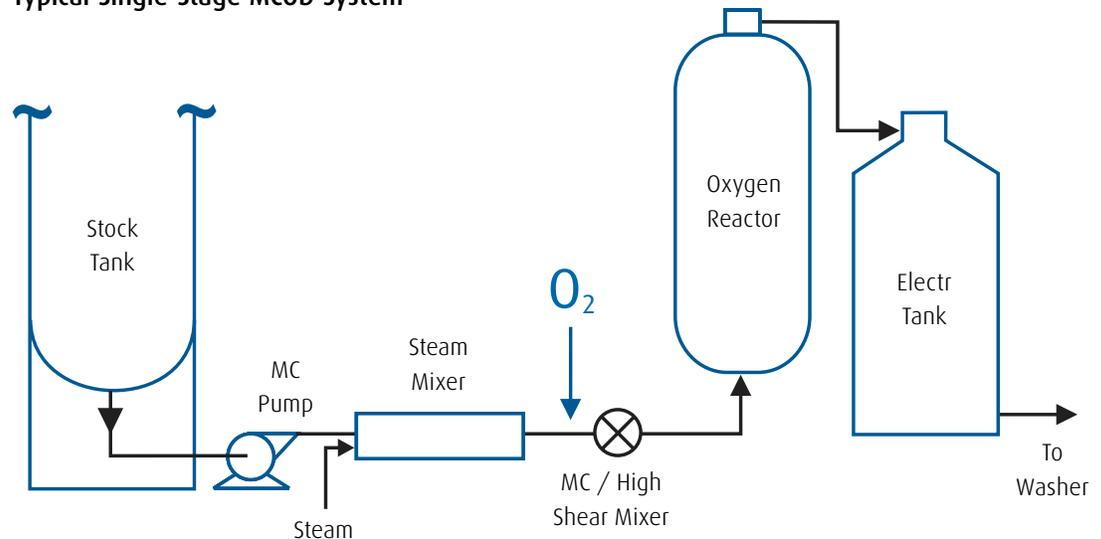




## Oxygen Delignification

### Typical Single-Stage MCOD System



Oxygen ( $O_2$ ) delignification is one of the most important processes in today's pulp bleaching technology.

The process uses oxygen to reduce active chlorine requirements in the bleach plant. It is an important step towards total chlorine free (TCF) and elemental chlorine free (ECF) pulp production. Recently, oxygen delignification has been recognized as one of the strategic technologies that offers yield enhancement in bleached pulp production.

An important environmental impact of oxygen delignification is the reduction or elimination of adsorbable organic halides (AOX). Other environmental benefits include lower biochemical oxygen demand/chemical oxygen demand (BOD/COD) and less color in the effluent.

With chlorine gradually being phased out of the bleaching process, oxygen delignification offers significant operating cost advantages over delignification processes which use bleaching agents such as chlorine dioxide and hydrogen peroxide.

There are several types of oxygen delignification, including:

- High Consistency Oxygen Delignification (HCOD)
- Medium Consistency Oxygen Delignification (MCOD)
  - Double Stage
  - Single Stage
  - Mini

Selecting the appropriate type of delignification system involves careful consideration of each mill's unique operating situation and the balance between installation and operating costs. The table offers the range in rates for different oxygen delignification systems.

Type of System	% Delignification System
HCOD	30-60%
MCOD (Double Stage)	40-70%
MCOD (Single Stage)	30-50%
MCOD (Single Stage)	20-30%

**Applications** Single stage, medium consistency oxygen delignification (MCOD) is the most common technology being adopted by the industry.

In a typical MCO installation, the pulp from the stock tank is moved by an MC pump to a steam mixer, where the temperature is raised to the desired level, and oxygen is injected into the pulp mixture. Next, an MC/High Shear mixer ensures intimate gas/liquid mixing of the oxygen-enriched pulp. The pulp is then fed to an upflow reactor and discharged to a blow tank for further processing. Caustic and other chemicals are usually added before the MC pump.

### Reinforcing Extraction with Oxygen and Peroxide

Because the process conditions during the extraction stage are optimal for the addition of oxygen and hydrogen peroxide, Linde also offers oxygen- and oxygen and-peroxide-reinforced extraction as an application related to delignification. Adding oxygen and hydrogen peroxide during the alkaline extraction stage reduces the chemical demand of chlorine dioxide in subsequent stages. While the addition of hydrogen peroxide improves the brightness, the addition of oxygen selectively reduces the lignin content of the pulp. Both types of extraction are applicable to all bleaching sequences.

- Benefits**
- Lower overall bleaching chemical costs
  - Reduced or eliminated AOX production
  - Lower BOD/COD production and less color in the effluent
  - Reduced wastewater treatment costs
  - Better yield than extended cooking
  - An important bleaching step towards TCF or ECF pulp production and mill closure