Caustic recovery

for mercerising lye

Körting

THE EJECTOR COMPANY

Changing mercerising waste water into money

Körting Caustic Recovery Plants (CRPs)

The Körting caustic recovery plant (CRP)

During mercerisation, the diluted caustic soda (weak lye) from the stabilisation section is usually drained off. Körting has found a way of recovering this diluted caustic soda by evaporating water.

HOW IT WORKS

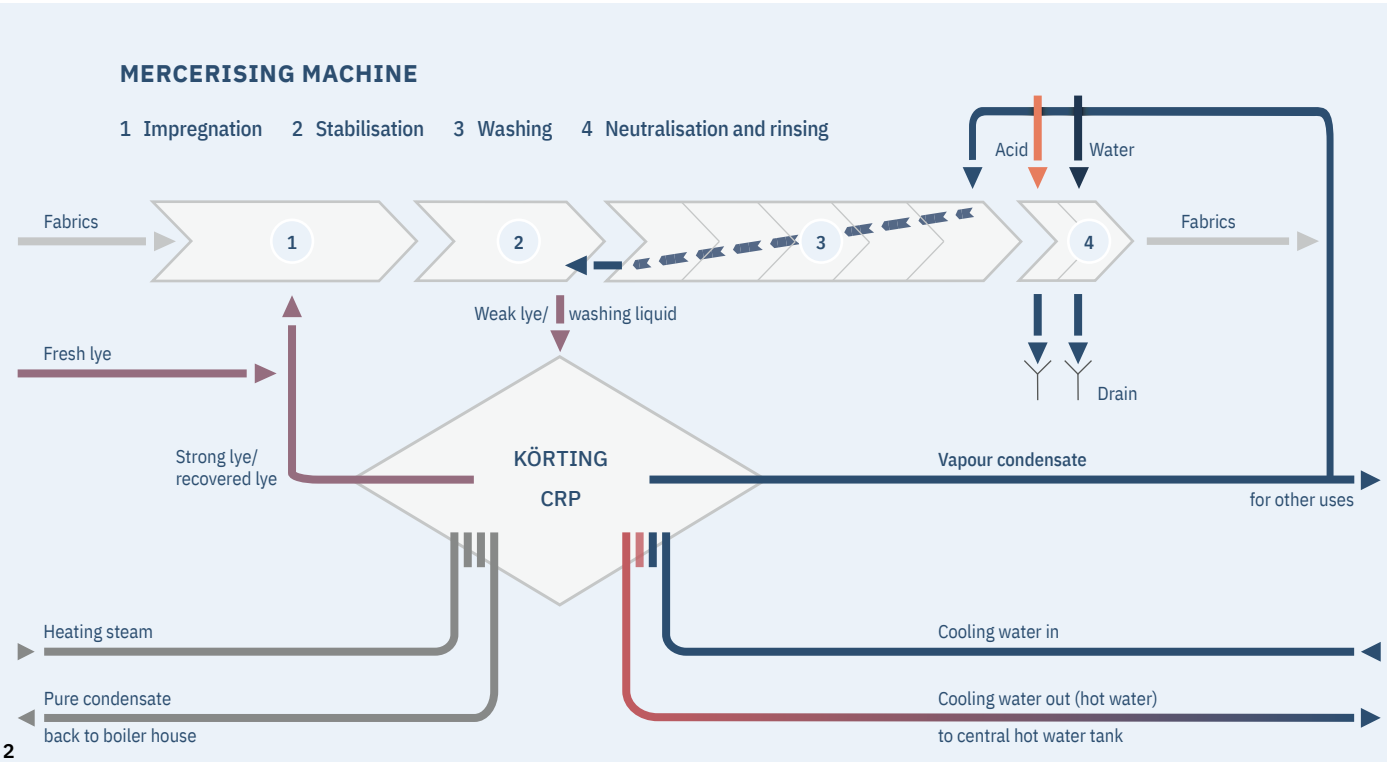
As shown in the graphic, the caustic recovery plant (CRP) separates the weak lye (washing liquid) into strong lye and vapour condensate. The strong lye (recovered lye) can be reused in the mercerising machine.

Depending on the quality of the fabrics, further cleaning of the lye with hydrogen peroxide might be advisable (see page 6). The vapour condensate is slightly alkaline completely soft water. Its temperature is approximately 90°C. It can be used for cleaning, for instance, in the mercerising or bleaching machine, or in other types of pre-treatment systems.

The CRP requires heating steam and cooling water. Almost the same amount of steam used for recovering the mercerising lye can be saved in the central water heating system. The cooling water is heated up to 60° to 85°, making it a welcome by-product of the process. The CRP is very energy efficient, especially when hot water generation is integrated in the central water heating system.

There's no direct contact between the heating steam and the lye. Therefore, the heating steam condensate can be reused as boiler feed water without any additional treatment required.

Feel free to use this calculation tool to estimate the weak lye flow rate:
service.koerting.de/en/calculations/calculations-/estimation-of-weak-lye-generation



ADVANTAGES OF KÖRTING CAUSTIC RECOVERY PLANTS (CRP)

- Return on investment in less than one year
- No alkaline waste water from the mercerising machine
- The best lye cleaning system with hydrogen peroxide
- Hot water generated from waste energy
- Soft water with a low alkaline content produced
- Surplus lye recovered from wet-on-wet mercerisation
- No contamination of the heating steam
- Environmentally friendly: fewer chemicals required for neutralisation
- Tailor-made solution between 2,000 - 40,000 l/h
- Suitable for yarn-dyed fabrics and denim (lab test required beforehand)

You can find a practical questionnaire to request a quote and more information at:
koerting.de/en/caustic-recovery-plants.html

4-STAGE CAUSTIC RECOVERY PLANT (CRP)

KÖRTING
CAUSTIC RECOVERY PLANTS

We've been supplying caustic recovery plants for mercerising lye to the textile industry since 1956. They have been installed in way more than 200 factories in over 50 countries. Most of the CRPs are 3 or 4-stage evaporation plants. Here are some examples:

HOW THE CAUSTIC RECOVERY PLANT WORKS

The weak lye is reconcentrated by water evaporating. The CRP is based on the natural circulation principle. The heating steam is condensed on the outside of the tubes and heats the lye inside. The lye is brought to a boil in the heating tubes. The mix of lye and vapour flows into the separator at the side, where the vapour is separated from the lye that is circulating. The vapour is used as heating steam in the next stage. Partial vapour flow is used to preheat the weak lye. A swirl droplet separator in the separator prevents the alkaline liquid from reaching the next stage. The separated lye flows back to the evaporator through a return pipe.

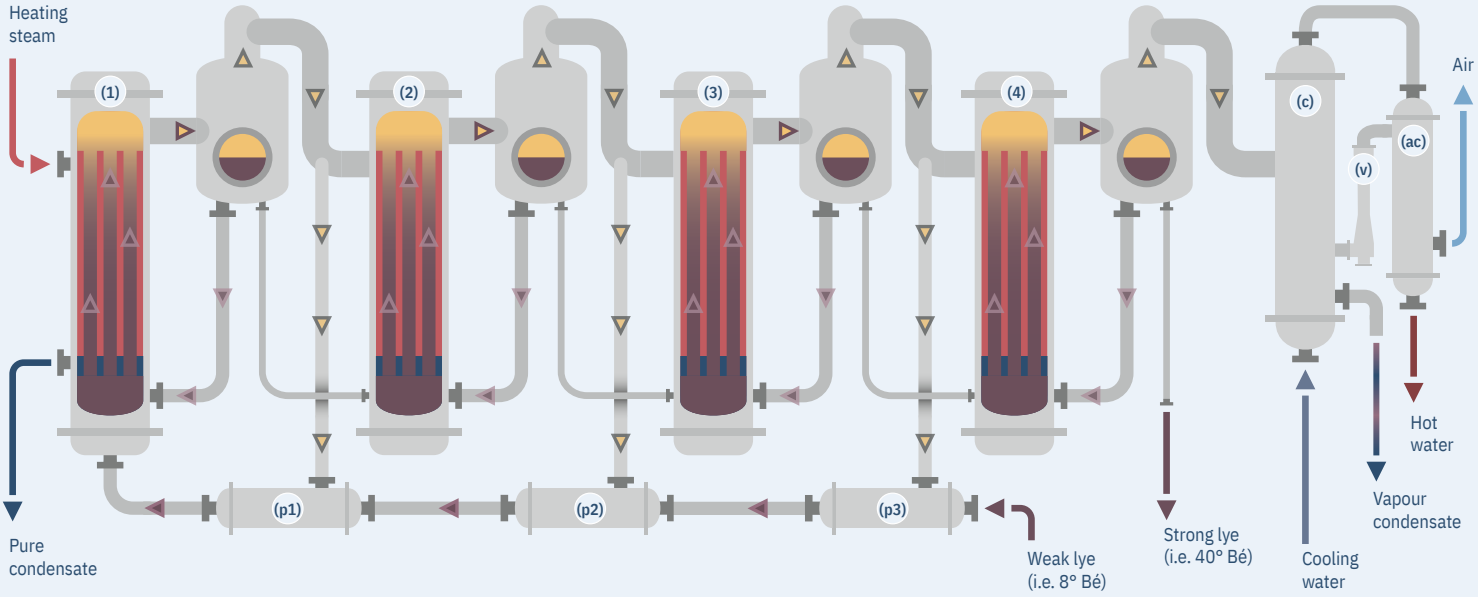
The caustic recovery plant is driven by the pressure drop between the stages. The highest pressure is in the first stage. The last stage operates under a vacuum which is maintained by a steam jet vacuum ejector (v) with an after-condenser (ac), or by a liquid ring vacuum pump. In the first stage (1), live steam generates vapour which flows as heating steam into the second stage (2). The heating steam condensate from the first stage flows back to the boiler.

The vapour from the second stage heats the third stage (3). The vapour from the last stage (in this case, the 4th stage) is condensed with cooling water in the condenser (c) and heats the cooling water.

The more stages a system has, the less heating steam and cooling water is required. The CRP's number of stages should be adapted to the hot water required.

4-STAGE CAUSTIC RECOVERY PLANT (CRP)

with three pre-heaters (p1), (p2) and (p3) and a steam jet vacuum ejector (v) with an after-condenser (ac)



Lye cleaning system with peroxide

The lye is reconcentrated by a multi-stage water evaporation process. As just water is removed from the weak lye during evaporation, dirt, fibres, and sizing residue from the previous treatment remain in the recovered lye and are also reconcentrated. The level of pollution depends on the quality of the fabrics mercerised.

Underpinned by its exceptional ejector technology, Körting developed a lye cleaning system with hydrogen peroxide (H_2O_2) to remove these impurities from the recycled lye. The lye recovered from the CRP is cooled down before it enters the settling tank through the mixing and dosing ejector, as shown in the graphic below. Peroxide is added to the lye in this ejector and creates fine gas bubbles. The 3-phase mix of strong lye, solid dirt particles and finely dispersed gas bubbles flows into the settling tank.

Because of the small gas bubbles, a large phase interface for mass transfer and oxidation is generated. The gas bubbles are formed by the peroxide decomposing. As a result, chemical reactions on the surface of the reactive impurities can occur.

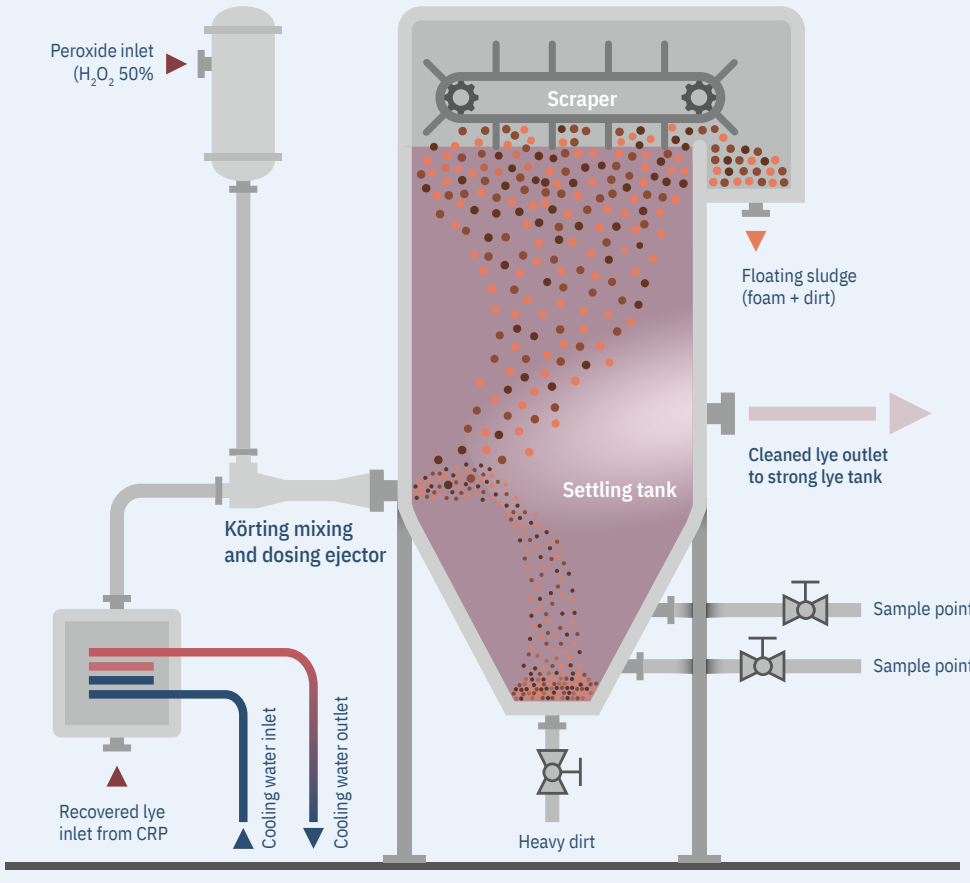
The consumption of peroxide (50% H_2O_2) is approximately 0.25 - 1.5 vol.% of the strong lye flow, depending on the quality of the lye. Bleaching and washing the fabrics before mercerisation is the best way of ensuring clean lye. We recommend filters for the mercerising machine's circulation pumps.

Most dyes will be destroyed by the peroxide. A simple lab test can be performed to check the impact on a specific lye. Please contact us to obtain a detailed manual about this test.

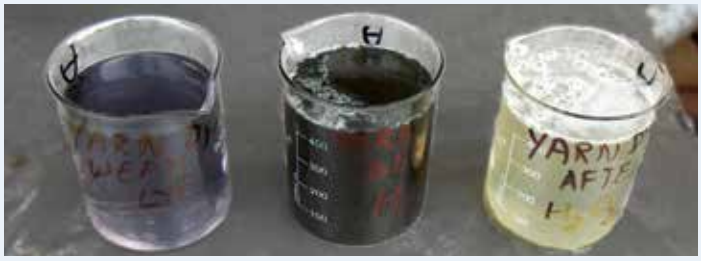
Please note:
the lye cleaning system is **no substitute** for proper washing and desizing of the fabrics before mercerisation.

PEROXIDE DOSING SYSTEM

Körting lye cleaning system, consisting of a peroxide dosing system, scraper and settling tank



LYE CLEANING SAMPLES WITH HYDROGEN PEROXIDE

	Weak lye	Strong lye before lye cleaning	Strong lye after lye cleaning
Bleached fabrics			
Workwear			
Yarn-dyed fabrics			

The lye cleaning system consists of three main components:

The peroxide dosing system	This consists of a custom-developed mixing-and-dosing-ejector, peroxide storage tank and lye cooler. The dosing system has no moving parts, which means zero maintenance.
Settling tank	The settling tank allows unhindered separation of lye and dirt. The tank is designed so that floating sludge and sludge on the bottom are easy to remove.
Automatic scraper	The automatic scraper ensures consistent removal of the floating sludge before it sinks back into the recovered lye.

The peroxide has the following effects on the lye:

Flotation	The majority of the dirt particles mixed with bubbles rises to the surface (called flotation) and forms a layer of foam. Non-reactive particles attach themselves to rising gas bubbles (called physical adhesion) and join the foam layer too. An automatic scraper regularly removes the foam layer or floating sludge.
Sedimentation	Other dirt particles with a higher density, some of which form a mass, sink to the bottom. This aspect is mitigated by peroxide treatment, which reduces lye viscosity by destroying the starch left over from sizing. As a result, dirt separation is successful.
Bleaching	The peroxide bleaches the dirt and dye particles. The colour of the lye is much brighter after peroxide treatment.

Körting Hannover GmbH
Badenstedter Str. 56
30453 Hannover | Germany

+49 511 2129 - 359
sales@koerting.de

KOERTING.DE

270-Caustic recovery-EN-230531