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ВАКУУМНЫЕ СИСТЕМЫ DPM, DPO, PGV

Технические характеристики

Multi-stage steam jet vacuum pumps

in metal construction with mixing condensers

DESIGN AND MODE OF OPERATION

FIVE-STAGE STEAM JET VACUUM PUMP WI

MIXING CONDENSERS FOR 1 mbar (FIG. 1)

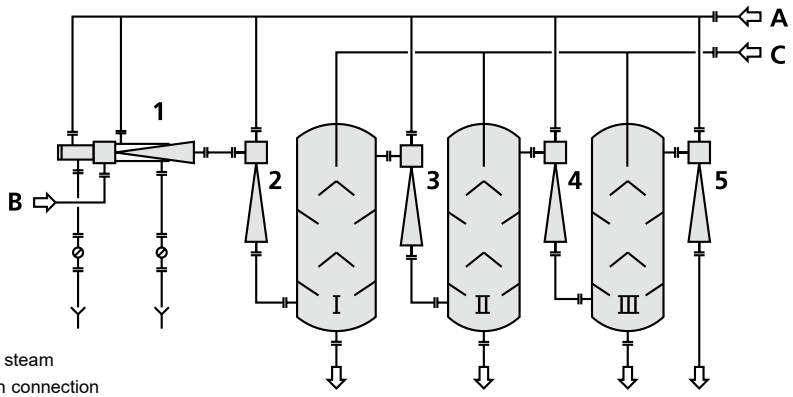
STAGE 1: extracts the vapours and gases from the process to be kept under vacuum; final vacuum e.g. 2 mbar
STAGE 2: compresses both the motive steam and the extracted vapours and gases of the 1st stage to a pressure of approx. 55 mbar **MIXING CONDENSER I :** is designed for a con-densation pressure level which is as low as possible to keep the steam consumption as low as possible. The suction flow load of the downstream-arranged stages and their steam requirements are thereby reduced.
STAGE 3: extracts all gases and vapours which were not condensed in the upstream mixing condenser I for compression to a pressure of 160 mbar
MIXING CONDENSER II: reduces the suction flow in order to relieve the downstream arranged stages
STAGE 4: compresses to a pressure of 400 mbar **MIXING CONDENSER III:** condenses the remain-ing suction flow and the motive steam of the upstream arranged stage
STAGE 5: compresses to atmospheric pressure for discharge to the ambient air via a scrub-ber or a mixing condenser

Mixing condensers are internally fitted with baffles or nozzles to enhance water distri-bution. They are shaped such that fouling problems are minimized. The cooling water is best drained off through barometric legs.

See also “Planning a steam jet vacuum pump”,
↗| gdp3.

Suction capacity: 17 kg/h from 1 mbar, corresponding to 7230 m³/h and 3.6 kg/h from 2 mbar, corresponding to 1500 m³/h

FIG. 1



A Motive steam
B Suction connection
C Cooling water

1 – 5 Steam jet vacuum pumps, stages 1 to 5 I – III Mixing condensers

5-stage steam jet vacuum pump with mixing condenser

Multi-stage steam jet vacuum pumps

in metal construction with surface condensers

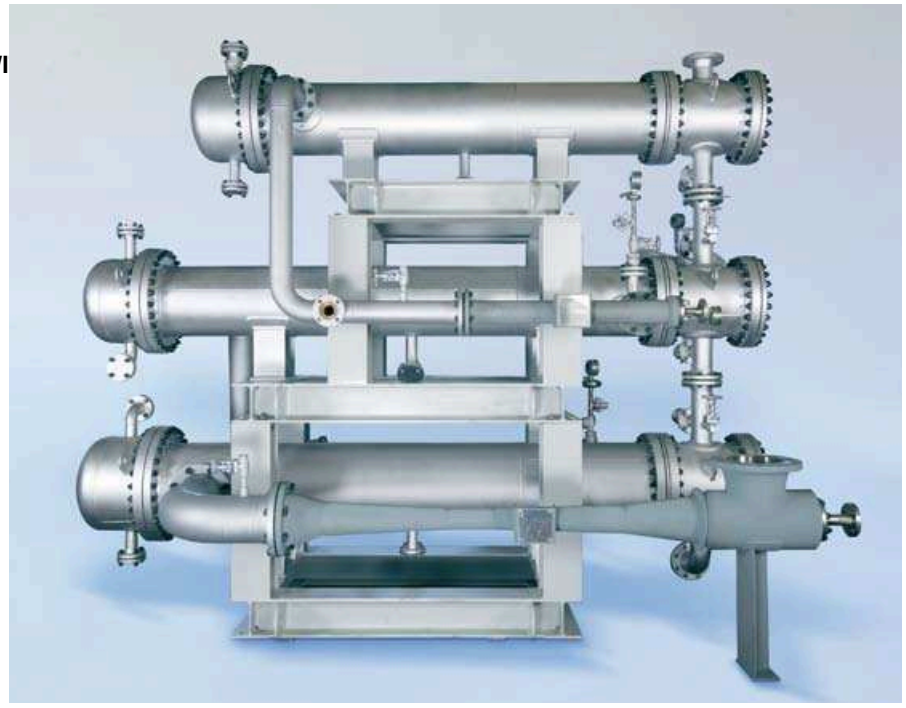
DESIGN AND MODE OF OPERATION

FOUR-STAGE STEAM JET VACUUM PUMP WI

SURFACE CONDENSER FOR 1 mbar (FIG. 1)

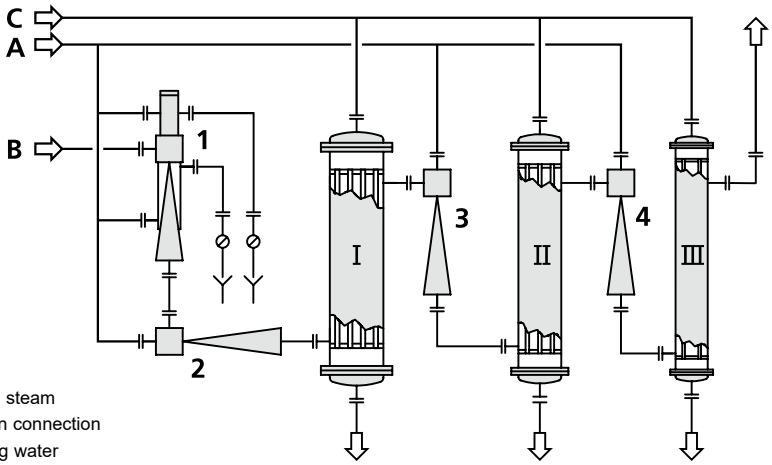
STAGE 1: extracts the vapours and gases from the process to be kept under vacuum; final vacuum e.g. 2 mbar
STAGE 2: compresses both the motive steam and the extracted vapours and gases dis-charged by the 1st pump stage to a pressure of 80 mbar
SURFACE CONDENSER I : is designed for a con-densation pressure level which is as low as possible to keep the steam consumption as low as possible. The suction flow load of the downstream-arranged stages and their steam requirements are thereby reduced.
STAGE 3: stage extracts all gases and vapours which were not condensed in the surface condenser I for compression to a pressure of 320 mbar
SURFACE CONDENSER II: reduces the suction flow in order to relieve the downstream arranged stages
STAGE 4: compresses to atmospheric pressure for discharge to the ambient air via a scrub-ber or a surface condenser
SURFACE CONDENSER III: condenses the remain-ing suction flow and the motive steam of the upstream arranged stage

See also “Planning a steam jet vacuum pump”, ↗ | gdp3.



3-stage steam jet vacuum pump downstream of the 1st stage (pre-stage, heated), suction capacity: 3462 kg/h from 26.7 mbar abs.

FIG. 1



A Motive steam
B Suction connection
C Cooling water

1 – 4 Steam jet vacuum pumps, stages 1 to 4 I
– III Surface condenser

4-stage steam jet vacuum pump with surface condensers

Fig. 2
3-stage steam jet vacuum pump with several lateral flows (10 jet pumps in total) for the production of mono-ethylene glycole (plastics industries)
Total suction flow: approx. 1 050 kg from different pressure levels

Fig. 3
2-stage steam jet vacuum pump with surface condenser, completely in Hastelloy
Suction capacity: 110 kg/h from 35 mbar

Fig. 4
3-stage steam jet vacuum pump with surface condenser for the vacuum column of a refinery
Suction flow: 13 180 kg/h (436 000 m³/h) Suction pressure abs.: 4.5 kPa abs.
Discharge pressure abs.: 110 kPa abs.

Multi-stage steam jet vacuum pumps

in porcelain/graphite

DESIGN AND MODE OF OPERATION

Multi-stage steam jet vacuum pumps in por-celain/graphite are used to extract corrosive gases and vapours, particularly where hal-ogen compounds are present, if stainless steels are not sufficiently resistant.

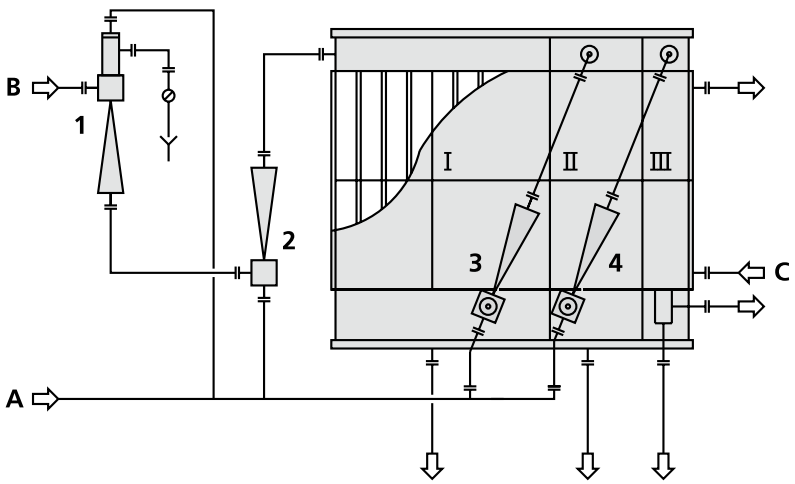
FOUR-STAGE STEAM JET VACUUM PUMP FOR 2 mbar, (FIG. 1)

STAGE 1: extracts the vapours and gases from the process to be kept under vacuum; final vacuum e.g. 2 mbar
STAGE 2: compresses the motive steam and the extracted vapour and gases of stage 1 to 75 mbar
SURFACE CONDENSER CHAMBER I : is designed for a condensation pressure level which is as low as possible to keep the steam consump-tion as low as possible. The suction flow load of the downstream-arranged stages and their steam requirements are thereby reduced.
STAGE 3: extracts all gases and vapours which were not condensed in the upstream con-denser chamber I for compression to a pres-sure of approx. 320 mbar
SURFACE CONDENSER CHAMBER II : reduces the suction flow in order to relieve the down-stream arranged stages
STAGE 4: extracts all non-condensable gases and vapour from condenser chamber II and compresses them to atmospheric pressure. **SURFACE CONDENSER CHAMBER III:** will only be required if the exhaust gases are not allowed to reach the open air. The inert gases are dis-charged silently and without steam trailing.

The condensate lines can be made in plastic, porcelain or glass tubes.
In the here described steam jet vacuum pump the extracted medium does not come into contact with the cooling water.
If the extracted medium is allowed to get into contact with the cooling water, we re-commend the use of our multi-stage porce-lain steam jet vacuum pumps, where mixing condensers of temperature-change resistant porcelain are used for inter-condensation.

Steam jet vacuum pump with block condenser made of graphite Suction capacity: 2.5 kg/h of air from 1.3 mbar

FIG. 1



A	Motive steam	1–4	Jet pumps, stages 1 to 4
B	Suction connection	I–II	Intermediate condenser chambers
C	Cooling water	III	After-condenser chamber

4-stage steam jet vacuum pump with compact block condenser

MATERIALS AND CONSTRUCTION

PORCELAIN has been used by us for the con-struction of jet pumps (and mixing condens-ers) for many years. It is insensitive to tem-perature changes and hydrofluoric acid is virtually the only material that will attack it. With wall thicknesses of 10-30 mm, the risk of breakage is negligible, if used correctly.

GRAPHITE is used for the construction of sur-face condensers and jet pumps in all cases where the usual corrosion and acid proof materials are not resistant enough. On account of its excellent thermal conductiv-ity and its high resistance to temperature change, graphite is ideal for heat exchang-ers and jet pumps. Gas-tightness is achieved by means of impregnation. Jet pumps made of graphite and operated in vacuum below 3 mbar can be heated to eliminate ice for-mation. As surface condensers, block heat exchang-ers, shell-and-tube heat exchangers or also plate heat exchangers from graphite of all commercial makes are used which are suit-able to condense vapours under vacuum.

STANDARD CONSTRUCTIONS are supplied for suction capacities of 1 kg/h to 10 kg/h at suc-tion pressures from 1 to 10 mbar; thereby meeting most requirements. Pumps are con-structed as modular units from standard ele-ments.

SPECIAL CONSTRUCTIONS can easily be built as modular units from standard parts. By using different combinations of standard parts, most intermediate duties are attainable.

SPARE PARTS for porcelain jet pumps and con-nection lines are mainly constituent parts of our standard types and are, therefore, gener-ally available from stock.

Fig. 2
5-stage steam jet vacuum pump in corrosion-resistant design
Materials: jet pump in porcelain, mixing condensers in C-steel enamelled
Suction capacity: 5 kg/h of air from 2.5 mbar abs.

Fig. 3
4-stage steam jet vacuum pump with surface condenser Materials: porcelain and graphite
Suction capacity: 22.7 kg/h from 16 mbar abs.

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