PRECISION CERAMIC COMPONENT

Ceramic Measuring Tube Assembly

For electromagnetic flowmeter manufacturers and OEMs



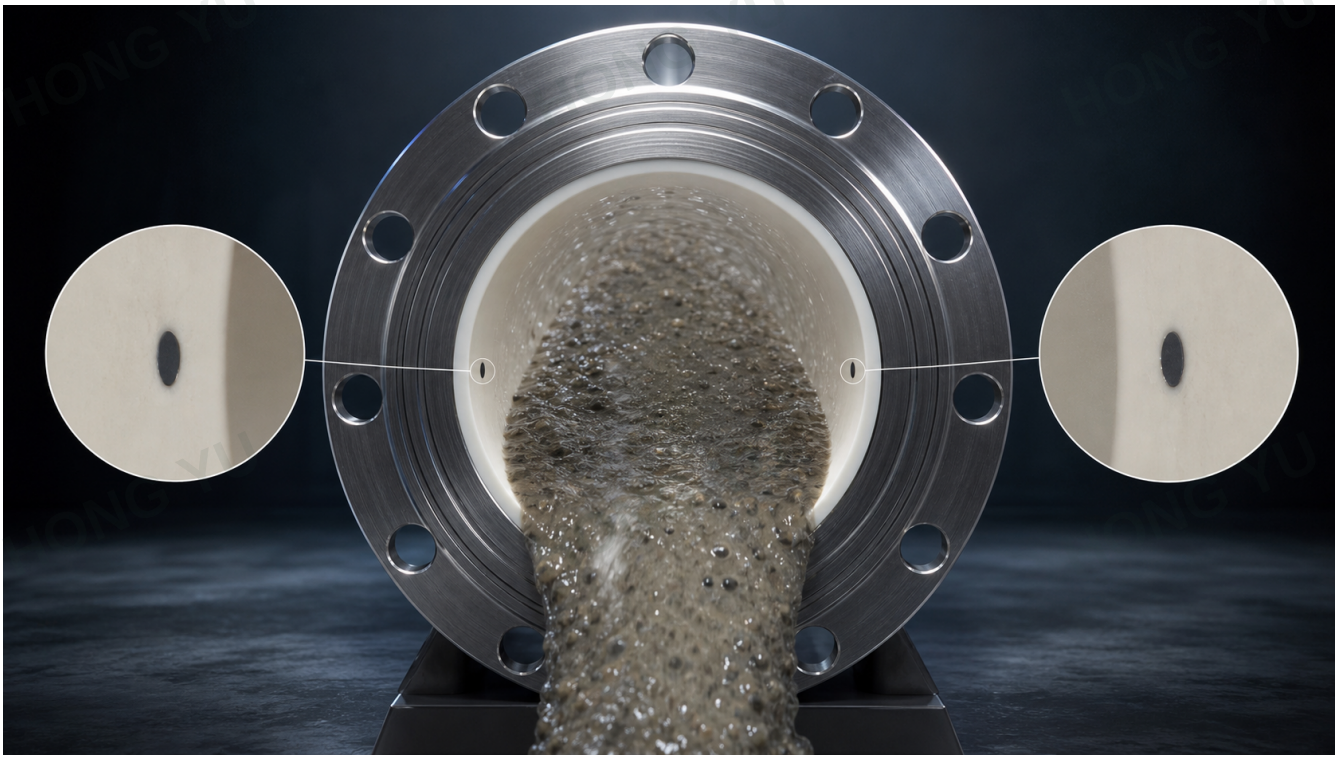
HONG YU (HAINAN) NEW MATERIAL TECHNOLOGY CO., LTD.

DEMANDING PROCESS MEDIA

A smooth bore for demanding process media

The finished ceramic measuring tube assembly is designed for integration into electromagnetic flowmeters used with demanding industrial process media.

The ceramic flow path combines a smooth bore surface with flush measuring electrodes. This supports a clean, even internal measuring profile across demanding conductive process applications.



Hard ceramic surface	Dense alumina structure	Flush electrode profile
Mohs 9 and Vickers hardness around 1800 HV0.5 provide a hard internal surface for demanding process service.	High-purity alumina ceramic with dense, low-absorption material characteristics supports a stable measuring bore.	Small through-wall electrodes remain level with the ceramic bore rather than creating a raised or recessed flow-path feature.

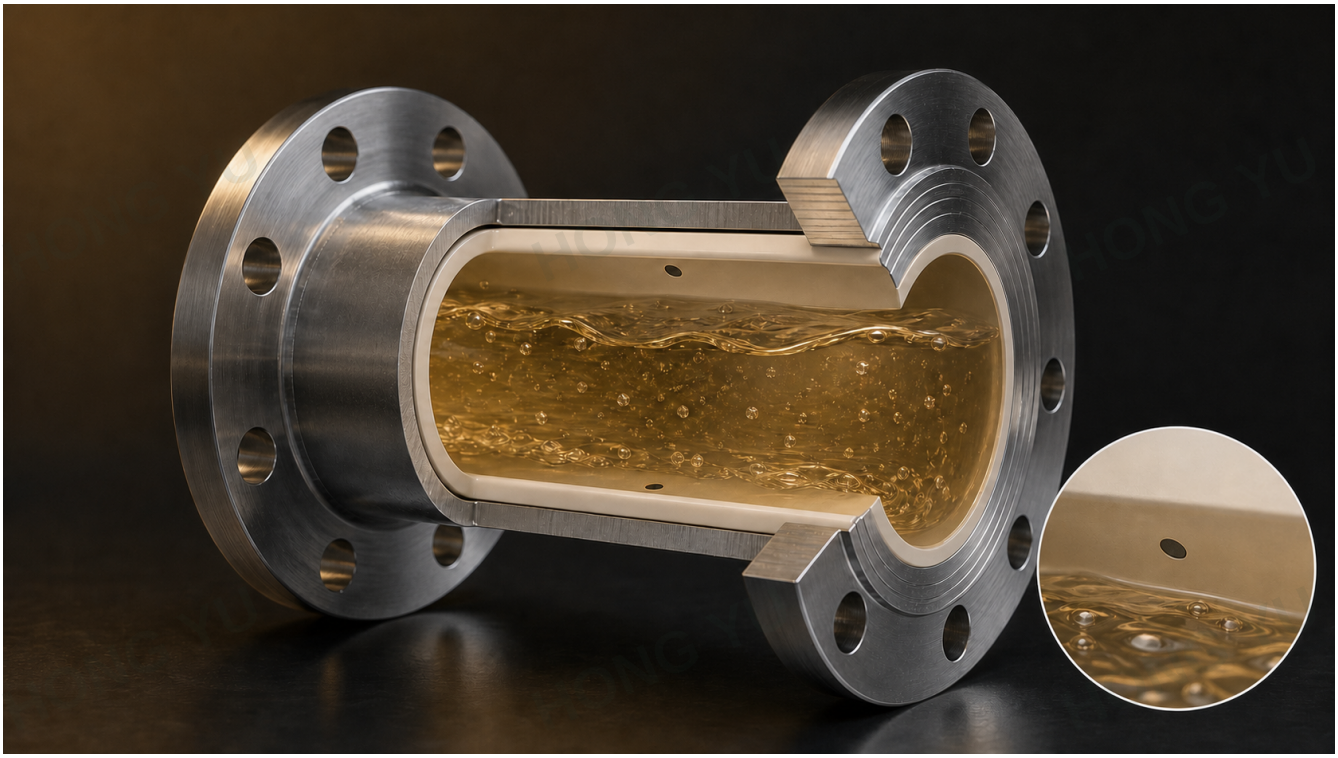
ENGINEERING INPUTS FOR OEM INTEGRATION

Tube geometry Share nominal diameter, connection standard, face-to-face length and available installation space.	**Operating conditions** Confirm the process medium, concentration, temperature, pressure, vacuum and cleaning conditions.	**Electrical interface** Confirm the electrode quantity, cable connection layout and instrument architecture.

CHEMICAL SERVICE

Strong acid and alkali applications

Ceramic measuring tube assemblies can be configured for demanding chemical process media. Application suitability is evaluated according to the actual medium, concentration, temperature and operating conditions.



Representative media
Hydrochloric acid, sulfuric acid and sodium hydroxide are representative chemical service categories for application review.

Flush internal interface
The ceramic bore and electrode face form an even internal measuring surface without adhesive-bonded pockets.

CHEMICAL SERVICE REVIEW

Medium chemistry
Identify acid, alkali, salt, solvent and impurity content. Representative examples include hydrochloric acid, sulfuric acid and sodium hydroxide.

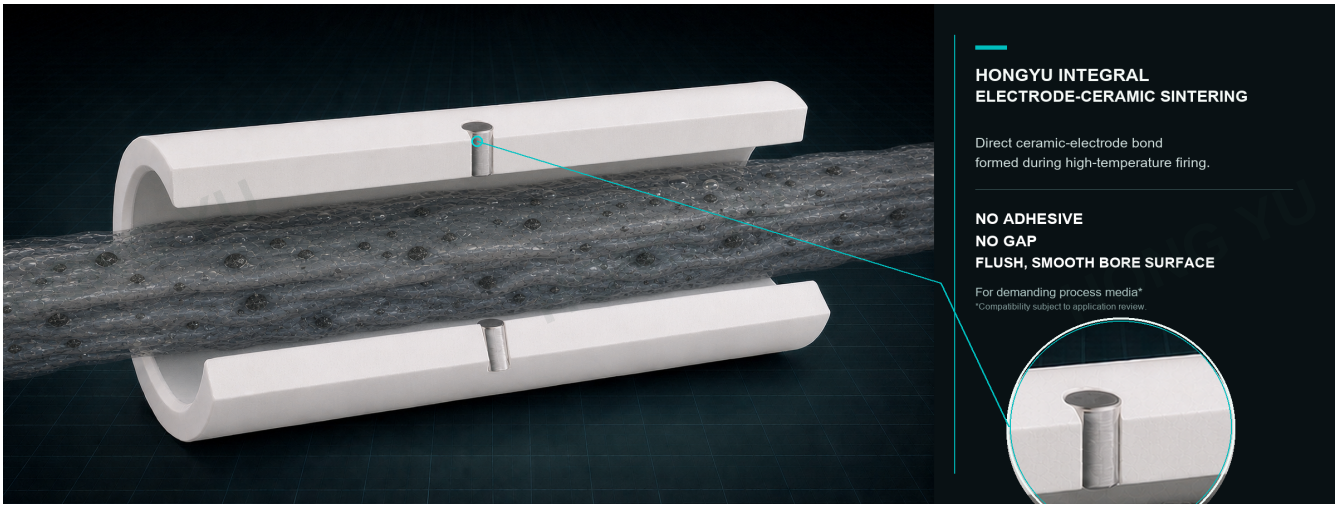
Thermal and pressure conditions
Confirm normal and abnormal temperature, pressure, vacuum and thermal-shock conditions before final material selection.

Solids and viscosity
Confirm solids loading, particle size, hardness, viscosity and expected abrasion level for the complete flow path.

PRECISION AT THE ELECTRODE INTERFACE

Integral electrode-ceramic sintering

Hongyu uses a high-temperature integrated sintering process to form a direct ceramic-electrode interface. The electrode face remains flush with the smooth ceramic bore surface.



No adhesive, no gap
The electrode passes through the ceramic wall as a continuous integrated element, without an adhesive-bonded interface in the measuring bore.

Protected technical know-how
Electrode material selection and process details are evaluated confidentially according to the application requirements.

DESIGN DETAILS

Through-wall electrode
Each small circular electrode passes through the ceramic wall. Its inner and outer faces are exposed and flush with the corresponding ceramic surfaces.

Smooth measuring bore
The internal electrode face is level with the ceramic bore to avoid a raised point, recessed pocket or adhesive-filled interface in the flow path.

Electrode configurations
Two opposing flush electrodes are standard. Three or four electrodes are options subject to project review and confirmation.

Finished integration component
Hong Yu supplies the assembled ceramic measuring tube, steel shell, flanges and electrical connection points for straightforward OEM integration.

ALUMINA CERAMIC TUBE PROPERTIES

Engineered for the measuring bore

The alumina ceramic measuring tube combines a dense structure, high hardness and stable insulating properties. These material characteristics support the flow-path design of demanding electromagnetic flowmeter applications.

Purity 99% alumina	**Density** 3.90 g/cm³	**Apparent porosity** 0%
Mohs hardness 9	**Vickers hardness** ≥ 1800 HV0.5	**Flexural strength** ≥ 390 MPa
Compressive strength ≥ 360 MPa	**Water absorption** 0%	**Insulation strength** 25 kV/mm
Fracture toughness 5 MPa·m½	**Firing temperature** 1750°C	**Surface condition** Smooth ceramic measuring bore

WHAT THESE PROPERTIES SUPPORT

Abrasion resistance High hardness supports particle-bearing, slurry and mineral-process flow paths.	**Stable flow-path geometry** Dense ceramic, low water absorption and a smooth bore support a stable internal measuring interface.	**Application flexibility** The ceramic tube is reviewed together with the medium, pressure, temperature and complete OEM instrument design.

Engineering note

These properties describe the alumina ceramic measuring tube material. The finished assembly specification is confirmed against the customer's drawing, process medium and operating conditions.

Material options: alumina, zirconia and ZTA, subject to project confirmation.
The table applies only to 99% alumina ceramic.
Test reports are not supplied. Confirm project-specific values separately.

APPLICATION INDUSTRIES

Built for demanding process industries

Hongyu ceramic measuring tube assemblies are intended for flowmeter OEM integration where process media, wear, corrosion, temperature or long-term stability make the measuring bore a critical design point.

Chemical processing
Acid, alkali, salt, solvent and other chemical process streams subject to media compatibility review.

Mining and mineral processing
Ore slurry, mineral slurry, tailings and other abrasive particle-bearing media.

Pulp and paper
Pulp, fiber-bearing process streams and chemical preparation duties.

Water and wastewater
Raw water, process water, wastewater and treatment applications where conductive media conditions are met.

Metallurgy and materials
Mineral handling, metal-processing auxiliaries and industrial slurry processes.

Food, beverage and sanitary process
Application-specific designs where the process medium, cleaning method and temperature conditions are reviewed.

APPLICATION REVIEW BASIS

Medium
Chemistry, conductivity, solids content, particle hardness and viscosity.

Operating conditions
Temperature, pressure, vacuum, thermal shock and cleaning conditions.

OEM integration
Tube geometry, flange standard, electrode quantity and electrical connection arrangement.

From application data to component definition.
For each industry, Hongyu reviews the process conditions and proposes the ceramic measuring tube configuration needed for the customer's flowmeter integration.

MATERIAL COMPARISON

Why ceramic is selected for demanding duties

The material comparison below follows the principal selection logic used for ceramic electromagnetic flowmeter measuring tubes. Final selection must match the actual medium and complete operating conditions.

Selection factor	Alumina ceramic	PFA / PTFE fluoropolymer	Polyurethane / rubber
Hardness and abrasion	Mohs 9 and Vickers hardness ≥ 1800 HV0.5. Well suited to abrasive, particle-bearing process media.	Good chemical resistance and surface quality, but lower hardness and abrasion resistance than alumina ceramic.	Polyurethane can offer good abrasion resistance; rubber grades are selected according to the slurry or water-duty conditions.
Chemical and temperature duty	Good chemical corrosion resistance and thermal-shock capability, subject to actual media and operating-condition review.	Excellent chemical resistance. Thermal expansion, temperature and vacuum conditions require liner-design review.	Polyurethane has limits in temperature and chemical service. Rubber is generally selected for water, mild-acid, mild-alkali or specific duties.
Negative pressure and geometry	Rigid, dense ceramic supports stable geometry, pressure resistance and negative-pressure service review.	For negative pressure or high temperature differences, liner support and expansion behavior need careful engineering review.	Material choice depends on temperature, pressure and compatibility; it should be reviewed for the specific instrument design.
Internal flow surface	Smooth ceramic bore with flush, integrally sintered through-wall electrodes. No adhesive interface in the measuring bore.	Surface condition depends on liner material, processing and electrode construction.	Surface condition depends on selected compound, processing and electrode construction.
Typical selection direction	Demanding slurry, mineral, chemical and stability-critical applications where the measuring bore is a key design point.	Chemical-process duties where the selected fluoropolymer liner is appropriate for the medium and conditions.	Water, slurry or defined process duties where the selected compound meets wear, chemical and temperature requirements.

Note: this table is a technical selection guide, not a universal material ranking. Final material compatibility should be reviewed against the actual operating conditions.

OEM INTEGRATION VALUE

Designed around the measuring interface

For a flowmeter manufacturer, the measuring tube is not simply a liner. It is the process-wetted interface where internal geometry, electrode construction and material behavior meet the instrument design.

WHY FLOWMETER OEMS SELECT THIS COMPONENT

Stable internal geometry
A smooth ceramic bore and flush electrode faces help keep the measuring interface focused on the process fluid rather than a raised or recessed electrode feature.

Integral electrode interface
The electrode passes through the ceramic wall and is integrally sintered without an adhesive interface in the measuring bore.

Component-level supply
Hongyu supplies the ceramic measuring tube assembly for integration by the flowmeter manufacturer, rather than a complete transmitter and meter package.

WHAT THE COMPONENT DELIVERS

Through-wall electrode
Small circular electrodes pass through the ceramic wall, with exposed inner and outer faces flush with the corresponding ceramic surfaces.

Smooth measuring bore
The ceramic bore and inner electrode faces remain level, without a raised point, recessed pocket or adhesive-filled interface.

Dense alumina ceramic
High hardness, dense structure and low water absorption support stable flow-path geometry for demanding duties.

Configured for the instrument
Tube geometry, flange connection, electrode quantity and electrical connection points are defined for the OEM integration requirement.

Start with the process data.
Send the drawing, process medium and operating conditions. Hongyu will review the ceramic measuring tube assembly at component level before your instrument design is finalized.

CUSTOM CONFIGURATION FOR FLOWMETER OEMS

Configured around your instrument

Two opposing flush electrodes are standard. Three- and four-electrode layouts are options subject to project review and confirmation.

2 electrodes Standard opposing configuration for core flowmeter applications.	**3 electrodes** Option subject to project review and confirmation.	**4 electrodes** Option subject to project review and confirmation.

What to send us

Flowmeter drawing or dimensional requirements	**Required electrode configuration**	**Working medium and operating conditions**	**Quantity and delivery requirements**

TYPICAL SUPPLY SCOPE

Ceramic measuring tube Alumina, zirconia or ZTA, selected to suit the project.	**Stainless steel shell** Outer structural shell tailored to the component design.	**Flange connections** Connection standard and dimensional interface reviewed with the OEM.	**Electrical connection points** Prepared connection arrangement for the customer's instrument integration.

OEM PROJECT FLOW

01 | Review Confirm drawing, medium and instrument requirements.	**02 | Define** Agree the tube geometry, electrode layout and connection interface.	**03 | Manufacture** Produce the ceramic and assembled component to the confirmed specification.	**04 | Integrate** Deliver the finished component for OEM assembly and instrument testing.

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Send your drawing or operating conditions for a component-level review.