


CASE STUDY

## Long-term successful collaboration with major fertilizer producer

One of the world's top fertilizer producers operates a big fertilizer complex in South America. A few years ago, the company started an expansion project that includes three additional phosphoric acid concentration lines. Sulzer was selected to supply the critical evaporator circulation pumps.





“The circulation of the phosphoric acid in the concentration loop is a critical application, where state-of-the-art practices have to be applied. Our successful cooperation started in 2004 with the supply of two axial flow pumps, and the customer recently ordered the seventh pump. The close technical collaboration is valuable.”

Henrique Botura, Sales Manager at Sulzer

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### The challenge

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For this application, the technical challenge was to select the right hydraulics to match the duty point while allowing a certain flexibility due to crystallization and scaling that will take place in the loop.

The constraints of the evaporator circulator are:

- 50-52% P2O5 acid with contaminants (sulfates, chloride, fluorine, ≈ 4-5% solids)
- Maximum operating temperature of 90°C
- High flow and low head
- Margin on minimum flow for flexibility in operation
- Fixed speed

### The solution

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Sulzer selected the best pump size and propeller design for optimal benefits:

- Size of the casing for an acceptable linear velocity.
- Propeller design allowing a sufficient margin on the minimum flow with an operating point close to the BEP.
- Adapted mechanism guaranteeing perfect performance and lifetime of the mechanical seals as well as trouble-free bearing operation.

The material of construction is SS904L, which is a common material for this kind of application. Its asset is a good corrosion resistance in most P2O5 applications. The higher-grade alloy 28 selected for the wear ring and the propeller will prolong the lifetime of these parts that are subject to higher wear. Finally, the shaft made of Super Duplex SS is the best option in terms of mechanical properties.

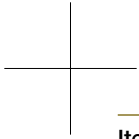
### Customer benefit

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The evaporator circulation pump is the key rotating equipment of the concentration unit. A failure of this equipment will stop the production process. That is why long-term successful experience with specific equipment is so important. It brings comfort and eases the life of the operators.

In this specific pump design, the pump casing is welded. It is more expensive than a cast casing, but the undeniable advantage is the inherent higher quality of the surface and the homogeneity of the laminated materials. This has a significant impact on the corrosion resistance of the equipment. In this application, the corrosivity of the product is an important criterion for the lifetime of the pump. The original construction includes a replaceable wear ring. Also here, the investment is a bit more expensive. The advantage, however, is that this solution avoids heavy and costly maintenance, as the area of the casing located at the propeller will inevitably be worn. Because the efficiency of the pump is directly affected by the clearance between the tip blades and the casing, this is a parameter that cannot be disregarded.

Long-term technical collaboration with an experienced supplier is a real advantage for the plant operators. They know that the equipment is working well under similar conditions, and the maintenance teams are familiar with it. The support from the equipment supplier is valuable, and the operators can feel comfortable even if the operating parameters would be changed for new orders.



<b>Item</b>	<b>Description</b>
<b>Application</b>	Evaporator circulation pump
<b>Liquid</b>	50% phosphoric acid @ 86 (°C)
<b>Flow</b>	< 12'000 (m <sup>3</sup> /h)
<b>Pump type</b>	CAHRM1000F
<b>Material of construction</b>	Casing in EN-WN 1.4539 Propeller and wear ring in EN-WN 1.4563 Shaft in Super Duplex SS (PRE40)
<b>Nominal speed</b>	430 (RPM)
<b>Lubrication</b>	Grease
<b>Motor</b>	590 (kW) – 4'000 V – 60 Hz (WEG)
<b>Transmission</b>	Gearbox (SEW)
<b>Sealing system</b>	Dual mechanical seal (John Crane P32+R33) with safe unit
<b>Accessories</b>	Sulzer Sense with Gateway (instrumentation)

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**For any inquiries please contact**

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