Mod4 Vacuum Belt Filter

FLT 56-100

Rev.	Description	Date	Prepared by
5	Add phase 1	03-12-24	KDB
4	Delete phase 2	04-09-24	KDB
3	Correction following Petrofac comments	28-11-22	KDB
2	Correction following TKiS comments	06-07-22	TDE/KDB
1	Tickness of the cake	01-07-22	KDB
0	Issued for preliminary engineering	21-06-22	TDE/KDB

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PROCESS DATA

TYPE: BELT FILTER Nr. of UNITS/SPARE: 1 / 0

General

The intent of this specification is to describe the process conditions for the vacuum belt filter and the ancillary equipment, for the filtration of a gypsum slurry.

The belt filter is sized for a gypsum filtration of 45,1 t/h (humid cake)

Gypsum cake will be washed three times. The first wash is performed with the filtrate from the second wash. The second wash is performed with filtrate from the third wash. The third (last) wash will be performed with hot water from battery limit.

The effective filtration area is 140 m².

Equipment will be designed for an on-stream factor of 24h/day, 365 days/year.

Stream Composition (according to Phase 1 nominal calculations)

Feed slurry

- Liquid phase: 80 to 85% by weight, 5 to 15% Cl, about 1% Ca (dissolved) and 1000 ppm Na
- Solid phase: 15 to 20% by weight, essentially of CaSO4.2H2O with fluosilicates, silica.
  Size of the crystals: up to 500µm.
- Property: abrasive and corrosive.
- Specific weight: 1100 to 1250 kg/m³.
- Viscosity: 1-5 cP.
- Temperature: 40 to 50°C (design temperature for the rubber belt: 70°C).

Cake/cloth washing water

- The cake wash will be performed partially with process water
- Nominal Temperature is 50°C, controlled by the HTX 56-480
- The cloth wash is also performed with process water, but not heated
- The water from cloth wash is sent to a settler (CLR 56-420) to separate the solids

Cake

- Gypsum with ~25% free moisture, about 2000 ppm Cl.
- Discharge: DRY; using belt conveyors to the drying unit
- Temperature: 60°C max

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Flows

Stream	Unit	Nominal Flow
Slurry Feed	m³/h	192
Recycled HCl	m³/h	197
2nd wash filtrate	m³/h	62
3rd wash filtrate	m³/h	62
Cake wash water	m³/h	40
Gypsum Cake	t³/h	65,5

Performance (by the filter supplier)

- Chlorine content in gypsum: maximum 0,2% on dried cake at 45°C.
- Minimum solids in the filtrate stream, cloth porosity of 625 L/(m²*s)
- Tickness of the cake on the VBF between 20 and 25mm
- Free moisture in gypsum cake: maximum 25%

Filter Washing

- The washing of the filter and of the filtration circuits will be made by circulating hot water containing 5% HCl / H_2SO_4
- The foreseen frequency is once a week.

Construction Materials

- All the parts in contact with fluid (liquid or gas) and surroundings the filter: rubberlined carbon steel
- Filter cloth: polypropylen monofilament.

Design Remarks

- The vacuum box is provided with movable dividers.
- The filter should be provided with side gutters to collect possible filter overflow.
- The acid separators on vacuum network shall be designed by the manufacturer.
- The acid condenser on vacuum network shall be designed by the manufacturer.
- The vacuum pump shall be specified by the manufacturer.
  Nominal relative vacuum required: 500 mmHg (260 mmHg absolute pressure)
  Design relative vacuum required: 510 mmHg (250 mmHg absolute pressure)
- Supplier to provide filter cloth air coefficient (kg/h/m²).
- Supplier to provide the settler CLR 56-420 if mandatory for save water
- Supplier to specify recommended cycle time and belt speed

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Scheme of the Belt Filter

See P&ID F156-1.