

Regeneration systems

for hydrochloric waste pickling solutions



The leading regeneration technology for hydrochloric waste pickling acid

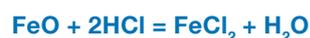
The ANDRITZ spray roasting and fluid bed processes recycle hydrochloric acid with an efficiency of 99.5% for reuse in your pickling line.

The process

The dissolved iron is extracted either as iron oxide powder (spray roasting technology) or as sintered iron oxide (fluidized bed technology).

Spray roasting is also used to produce other metal oxides from chloride solutions, for example aluminium, cobalt, magnesium, nickel and titanium oxides, rare earth, and various mixed oxides.

When steel is pickled with hydrochloric acid, an iron chloride solution is produced:

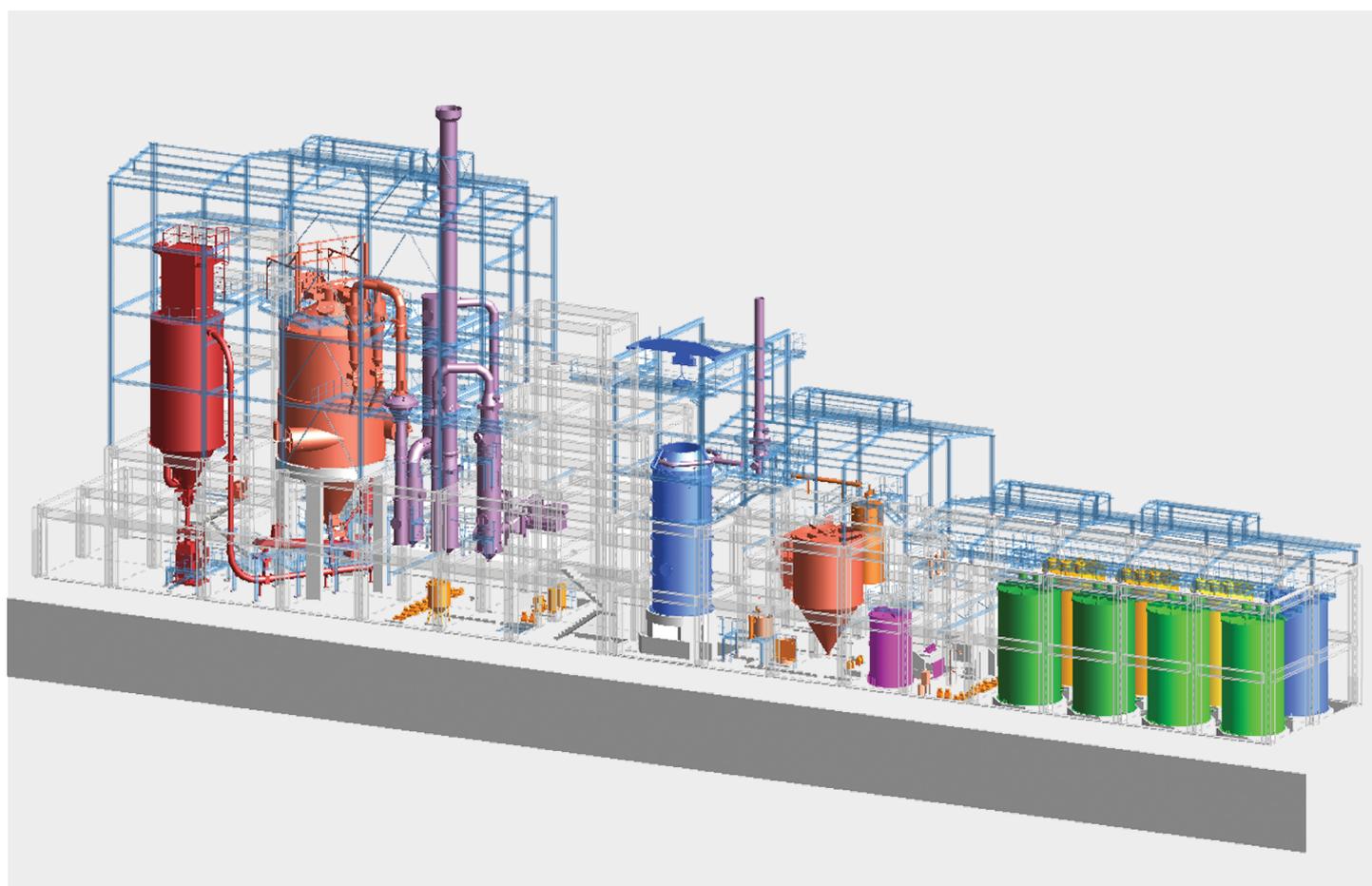


In the regeneration system, the iron chloride (FeCl_2) is converted into hydrochloric acid and iron oxide by hydrolytic decomposition.



This reaction takes place in the reactor at temperatures ranging from 600° C to 800° C.

The iron chloride containing waste pickling acid from the pickling system is conveyed to the evaporator, where it comes into direct contact with the hot waste gases from the reactor and is concentrated. This concentrated iron chloride solution is sprayed into the spray roasting reactor or fed to the bed of a fluidized bed reactor.



▲ Advanced 3D design and modelling tools

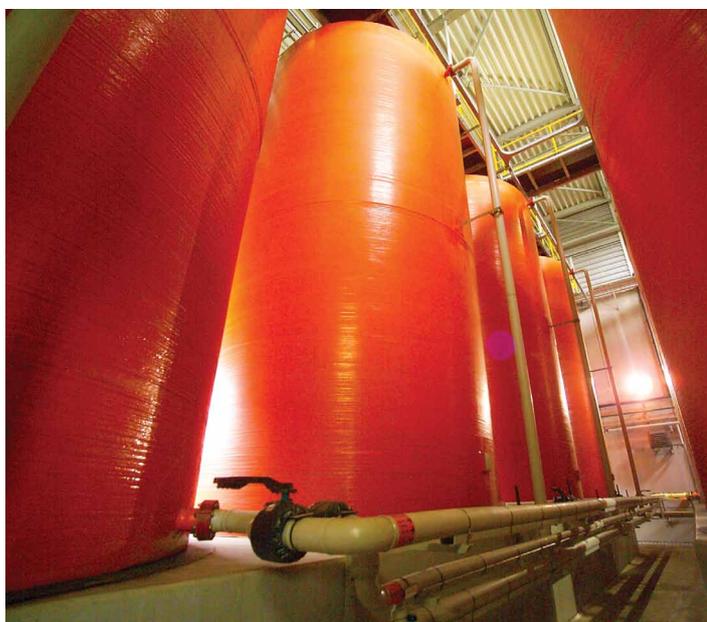
Our technologies provide high saving

At reaction temperatures between 600° C and 800° C the iron chloride solution is split into hydrogen chloride and iron oxide by means of water vapor and atmospheric oxygen.

After passing through the cyclone, the hydrogen chloride gas, water vapor and combustion gases enter the evaporator and the absorption column, where the HCl gas is absorbed adiabatically by assign rinse water from the pickling plant.

The resulting hydrochloric acid (18% by weight) is recycled to the pickling process. The gas from the column is cleaned in a scrubber stage in accordance with anti-pollution requirements and then discharged to the atmosphere. A fan keeps the system under vacuum, preventing the HCl gas from escaping.

Iron oxide powder or sintered iron oxide in the reactor is transported to the appropriate tanks and then filled into big bags.



▲ Tank farm



▲ Reactor, venturi, absorption column

Low acid consumption

Acid consumption in pickling plants is substantially reduced when a regeneration system is used.

- Acid consumption with regeneration system:
0.5-1 kg/t material to be pickled

The following are guideline values for a pickling plant for low-carbon strip, based on 32 percent by weight of hydrochloric acid:

- Acid consumption without regeneration system:
18-30 kg/t material to be pickled

Heat consumption for spray-roasting and fluidized bed reactors as a function of the iron content in the waste pickling acid from the regeneration system:

Fe content in waste pickling acid g/l	Spray roasting reactor kJ/kg iron oxide (Fe ₂ O ₃)	Fluidized bed reactor kJ/kg iron oxide (Fe ₂ O ₃)
80	25,000	25,000
100	22,000	23,000
120	18,000	21,000
140	16,000	21,000

Production of high-value iron oxide

Additional revenue from production of high-value iron oxide.

On account of its specific qualities, the iron oxide produced with the ANDRITZ spray roasting process is highly valued as raw material and is generating increasing worldwide demand.

In order to further increase the value of the iron oxide, a waste acid purification process (WAPUR) was developed. It can reduce the amount of certain impurities like silicon to a very low value.

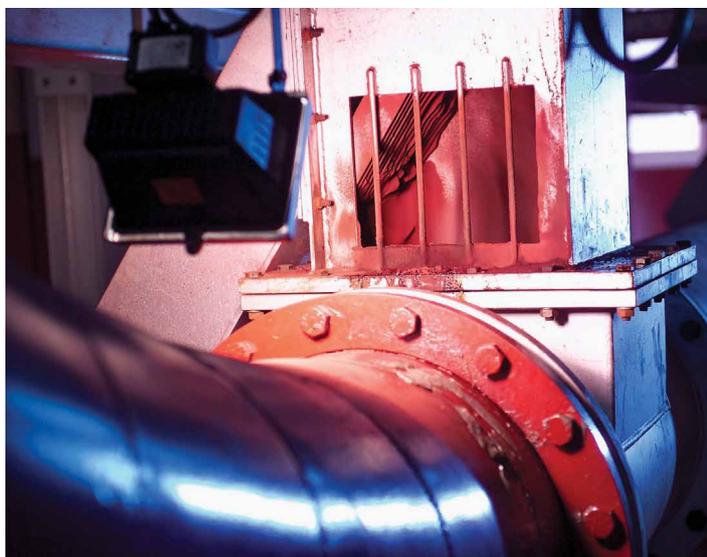
Major iron oxide uses

- Production of hard and soft ferrites
- Foundry applications
- Binder materials for refractories
- Coloring pigments

We ensure a cleaner environment.

As the acid loop between the pickling plant and the regeneration system is closed, and the rinse water from the pickling plant is reused in the regeneration system, the pickling system can be operated largely without producing waste water.

The off-gases from the HCl regeneration system consist of water vapor and the combustion gases from reactor heating. The HCl and dust emission values conform to legal requirements.



▲ Oxide conveying system



▲ Regeneration plant

Make our experience your advantage

Our strengths

- Recycling of hydrochloric acid with an efficiency of 99.5 %
- Closed acid loop between the pickling plant and the re-generation system
- Waste pickle liquors containing Si, Zn, and Pb can be treated
- Rinse water can be used as absorption water in the regeneration plant; thus, the pickling plant can be operated without waste water
- Consistently high pickling quality due to constant iron and acid concentrations
- Reactors can be heated with any gaseous or liquid fuels
- High-purity iron oxide as by-product
- Appropriate E&A models — standard software package providing simulation mode for plant testing and optimization



▲ Reactor base



▲ Dust separator and injection of waste pickle at the evaporator

Proven and sophisticated design

with more than 200 references worldwide

Extract from our reference list

Customer	Country	Year	Capacity l/h
Anyang Iron & Steel	China	2011	11,000
Guangxi Liuzhou Iron & Steel	China	2010	11,000
Usinas Siderúrgicas de Minas Gerais	Brazil	2009	6,000
Acciaieria Arvedi	Italy	2009	10,000
Guangzhou JFE Steel Shreet	China	2008	9,500
Tian Tie Group	China	2006	11,700
Baosteel Shanghai No. 1	China	2006	9,500
Al Ghurair Steel	U.A.E.	2006	2,700
Novolipetsk Steel	Russia	2005	2,700
voestalpine Stahl	Austria	2005	5,000
Benxi Iron & Steel	China	2003	12,500
Handan Iron & Steel Group	China	2002	8,000
Baoshan Iron & Steel Corp.	China	2001	6,000
Inpromesa F. Sidmed S.A.	Spain	1999	9,000
voest alpine Stahl	Austria	1996	10,000

Choose us as partners

ANDRITZ METALS designs and builds complete lines for the production and further processing of cold-rolled carbon

steel, stainless steel, and non-ferrous metal strip. ANDRITZ METALS is one of the few suppliers worldwide capable of providing all technologies and processes involved in

the production of steel strip (mechanical, process, and electrical equipment, automation, and life cycle services).

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