

# Ceramaret: Precision Parts Made from Advanced Ceramics for Analytical and Medical Components and More

The outstanding qualities of advanced ceramics make them ideal for use in high-tech applications such as analytical and medical instrumentation. Besides being very hard, ceramic materials are inert, resistant to aggressive solvents, biocompatible, insulating and resistant to both high temperatures and highly abrasive fluids.



Fig. 1  
Ceramic plungers and valve components used in HPLC instrumentation (source: Ceramaret)

## High-performance liquid chromatography (HPLC) instrumentation

Ceramaret SA in Switzerland has developed tremendous experience in the manufacturing of precision parts made from advanced ceramics. One of Ceramaret's areas of expertise is the manufacturing of

### Keywords

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complex high-precision parts used in high-performance liquid chromatography (HPLC) instrumentation. Cylinders and plungers made from advanced ceramics are used in the pumping systems of HPLC units, which must be able to reach very high pressure, mainly to overcome the flow resistance up to the chromatographic column. These parts are first pressed from high-grade ceramic powders and sintered into near-net-shape blanks which are then

machined to customer specifications, within microns of geometric tolerance and with outstanding surface finishes. In some applications, sapphire can be specified for the plunger of the pumping system, which is also manufactured by Ceramaret. Sapphire or ceramic plungers are also used in other fluidic systems, for instance in precision biomedical liquid dispenser systems. Other important components of the HPLC pumping system are the high-precision flow valves mounted at the head of the cylinder to coordinate and direct the solvent flow, e.g. an inlet valve to let the liquid into the cylinder during the suction travel of the plunger and the discharge valve allowing the discharge of the fluid to the chromatographic columns during the forward stroke of the plunger. Ceramaret manufactures high-precision check valves either as separate elements (seats and balls) or pre-mounted in cartridges. The company manufactures both single and

Ceramaret SA  
Small precision parts in Advanced  
Ceramics  
Rue des Croix 43  
CH – Bôle  
Switzerland

[www.ceramaret.ch](http://www.ceramaret.ch)  
[info@ceramaret.ch](mailto:info@ceramaret.ch)



Fig. 2  
High-precision seats and balls, complete check valve cartridges (source: Ceramaret)

double valve cartridges depending on the application. All check valves can undergo a standard leak test according to specific customer requirements.

Another key fluidic component in HPLC instrumentation is the high-pressure distribution valve, which also requires high-precision ceramic parts. Once again, the distribution rotor and stator are machined to outstanding geometric tolerances (flatness) to guarantee the tightness of the valve and precise fluid distribution.

#### Medical instrumentation

With regard to medical instrumentation, Ceramaret manufactures high-quality ceramic insulator tips for various medical endoscopes. The specific ceramic material for these particular insulators is an yttria stabilized zirconia (YTZP). This material is very hard and resistant, capable of withstanding shocks and strong mechanical abuse. All insulators are machined to tolerances of a few microns according to specific customer requirements.

Ceramaret has enjoyed continuous growth and recently inaugurated two new production buildings on its site in Bôle near Neuchâtel/CH. These new additions have increased the available manufacturing area to 8000 m<sup>2</sup>. Besides a growing interest in ceramic parts, this continued success is

due to the company's basic attention to customer expectations throughout all the steps of the value chain. This starts with the strong involvement of an engineering team to help customers identify the best design to allow full expression of the basic ceramic properties for the particular customer assembly, and all at a minimal cost. Quality and traceability are priorities at Ceramaret and the company is certified to ISO-9001, ISO-14001, ISO-13485 and OHSAS-18001. It also works closely with customers on specific quality aspects and

requirements. Last but not least, strong emphasis is placed on the logistics service provided to customers, to simplify and optimize their complete sourcing process.

Additional growth is expected in other important strategic fields (sensor technology, automotive, avionics, oil and gas, etc.) and Ceramaret is also actively promoting the substitution market for advanced technical ceramics, an area where this exceptional material could improve the performance and durability of many products.



Fig. 3  
Complex shaped insulator tips for endoscopes, machined to customer specifications (source: Ceramaret)

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