

ATTACHMENT

Hierarchy of Pulping and Bleaching Processes

Process	How It Works
Processed Chlorine Free (PCF) & Totally Chlorine Free (TCF)*	Completely substitutes oxygen-based compounds for chlorine compounds.
Enhanced ECF with ozone or hydrogen peroxide	Uses ozone or hydrogen peroxide as brightening agent in initial stages of bleaching processes. (Final or near final stage uses chlorine dioxide.)
ECF with extended or oxygen delignification ("enhanced ECF")	Removes more of the lignin before bleaching, thus reducing energy and chemical use during bleaching process. (Final stage uses chlorine dioxide.)
Elemental Chlorine Free ("traditional ECF")	Replaces elemental chlorine with chlorine dioxide.
Elemental Chlorine	Uses elemental chlorine to bleach pulp. In the U.S. elemental chlorine was phased out as of April 2001 per EPA's Cluster Rule.

* The terms PCF and TCF refer to paper produced without chlorine or chlorine compounds. As used in the market today, PCF paper is preferable because it contains recycled fiber, while TCF refers only to 100% virgin paper.