United Global Sourcing Incorporated

INVESTMENT CAST INDUSTRIAL COMPONENTS

Stainless Steel Pressure Socket Switch

APPLICATION

Oil and gas: Pressure gauges

MATERIAL

ASTM A351 Gr. CF8M stainless steel

MANUFACTURING PROCESSES

Investment casting
Surface preparation (deburring, cleaning)

REQUIRED TESTING

Material certification
Hardness
Porosity detection (section/micro-polish)

TOLERANCES

General Tolerances
- Linear ± 0.010 in
- Angular ± 1 in

As-cast General Dimensioning and Tolerancing (GD&T)
- Position within 0.015 in
- Flatness within 0.010 in
- Perpendicular within 0.015 in

Challenge: WIKA, a leading supplier of pressure gauges to the oil and gas industry, approached UGS with the need for cost savings on a stainless steel socket switch used in pressure gauges on natural gas lines. While the company has an in-house factory, they believed they could gain a larger cost savings by working with us.

The design of the socket switch produced a number of challenges, particularly because of the very difficult as-cast tolerances for the size, location and perpendicularity of two small holes located on either side of the center shaft. The accuracy and precision of these holes are crucial to the mounting and functionality of a critical sensor. Any misalignment could cause the sensor to fail, potentially resulting in over-pressurization of the gas line.

Furthermore, because natural gas flows through the center shaft of the socket switch, the specifications required zero porosity to prevent gas leaks.

Solution: We started by reviewing the capabilities of our casting partners to identify one who could reliably meet the tight as-cast tolerances in the specified stainless steel. Working with this partner, we developed, validated and implemented a proprietary process to maintain the size, placement and perpendicularity of the small mounting holes during the casting process. We also engineered a highly reliable gating system to maximize yield while ensuring proper filling and solidification to eliminate porosity.

To guarantee each batch of pressure socket switches met the zero-porosity requirement, we implemented a quality assurance program that includes sectioning, micro-polishing and analyzing one out of every 200 parts. We also established a gauging process to confirm the components met the necessary as-cast dimensional requirements.

Ultimately, UGS won the business after providing the prototypes ahead of schedule and exceeding WIKA's expectations for cost savings. Since winning the business, UGS has maintained the initial quality, boasting on-time delivery higher than 98 percent and cost of quality less than 1 percent.

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