

# VERTICAL PUMP IN CANTILEVER DESIGN MADE FROM METAL TYPE RCEV

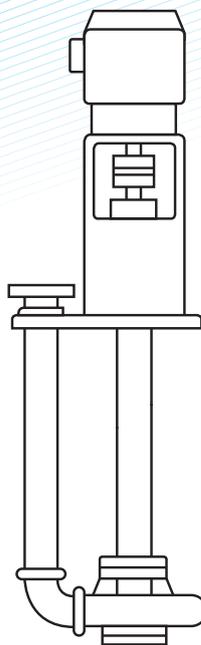
Pump type VS 5  
according to  
API 610  
11th edition/  
ISO 13709:2009

The FRIATEC-Rheinhütte pump range historically originated from applications in the chemical industry. Highly corrosive media requires the use of various materials of construction such as metallic alloys, exotic materials, plastics and ceramics.

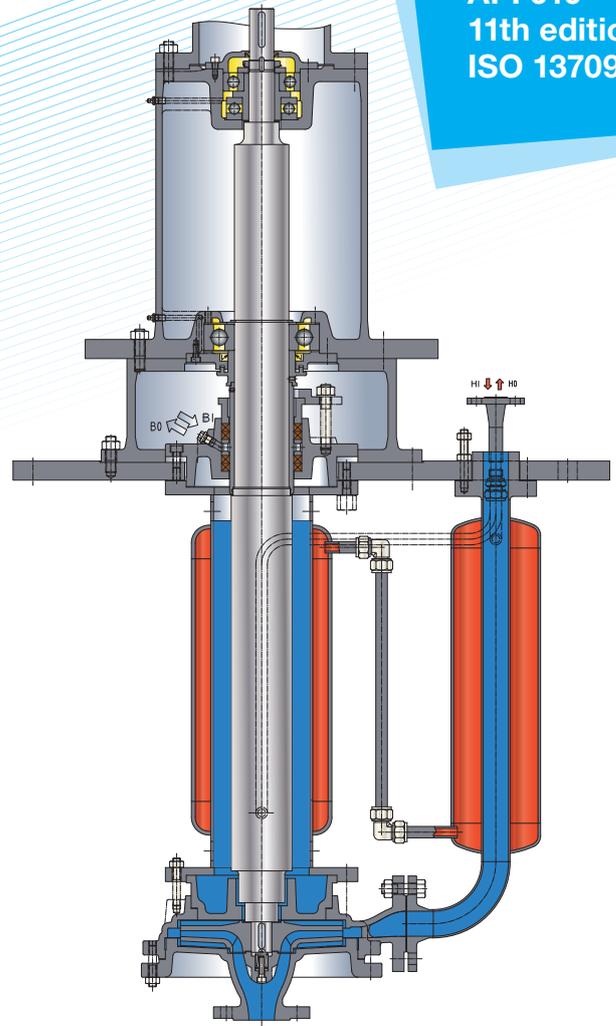
The use of such different materials in conjunction with the nature of corrosive, abrasive or toxic fluids has decisive impact on the design of pumps.

There are few differences between pumps per API 610/ISO 13709 and pumps used in the chemical industry. This standard was issued by the American Petroleum Institute to meet the specific requirements of the petroleum and petrochemical industry such as high system pressures at elevated temperatures while corrosion is not a serious criterion.

FRIATEC-Rheinhütte pump type RCEV is according to API 610 standards and can be classified as a vertically suspended, cantilever sump pump designated as pump type VS5, except for some small deviations, which are mentioned in this document.



Pump type  
API 610  
VS 5



Pump type  
RCEV

# API 610 11<sup>th</sup> edition / ISO 13709:2009

## Comments

Chapter	Designation	Comments
<b>6 Basic designs</b>		
6.1.14	Sound pressure and sound power level are per octave band	Sound pressure and sound power level is only caused by motor and depending on motor size and type (defined by motor vendor). Octave band requires special measuring equipment and is inside buildings at a test bay and technically not a suitable requirement.
6.1.18	Jackets	Due to construction reasons and safety purposes, heating jackets are not equipped with cleanout connections or drains at all. Therefore vertical arrangements inside tanks can only be supplied with steam heating systems.
6.1.29	Bolting and threads	Internal fasteners and bolting sizes according to DIN/ISO standards only, depending on design requirements.
6.3.3 a)	Pressure casing	Twice nozzle loads of table 5 are not applicable in general, because the pressure casing is not directly connected to the external pipe system (submerged arrangement, separate, fixed discharge pipe).
6.5	External nozzle forces and moments	The RCEV has a separate discharge pipe fixed at the sole plate. The values, which are in accordance to ISO 5199 are <u>not twice, but always higher</u> than in API 610/ISO 13709 requested.
6.7	Wear rings and running clearances	RCEV is not designed using wear rings and not requested for VS5 pumps in case of impeller front and back vanes (see chapter 9.3.12.10). Also the minimum diametral running clearances are always <u>larger</u> than any clearance shown in Table 6.
6.9.3.5	Shaft vibration measurement peak-to-peak	A shaft vibration measurement is not applicable due to construction reasons (protected shaft design). Only ball bearing vibrations (RMS) will be provided.
6.9.4.3	Rotor balancing	Balancing is limited to impeller only. Complete rotor balancing is not applicable (shaft design criteria see 9.3.3.1).
6.10.1.2 ff	Bearings and bearing housings	Bearing design details according to manufacturer standard.
6.11	Lubrication	Only grease lubricated bearings due to grease life greater than 2000 h ( $\leq 3000$ h). <u>Grease lubrication</u> is also claimed for VS5 pumps (see chapter 9.3.12.4).
6.12	Materials	Pump materials are not in full compliance with Table H.1. FRIATEC materials in accordance to DIN/ISO with similar or higher standard than API.
6.12.1.12.2	Nace MR0103	NACE MR0175 (also MR 0103) not applicable to liquid sulphur applications (no "wet" H <sub>2</sub> S service).
<b>8 Inspection, testing and preparation for shipment*</b>		
8.3.4.3	NPSH required test	<u>Not applicable for vertical submerged pumps.</u> Minimum submergence test on request.
<b>9 Specific pump types</b>		
9.3.3.1	Total indicated runout of shafts (TIR)	TIR is <u>only 20 µm/m</u> instead of 50 µm/m of length and therefore <u>better than required !!</u>
9.3.8.1.1	Reverse rotation	Pumps and motor assemblies are not designed with non-reverse ratchets. RCEV may run under reverse rotation for several minutes.
9.3.12.7	Discharge nozzle according to 6.3.3	See 6.3.3 a) and 6.5 comments.

\* FRIATEC AG-Division Rheinütte Pumpen has internal procedures for inspection and testing which can be provided. Performance test is normally done in accordance to ISO 9906 grade 2B. All other inspection and testing requirements shall be basically discussed regarding use and feasibility.

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