balls be stored in a cool, dry place, away from direct sunlight. With proper storage SCHMITZ cleaning balls have practically an indefinite shelf life.

#### **ADVISORY SERVICE**

Our specialists will gladly answer your queries regarding the selection and use of SCHMITZ cleaning balls.