OVERVIEW

OF

HFC 134a PLANT

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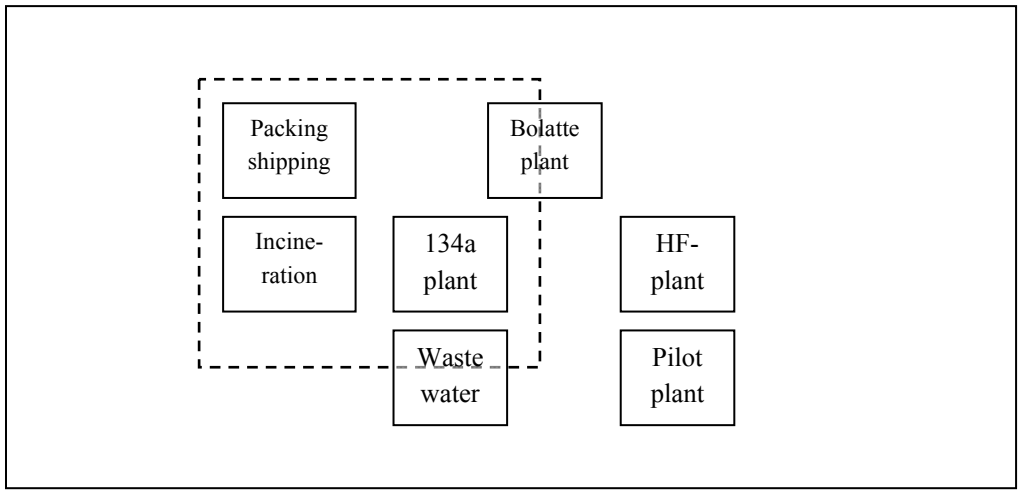
Content

Sample of information available

Introduction

The following diagram is supposed to clearly show the boundaries for the balances and give the distribution factors in case of common usage of installations



Technical Plant data

Chemistry

- Heterogeneous (solid catalyst, fluidized bed) catalyzed gas phase reaction

- 2 step synthesis:
  1st step: $HClC{=}CCl_2 + 3HF \rightarrow HClHC\text{-}CF_3 + 2\ HCL$
  2nd step: $ClH_2C\text{-}CF_3 + HF \leftrightarrow F_3C\text{-}CH_2F + HCL$
  1st step is irreversible and exothermic, the 2nd step is an equilibrium and endothermic

- Raw materials:
  Trichloroethylene (TCE)
  Anhydrous Hydrogen fluoride (HF)

- Main products and co-products:
  1,1,1,2 Tetrafluoroethane (134a)
  Hydrogen chloride (HCL) as Hydrochloric acid (32 %)

- Main by-products:
  Pentafluoroethane (125)

1-chloro-1,2,2,2 Tetrafluoroethane (124)
1,1,1 Trifluoroethane (143a)
Olefins (1122, 1131, 1225, 1234, 1243)

Capacities (in- / outputs)

	(absolute 45t/d)	(specific)
Raw material		
Trichloroethylene (TCE)	66 t/d	1,455 t/t_{134a}
Anhydrous hydrogen fluoride (HF)	44 t/d	0,984 t/t_{134a}
Average daily 134a production	45, t/d	-
Total yield with regard to TCE	88,6 %	-
Total yield 134a plus premix regard TCE	91%	-
Co – and by products		
Hydrochloric acid	160 t/d (ca.33%)	3,55 t/t_{134a}
"Premix" (125/143a ; 50/50 $\%_{mass}$)	1,57 t/d	35 kg/kg_{134a}
Light boilers (mostly 125, 143a)	2,16 t/d [x4]	48 kg/t_{134a} [x4]
High boilers (mostly 124(a), 134)	297 kg/d [x5]	6,6 kg/t_{134a} [x5]
Utilities / auxiliary material		
Compressed air	9.900 Nm^3/d	220 Nm^3/t_{134a}
Electricity	132.750 kWh/d	2.950 kWh/t_{134a}
Methane	18.000 Nm^3/d	400 Nm^3/t_{134a}
Nitrogen	49.500 Nm^3/d	1.100 Nm^3/t_{134a}
Nitrogen (liquid as cooling agent)	ca. 15 t/d	ca 330 kg/t_{134a}
MP Steam ($5bar^+$)	690 t/d	15,3 t/t_{134a}
Sulphuric acid (H_2SO_4) {99% PM 96% FFM}	8.400 kg/d	186 kg/t_{134a}
Waste water	60 m^3/d	1,33 m^3/t_{134a}
Water; demineralized	105 m^3/d [x7]	2,33 m^3/t_{134a} [x7]
Water; river (for cooling only)	80 m^3/d	1,8 m^3/t_{134a}