



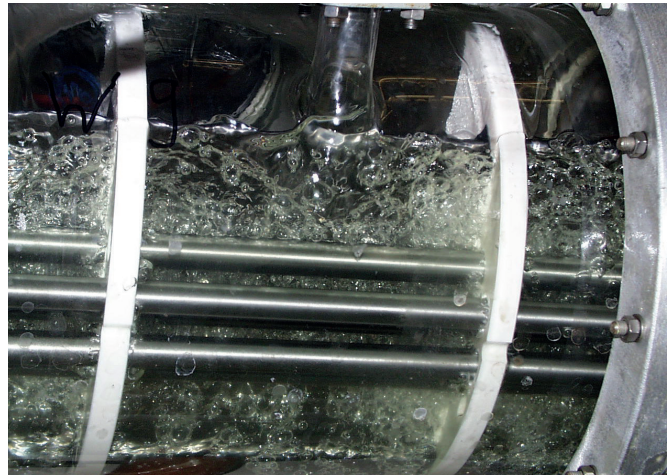
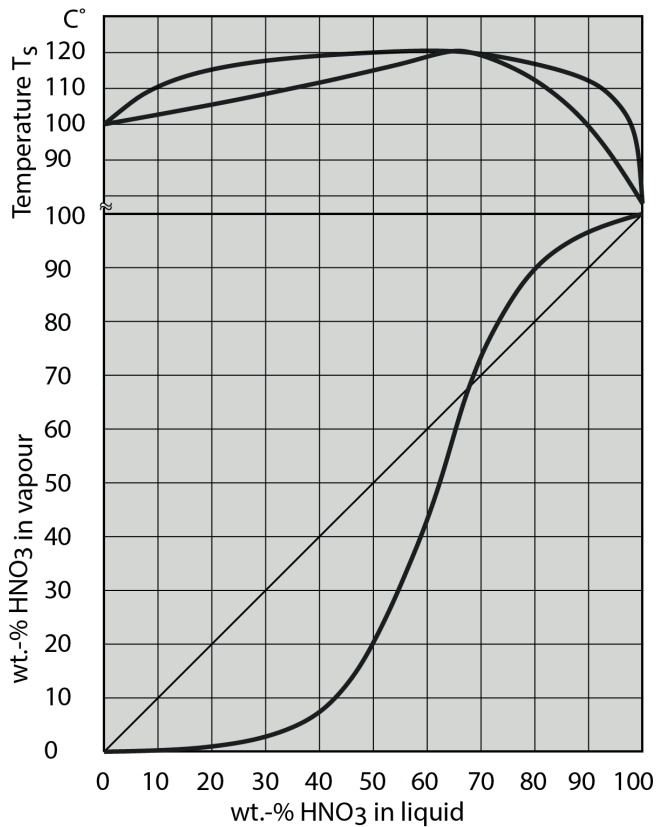
NITRIC ACID TREATMENT

Recovery
Cleaning
Concentration



INTRODUCTION

Nitric acid is one of the most common mineral acids in the chemical industry. It is produced by a high temperature oxidation of ammonia with oxygen catalyzed by a platinum/rhodium contact providing with water nitric acid with a strength of up to almost 68wt% can be generated. The majority of this nitric acid is used for the production of fertilizers. Other processes such as the production of explosives, pigments, rocket fuels or polyurethanes require higher concentrated nitric acid. For the concentration it has to be considered that nitric acid and water form an azeotrope at 68wt% of nitric acid as shown below.



Evaporator for nitric acid pre-concentration

Vapour/Liquid equilibrium of nitric acid and water

The concentration of nitric acid up or close to the azeotropic point is realized "simple" rectification called pre-concentration. The high concentration process of nitric acid passing the azeotropic point up to 99,8wt% is realized by extractive rectification with sulfuric acid. During this concentration process NO_x gases are generated and partially dissolved in the produced liquid nitric acid. In most cases the nitric acid needs to be free of NO_x so that a bleaching respectively stripping process with air is the subsequent process step to get clear concentrated nitric acid. The generated NO_x-gases are converted into nitric acid and recycled to improve the overall process efficiency and to avoid NO_x emissions.

Nitric acid used for nitration processes is commonly mixed with sulfuric acid to become a mixture called nitration acid. The nitric acid thereof is not reacting quantitatively during the nitration process so that the recovery of the acids is important for the cost efficiency of the overall nitration process and for the environment reducing nitrates in waste waters. For the recovery, the cleaning respectively the so called denitration and further purification of nitric acid from various waste and feed streams De Dietrich Process Systems has developed optimum processes and realized numerous plants worldwide.

The plants for these QVF® processes are built with highly corrosion resistant components made of QVF® borosilicate glass 3.3 and De Dietrich® glass-lined steel manufactured by De Dietrich Process Systems. Therefore De Dietrich Process Systems as the manufacturer of these components has developed throughout the last decades processes to handle nitric acid such as:

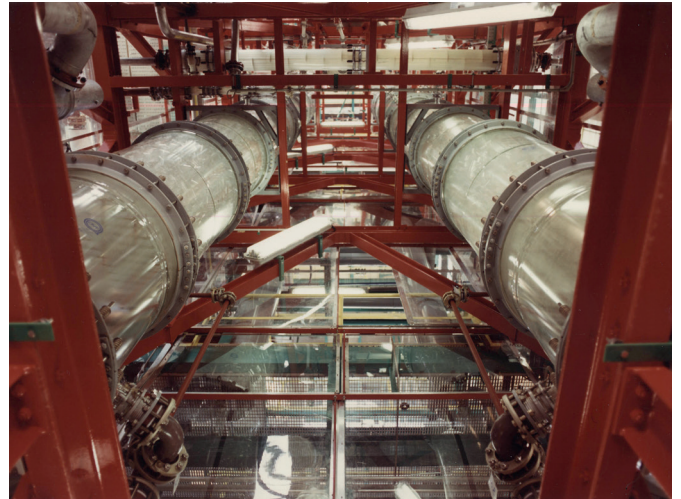
- Pre-concentration of nitric acid
- Production of high concentrated nitric acid up to 99,8wt%
- Bleaching of nitric acid Production of nitric acid from NOx Recovery of nitric acid from various waste streams
- Recovery of nitric and sulfuric acid from nitration processes
- Decomposition and removal of organic components from nitric acid
- Purification of nitric acid up to electronic grade

The design of these processes is always optimized for the utilities available at your site.

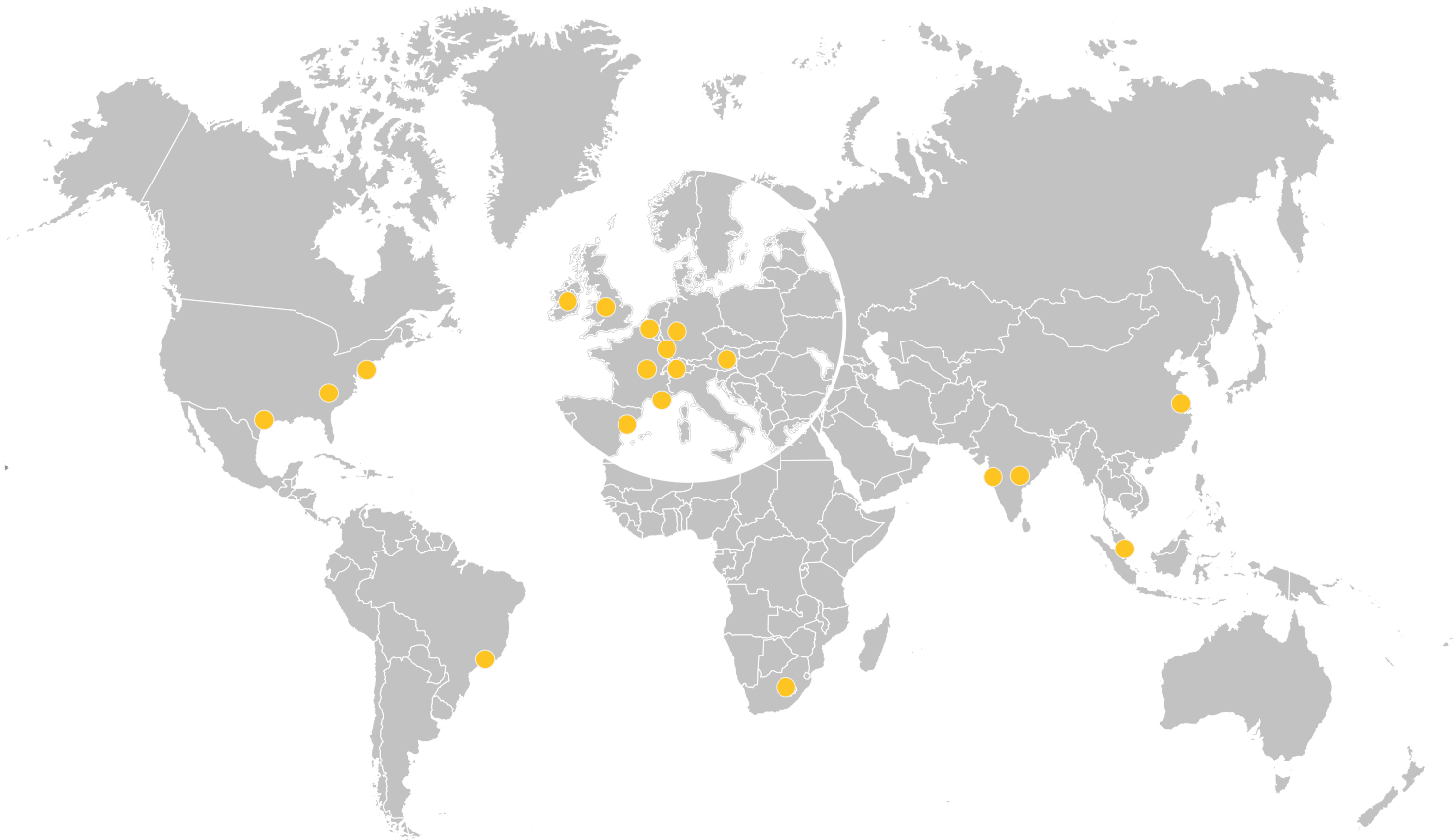
Optimization and adaptation of these processes according to your feed stream and your quality specification of the product can be carried out by us in our test facility..



Denitration Column to Recover Nitric Acid



Nitric Acid Concentration Columns



DE DIETRICH SAS

Immeuble Le Belem
Espace Européen de l'Entreprise
5, rue de Lisbonne - CS 70009
67012 Strasbourg Cedex
www.dedietrich.com

BENELUX

De Dietrich Process Systems N.V.
B - Heverlee-Leuven
Tél. +32 16 40 5000
Fax +32 16 40 5500
info@benelux.dedietrich.com

BRAZIL

De Dietrich Do Brasil Ltda
São Paulo
Tél. +55 11 2703 7380
Fax +55 11 2702 4284
brasil@dedietrich.com.br

CHINA

De Dietrich Process Systems Co. Ltd
Wuxi
Tél. +86 510 6696 7500
Fax +86 510 6696 7599
info@dedietrichchina.com

FRANCE

De Dietrich S.A.S.
Zinswiller
Tél. +33 3 88 53 23 00
sales@dedietrich.com

De Dietrich Process Systems Semur S.A.S.
Semur-en-Auxois

Tél. +33 3 80 97 12 23
Fax +33 3 80 97 07 58
info.semur@dedietrich.com

De Dietrich Process Systems Grasse
sales@dedietrich.com
Tél. +33 7 62 20 36 11

GERMANY

De Dietrich Process Systems GmbH
Mainz
Tél. +49 6131 9704 0
Fax +49 6131 9704 500
mail@qvf.de

GREAT BRITAIN / IRELAND

De Dietrich Process Systems Ltd
Stafford
Tél. +44 1785 609 900
Fax +44 1785 609 899
sales@ddpsitd.co.uk

HUNGARY

Shannon
Tél. +35 361 366924
Fax +35 361 366854
sales@dedietrich.ie

HUNGARY

De Dietrich S.A.S.
1097 Budapest
Tél. +36 20 56 83 444
info.hu@dedietrich.com

INDIA

De Dietrich Process Systems (India) Pvt, Ltd
Mumbai
Tél. +91 9819287276
sales@dedietrich.co.in

Hyderabad

Tél. +91 40 29805441/2
sales@dedietrich.co.in

SINGAPORE

De Dietrich Singapore (PTE) Ltd
Singapore
Tél. +65 68 61 12 32
Fax +65 68 61 61 12
info.sg@dedietrich.com

SOUTH AFRICA

De Dietrich South Africa (PTY) Ltd
Dunswart
Tél. +27 11 918 4131
Fax +27 11 918 4133
ddsa@iafrica.com

SPAIN

De Dietrich Equipos Quimicos S.L.
Barcelona
Tél. +34 93 292 0520
Fax +34 93 21 84 709
comercial@dedietrich.es

SWITZERLAND

De Dietrich Process Systems AG
Bubendorf
Tél. +41 61 925 11 11
Fax +41 61 921 99 40
info@rosenmund.com

UNITED STATES

De Dietrich Process Systems Inc.
Mountainside, NJ
Tél. +1 908 317 2585
Fax +1 908 889 4960
sales@ddpsinc.com

Charlotte, NC

Fax +1 704 588 68 66
sales@ddpsinc.com

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