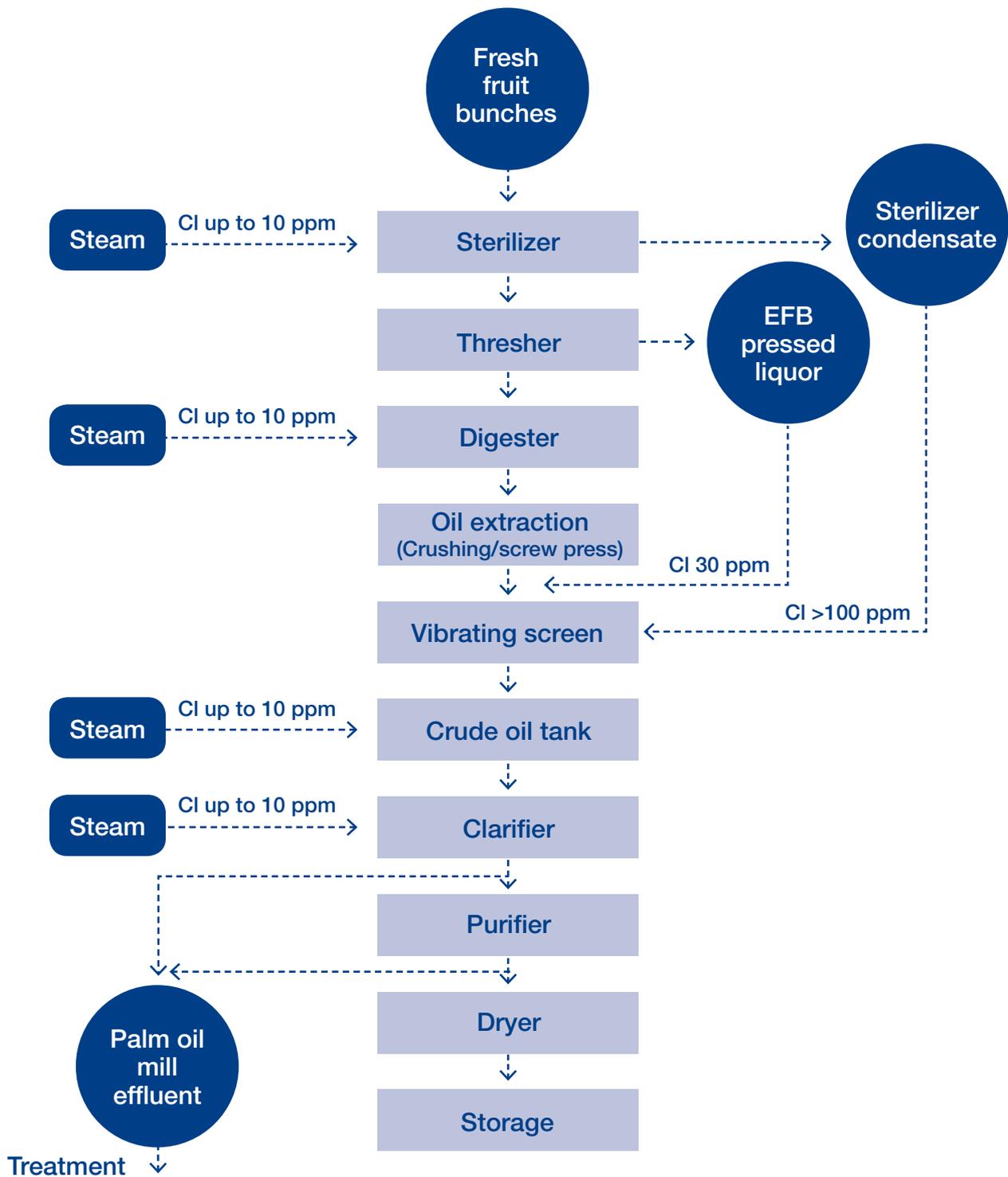


Sources of chloride contaminants in palm oil mills



Alfa Laval in brief

Alfa Laval is a leading global provider of specialized products and engineered solutions.

Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes. Time and time again.

We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuffs, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at **www.alfalaval.com**.

Close to you

With the Alfa Laval 360° service portfolio, support and service are always close at hand. Our global reach and local presence ensure that we can maximize the uptime, performance and operating efficiency of your Alfa Laval equipment throughout its life cycle.





Crude palm oil washing in the mills

The solution for reducing chlorides in crude palm oil





Balancing food safety, economy and performance

Regulatory guidelines for palm oil processing are evolving as health risks associated with the formation of 3-monochloro-1,2-propanediol, its esters (3-MCPDE), and glycidyl esters (GE) during refining come to light.

The formation of 3-MCPD is triggered by the presence of chlorides in the crude palm oil (CPO). As a result, Alfa Laval is working with palm oil producers to safeguard public health as well as the productivity of the palm oil plants worldwide.

Prepared for future regulations

European Food Safety Authority Panel on Contaminants in the Food Chain has set the tolerable daily intake of free and bound 3-MCPDE as 2.0 µg/kg of body weight. Although no regulation limiting 3-MCPDE in refined palm oils exists, Malaysia is spearheading a campaign to reduce the amount of 3-MCPDE formation in the physical refining process. Meanwhile, the European Commission has drafted a regulation to limit GE to below 1 ppm in all kinds of refined oils.

The Malaysian Palm Oil Board is also taking the lead to introduce chloride limitations as one of the specifications in the Malaysian Palm Oil Standard.



Alfa Laval's disc stack separator for CPO washing

The heart of the CPO washing process is the Alfa Laval high-speed separator. After mixing water into the CPO, the washed water containing chlorides is removed using the separator. We have a range of vegetable oil separators to suit different feed capacities. The oil after separation has a maximum moisture content of 0.5%. The operation of the separator is optimized for minimum oil content in the washed water.



Mitigation of 3-MCPDE by removing chloride in CPO

Alfa Laval has successfully installed and commissioned CPO washing plants that have proven to effectively reduce chlorides.

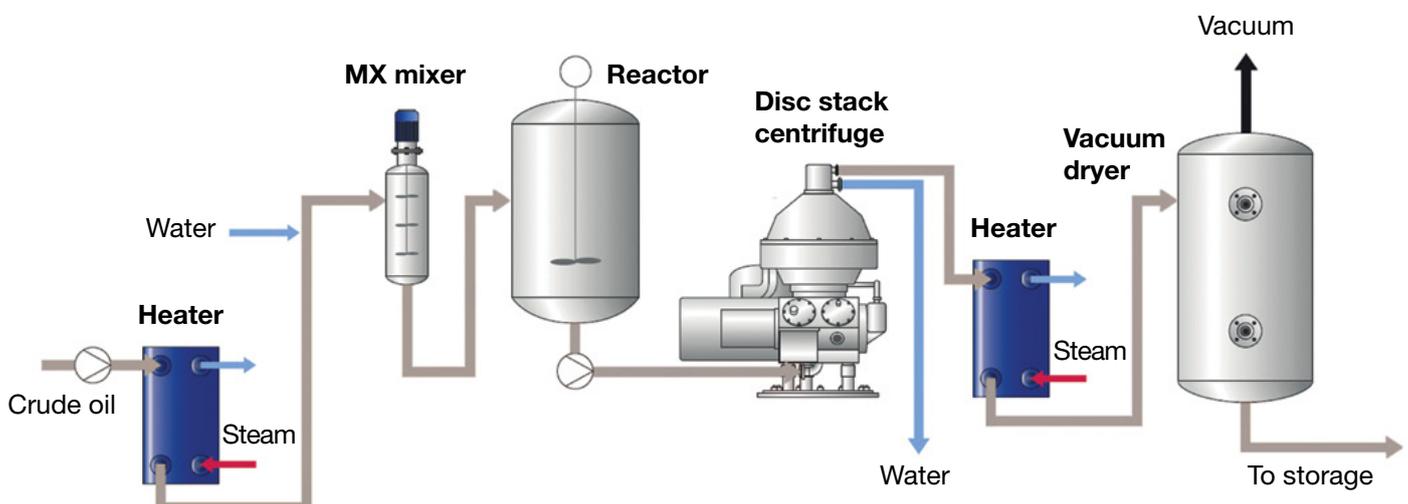
The washing process can achieve more than 80% chloride removal from CPO. Alfa Laval's CPO washing process does not react with oil, but removes chloride in the moisture content and chloride salts that are less soluble.

It is crucial that the CPO is washed in the producing countries instead of receiving country. This ensures that the total chloride can be reduced more effectively and oil quality can be preserved as much as possible.

It has also been established that removal of chlorides is most effectively accomplished during the early stages of processing, mainly before the formation of organic chlorides which are difficult to remove.

The Alfa Laval CPO washing process explained

In the Alfa Laval CPO washing process, chloride-free water is added into the CPO. The amount of water added is normally between 5-10% by weight of the crude oil.





Crude palm oil washing

The oil-water mixture is retained in the mixing tank for approximately 15 minutes. The retention tank is controlled by the level transmitter and the discharge pump. Water is separated by a disc stack centrifuge in a purifier mode. The washed oil will have remaining moisture content of 0.5% after separation. Moisture will be further reduced to less than 0.1% by using a vacuum dryer. At this stage, a small amount of chloride continues to be removed with the water. The washed oil can then be

sent to bleaching plant directly or can be cooled down for storage by using a heat economizer with feed oil.

Alfa Laval is able to supply the complete washing plant that can be incorporated into the existing mill process or be installed as a complete stand-alone modular system.

The table below illustrates the results from single-stage CPO washing.

Temperature	90°C	90°C	90°C	90°C
Crude palm oil flow rate (mt/h)	5.5	4.0	4.0	6.0
Hot water flow rate (l/h)	300	300	300	300
Hot water dosage (wt/wt %)	5.5	7.5	7.5	5
Total chloride before washing (ppm)	13	10	10	10
Total chloride after washing (ppm)	1.5	1	0.5	1.5