A Novel Approach to pH, ORP & Ion Selective Industrial Sensor Design and Manufacture - Application Oriented IOTRON™ Customized Analytical Sensors

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Rev. April 2004 – SECTION III SENSOR DESIGN

This Presentation Shall Consist of Four Main Sections:

I: Introduction to ASTI

II: Case Studies - Application Bulletins

III: Sensor Design Overview

IV: Contacting ASTI about your Application

III: Sensor Design Overview

ASTI has four main components to our customizable and modular sensor design. These are:

1) Application specific pH, ORP, Ion sensing elements
2) Solid-state conductive reference Systems
3) Resilient plastic housings
4) Integrated electronic components

By selecting the components for your sensor such that they are most appropriate for your particular application, Our replacement sensors outperform our competitors, often by a factor of two to ten times.

The saving on fewer replacement sensors coupled with lower maintenance costs make ASTI the company of choice for most intensive and ordinary applications.

Our selection of appropriate components is based upon application data that we receive directly from our customers.

Obtaining process information sometimes requires non-disclosure agreements to be signed between ASTI and the customer.

It is ASTI's standard policy that no detail of any customer's process application is revealed to any third party.

ASTI offers several simple options to submit details of your process measurement applications that will be discussed further at the end of this presentation.

Once the application questionnaire form has been submitted and we recommend a suitable sensor, ASTI will support our products with a unique performance guarantee.

ASTI standard performance warranty states:

If you submit a completed application assistance questionnaire with all required information, ASTI will guarantee your satisfaction with our recommended sensor or replace your original sensor with an improved unit at no charge.

1) Application Specific pH Sensing Elements

Our unique and proprietary pH glass formulations and ORP elements enable us to offer unparalleled performance in a wide diversity of applications. Through our experience in a wide range of industries, we stock pH glass sensing subassemblies optimized for:

high HF and saturated sodium amongst other specialized pH glass elements.

1) Application Specific pH Sensing Elements

Our unique and proprietary pH glass formulations and ORP elements enable us to offer unparalleled performance in a wide diversity of applications. Through our experience in a wide range of industries, we stock pH glass sensing subassemblies optimized for:

wide range pH measurements, high and ultra-high temperature applications, high sulfide and other gas media processes, organic solvent systems

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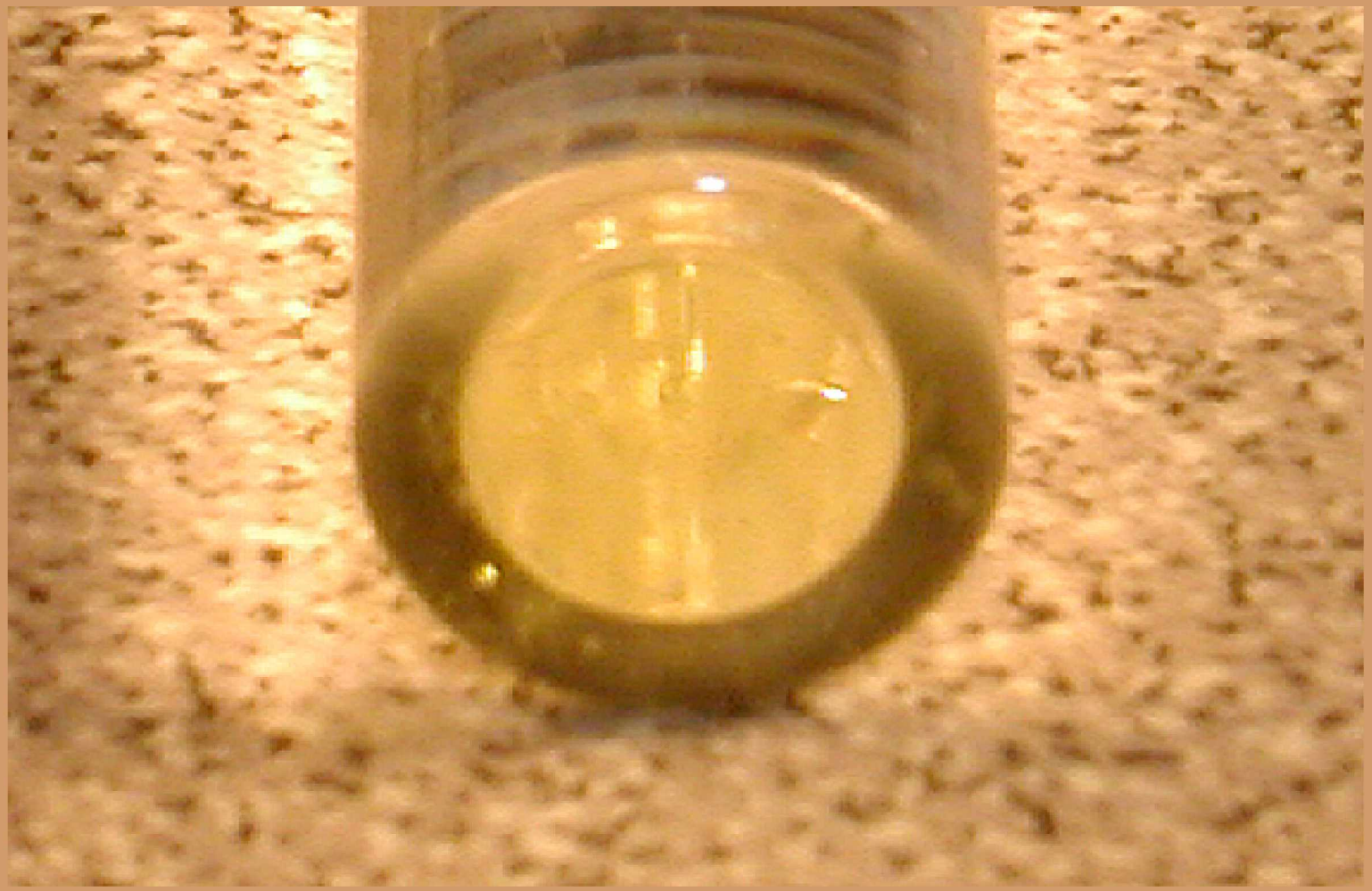
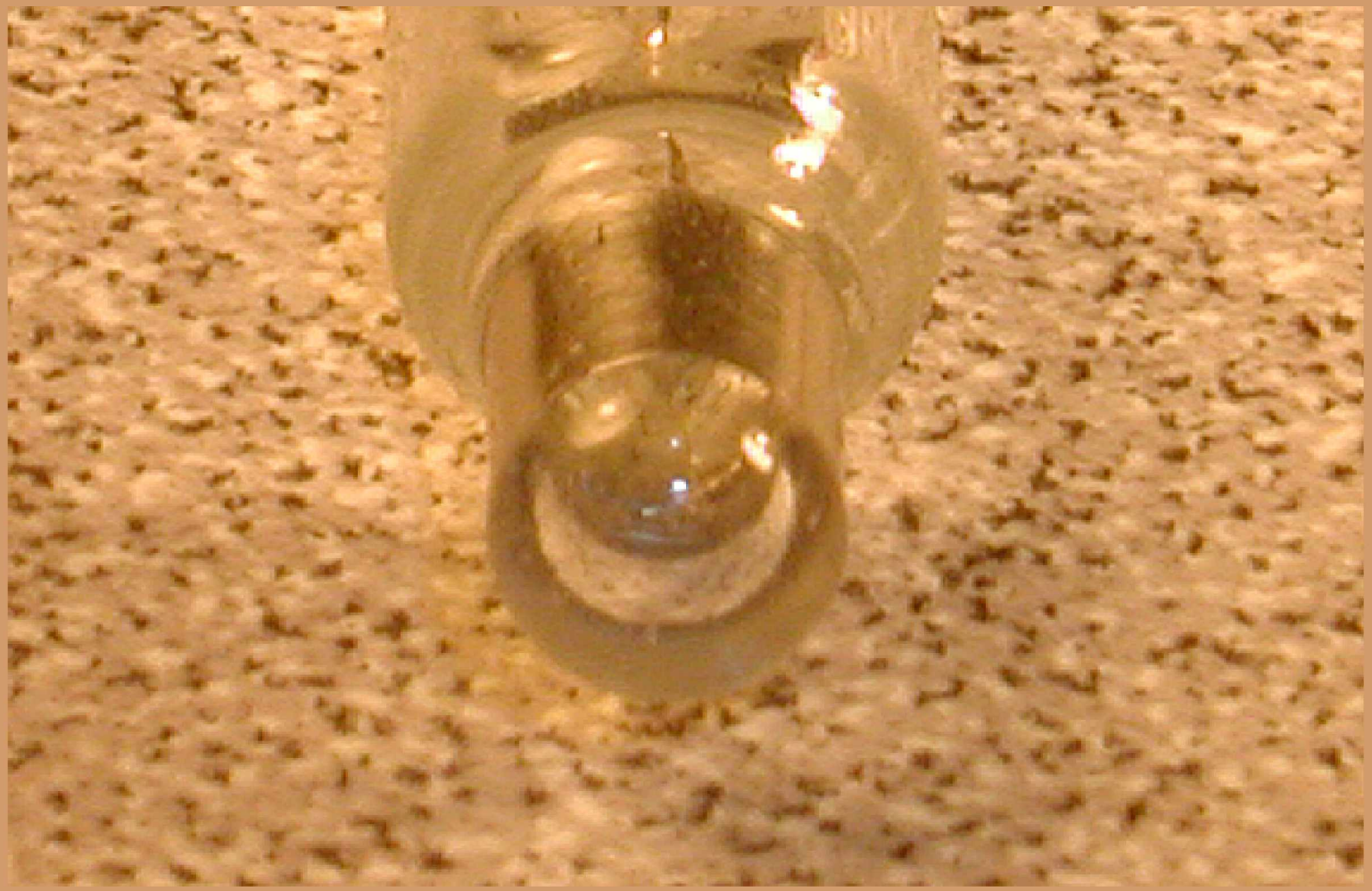


high and ultra-high temperature, high sulfide and other gas media processes, slurry/viscous media applications

1) Application Specific ORP Sensing Elements

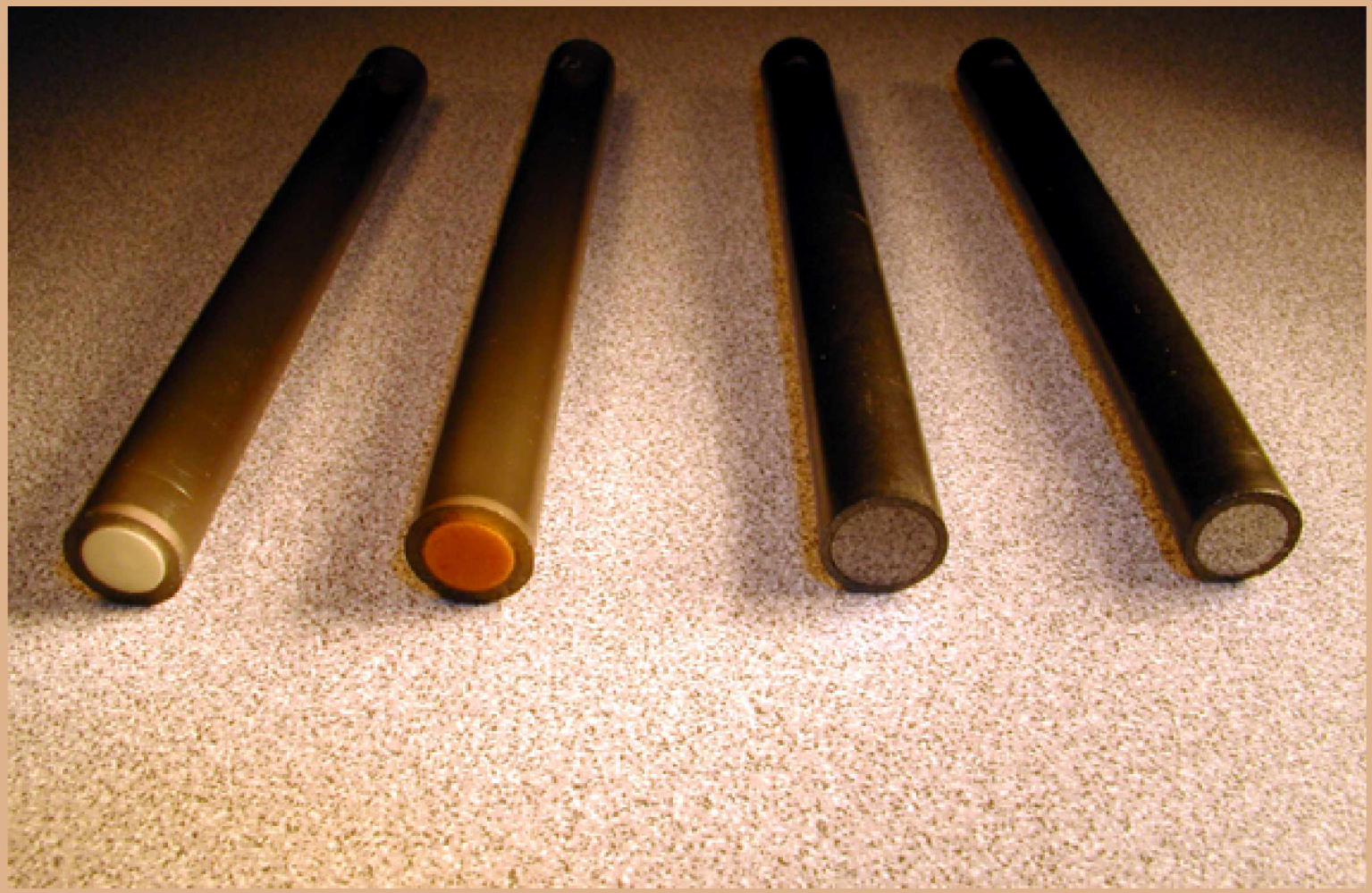
Our unique and proprietary pH glass formulations and ORP elements enable us to offer unparalleled performance in a wide diversity of applications. Through our experience in a wide range of industries, we stock pH glass sensing subassemblies optimized for:



high and ultra-high temperature applications, high sulfide and other gas media processes, organic solvent systems

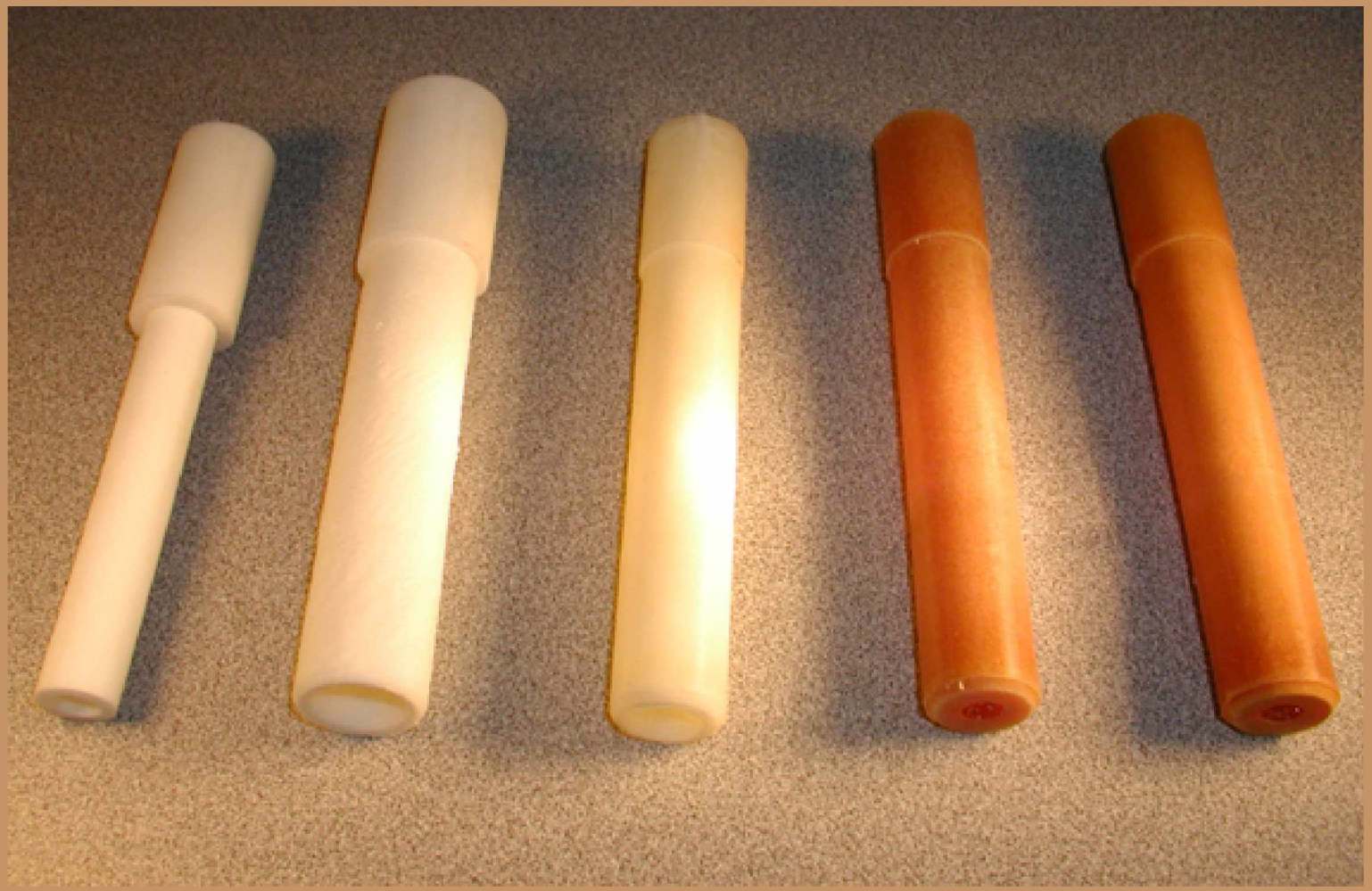
1) Application Specific Ion Sensing Elements

ASTI's novel solid state manufacturing methods allow for ultra-thick, industrial grade ion sensitive PVC and silver precipitate based membranes for significantly longer lifetime, and better performance under heavy and continuous use.



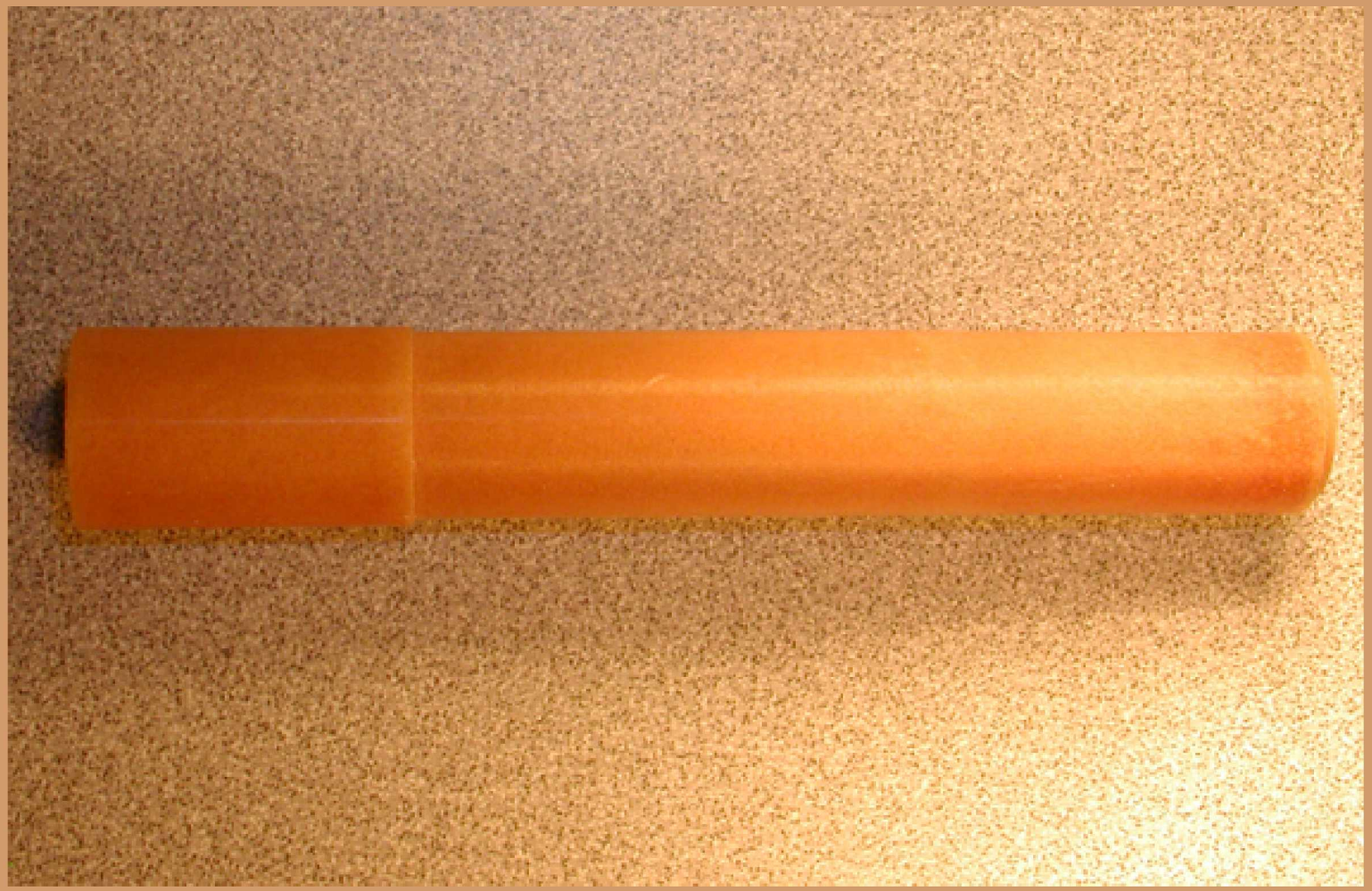
2) Solid-State Conductive Reference Systems

Our solid state ionically conductive reference junction polymers enable accurate pH measurement while permitting minimal process intrusion into the reference system.



2) Solid-State Conductive Reference Systems

This ability to provide high ionic conductivity while preventing aggressive gas intrusion has made ASTI the best performing sensor for the most difficult process control conditions.



2) Solid-State Conductive Reference Systems

Each reference system is optimized for its intended process use, with various salt mixtures and polymer formulations.

2) Solid-State Conductive Reference Systems

Our double and triple junction reference systems have been specialized for high dissolved gas media, high temperatures, organic solvents, high slurry mixtures just to name a few.

3) Resilient plastic housings

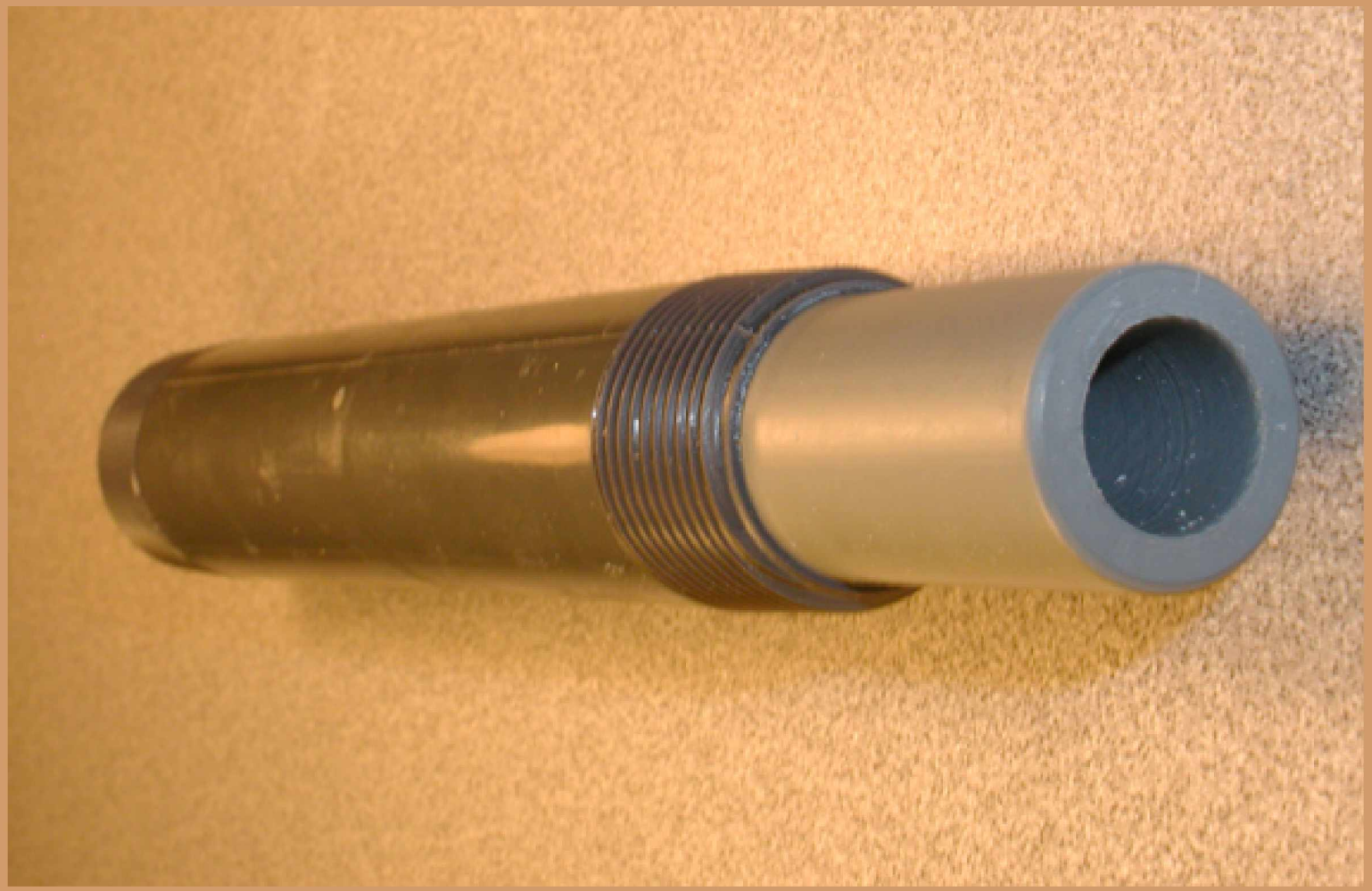
A suitable plastic is chosen based upon the application data that is received from our customers. Our goal is select the most effective plastic option as required for each process measurement. Our plastic selection includes high performance thermoplastics such as GE ULTEM (Poly-Ether-Imide) and Victrex PEEK (Poly-Ether-Ether-Ketone).

3) Resilient plastic housings

A suitable plastic is chosen based upon the application data that is received from our customers. Our goal is select the most effective plastic option as required for each process measurement. Our plastic selection also includes inexpensive PVC and CPVC.

3) Resilient plastic housings

These plastics are available in wide variety of physical configurations to allow us to retrofit the existing installation styles. Among the most common installation styles are ¾”- ¾” and ¾”-1” MNPT immersion. *Shown Below is the 6X11 PVC Series.*



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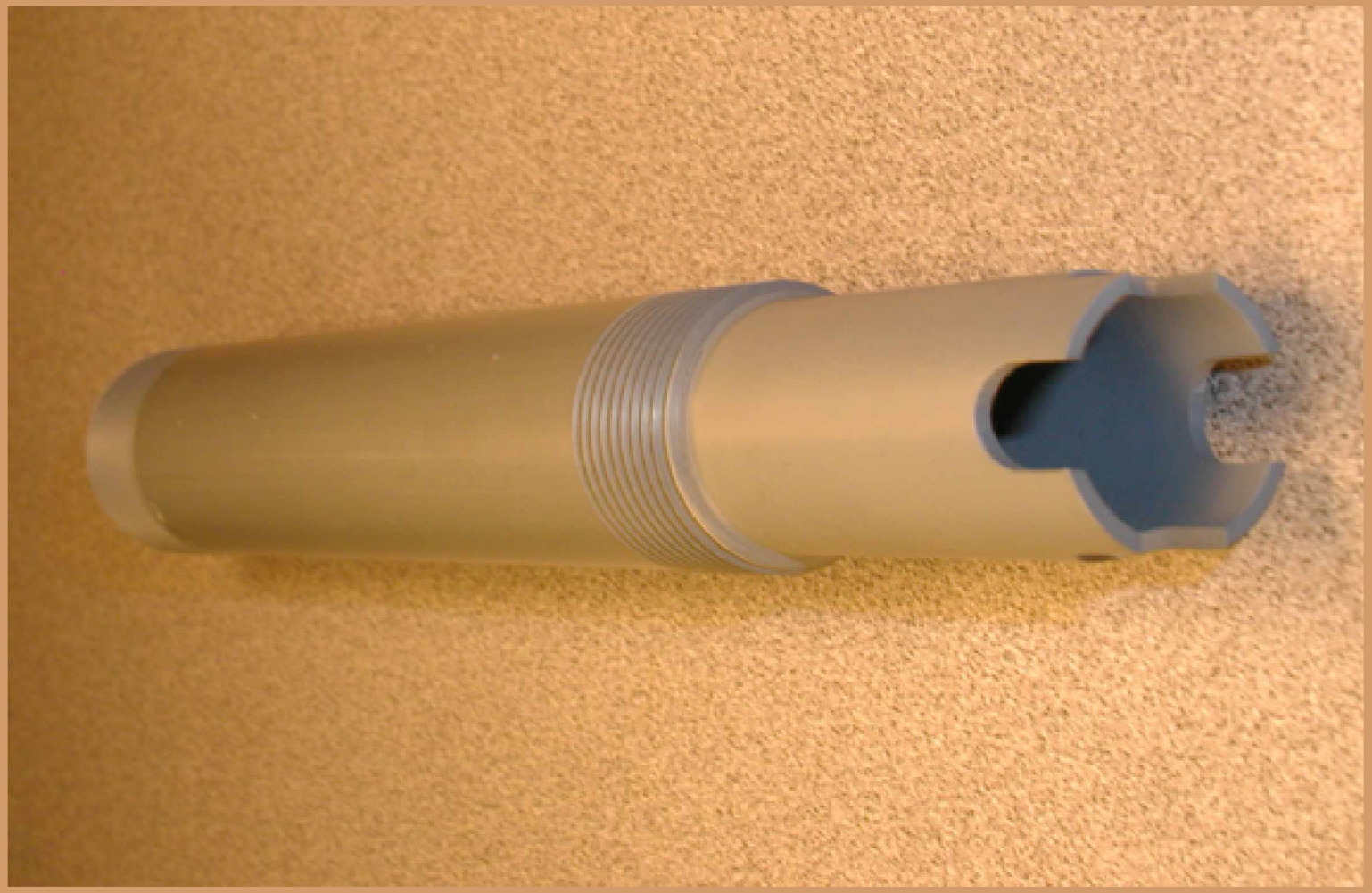
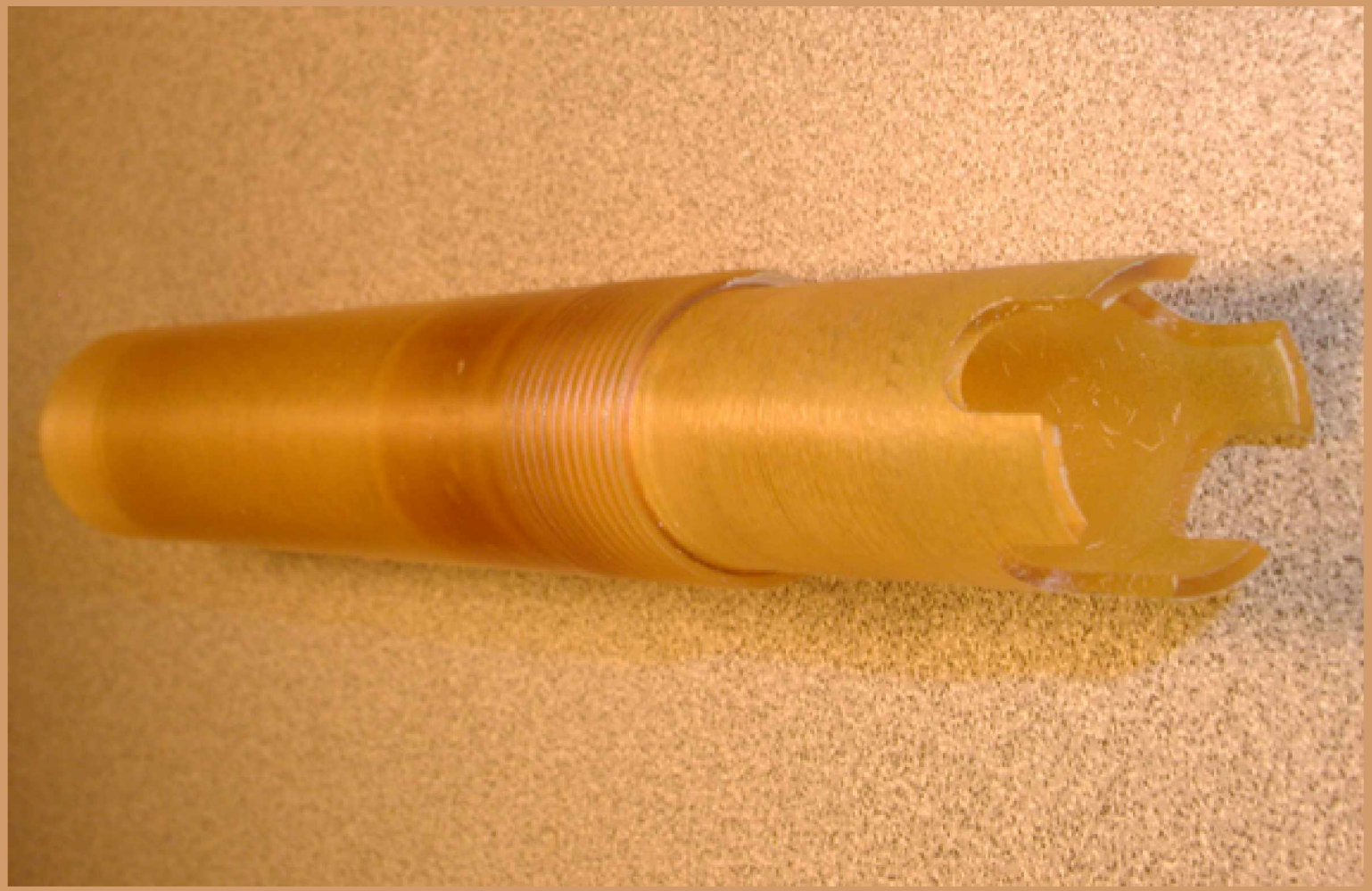


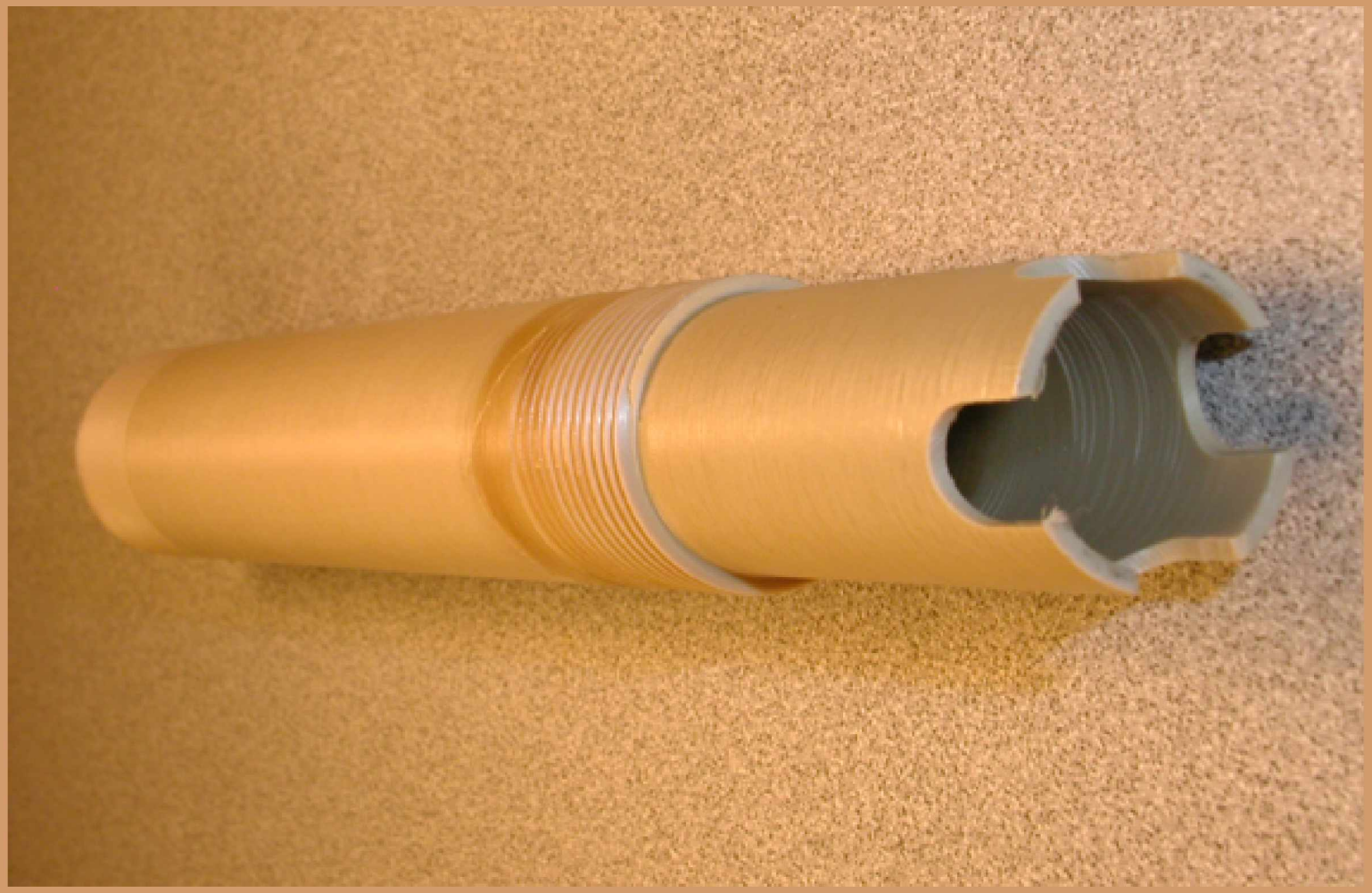
3) Resilient plastic housings

These plastics are available in wide variety of physical configurations to allow us to retrofit the existing installation styles. Among the most common installation styles are ¾”- ¾” and ¾”-1” MNPT immersion. *Shown Below is the 6X32 ULTEM Series.*



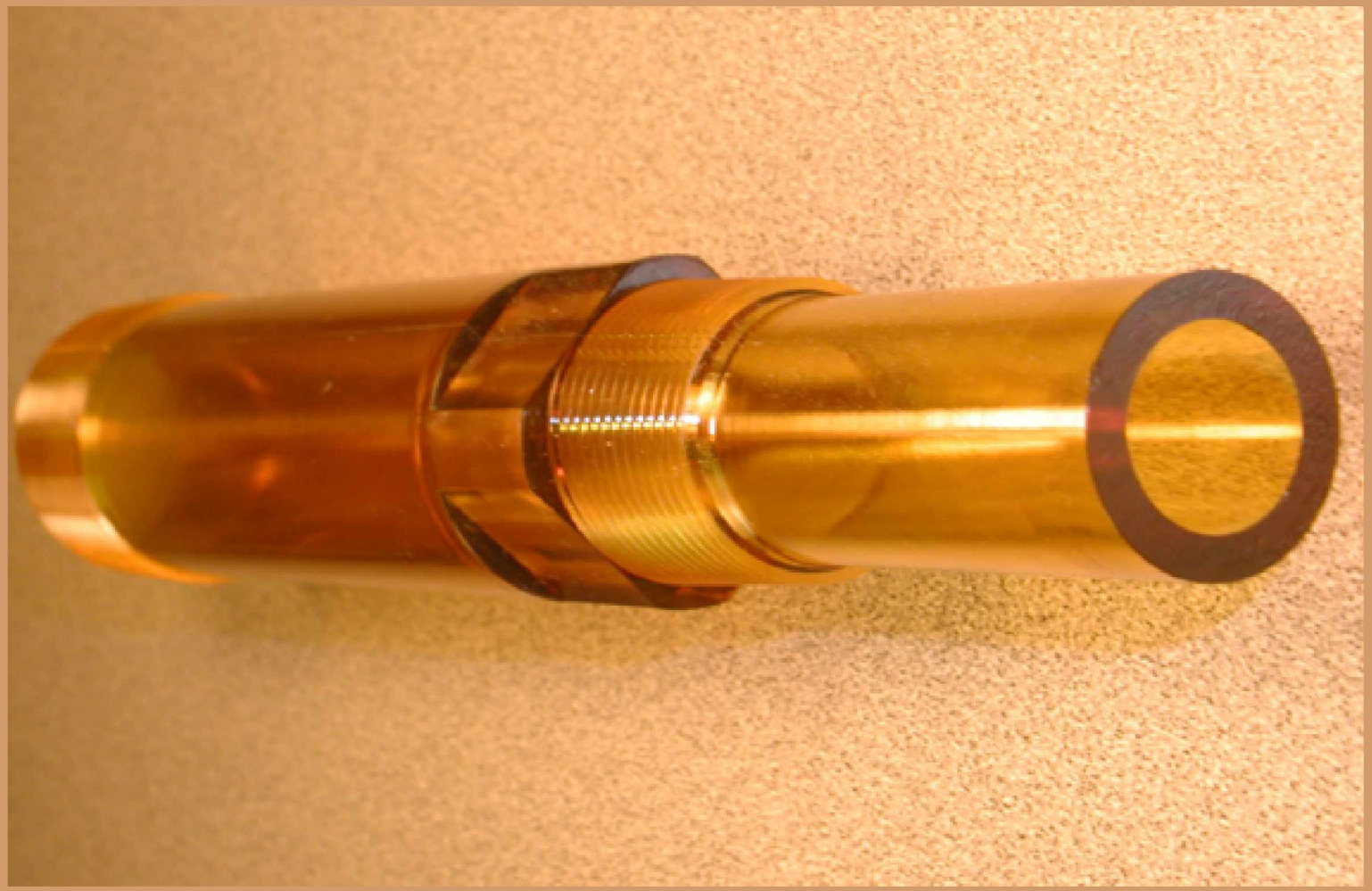
3) Resilient plastic housings

These plastics are available in wide variety of physical configurations to allow us to retrofit the existing installation styles. Among the most common installation styles are ¾”- ¾” and ¾”-1” MNPT immersion. *Shown Below is the 6X42 PEEK Series.*



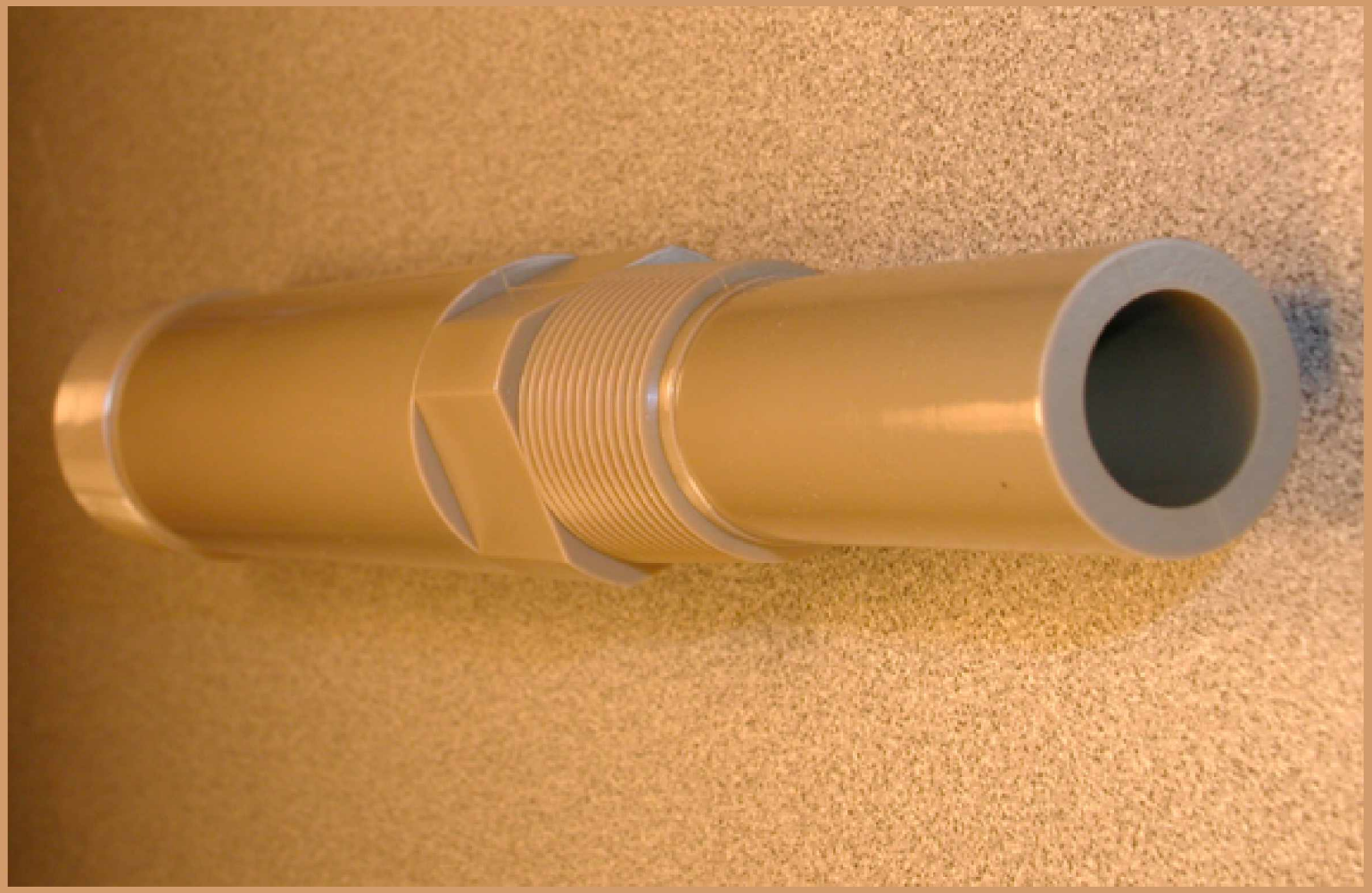
3) Resilient plastic housings

These plastics are available in wide variety of physical configurations to allow us to retrofit the existing installation styles. Among the most common installation styles are ¾”- ¾” and ¾”-1” MNPT immersion. *Shown Below is the 6X31 ULTEM Series.*



3) Resilient plastic housings

These plastics are available in wide variety of physical configurations to allow us to retrofit the existing installation styles. Among the most common installation styles are ¾”- ¾” and ¾”-1” MNPT immersion. *Shown Below is the 6X41 PEEK Series.*



3) Resilient plastic housings

Quick disconnect twist lock bayonet style installations are ideal for low pressure inline systems or ion selective installations or stand pipe installations.

Shown Below is the 8X31 ULTEM Series.

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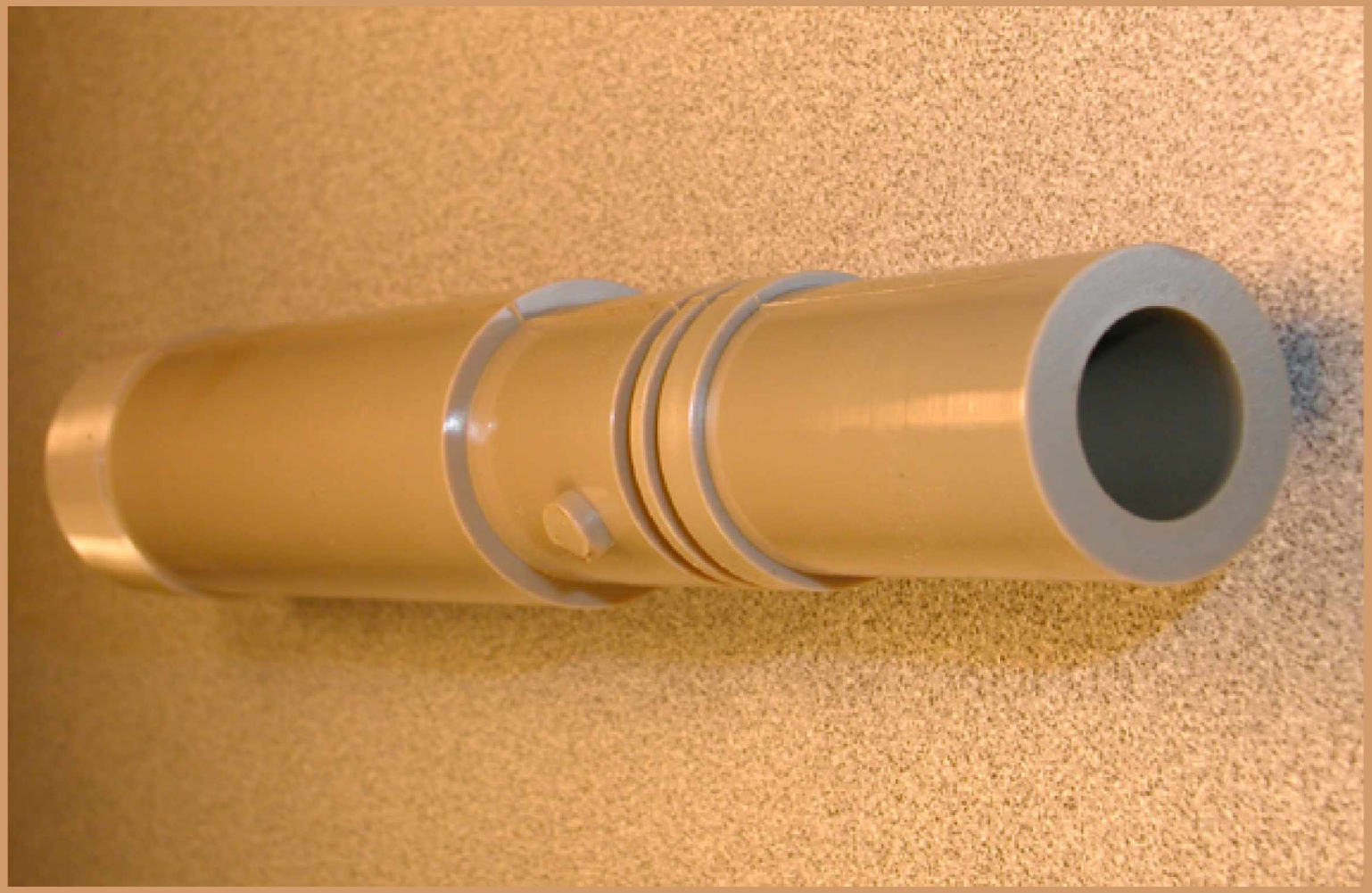
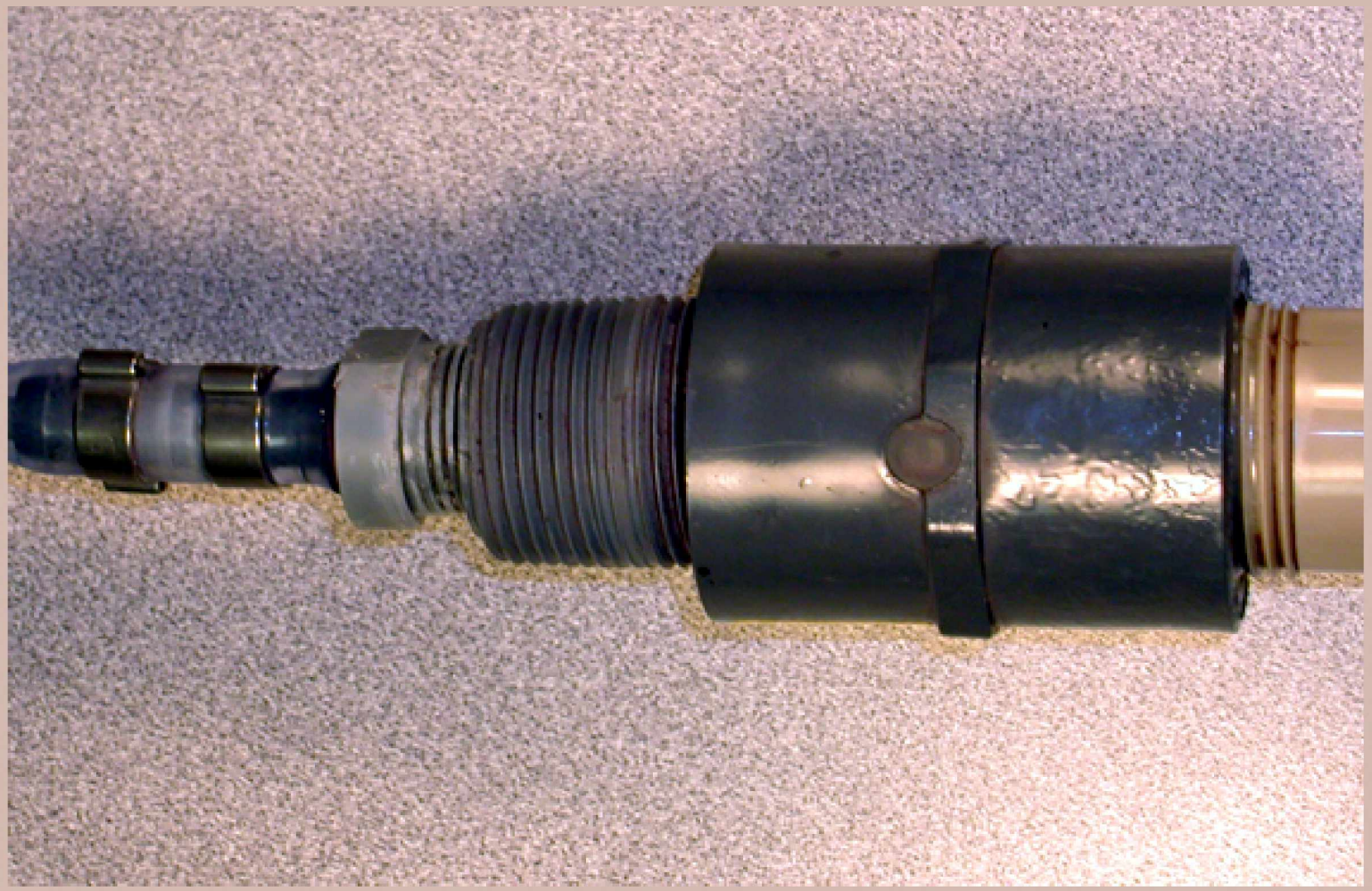


3) Resilient plastic housings

These immersion and twist lock sensors are also available as completely submersible sensors with our various waterproofing options.

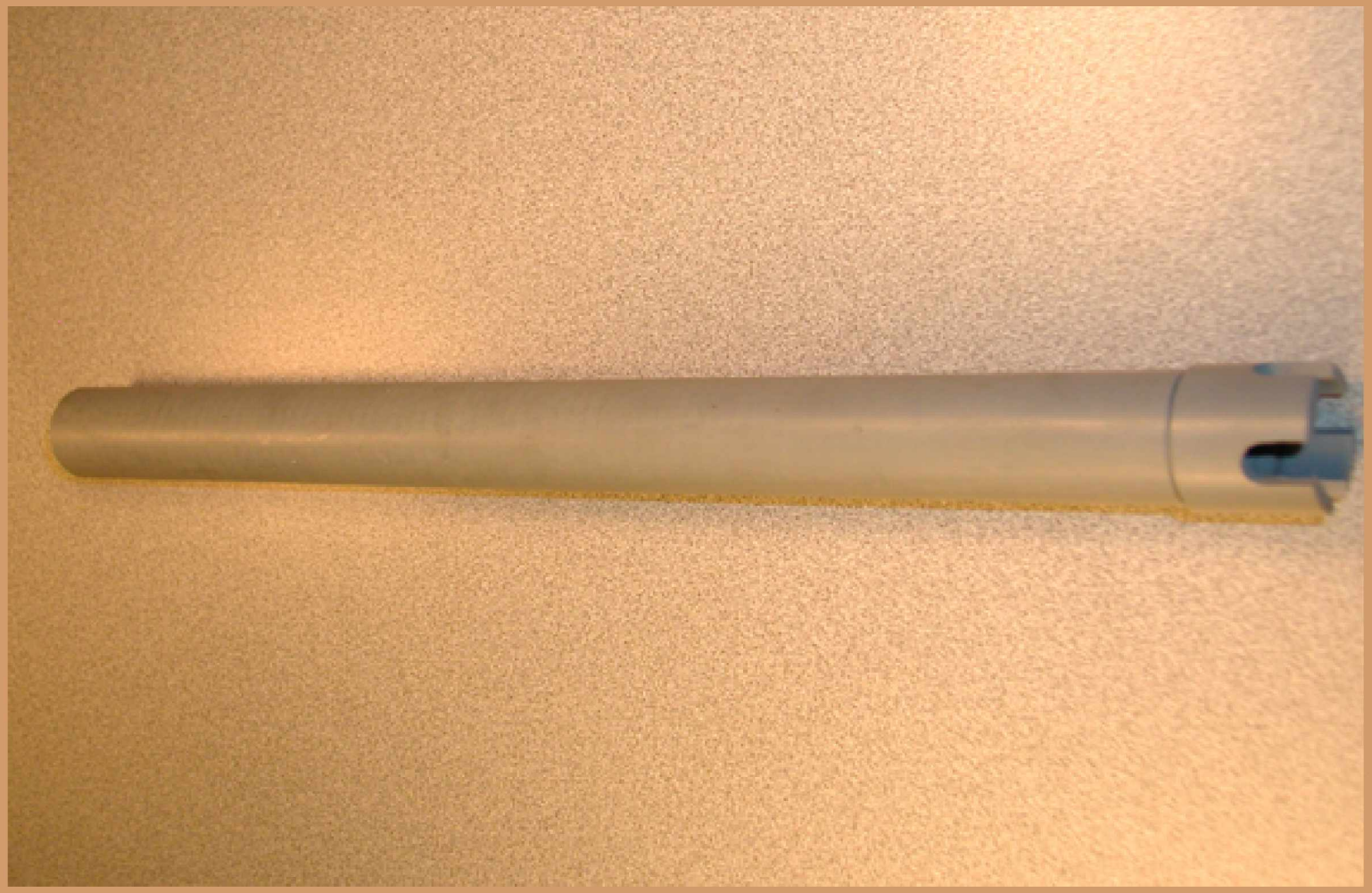
Shown Below is the Waterproofing "B" Series.



3) Resilient plastic housings

Our valve retractable sensors offer a simple single piece design that require little maintenance.

Shown Below is the 9X12 CPVC Series.



3) Resilient plastic housings

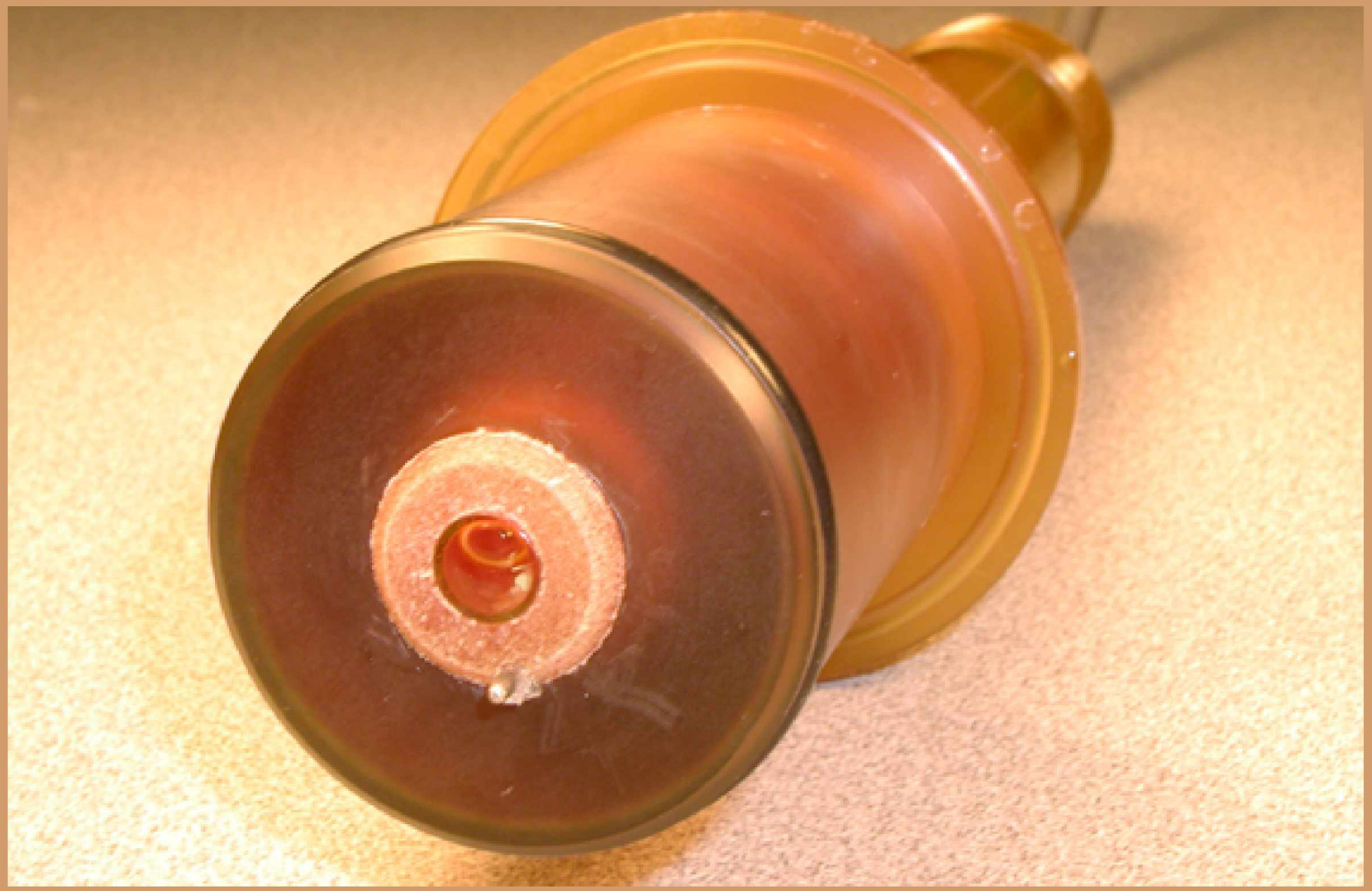
Our valve retractable sensors offer a simple single piece design that require little maintenance.

Shown Below is the 9X31 ULTEM Series.

3) Resilient plastic housings

Sanitary sensors are available for the food, beverage, dairy and pharmaceutical industries.

Shown Below is the 6X31SN ULTEM Sanitary Series.



4) Integrated electronic components

The required electronic components are selected to interface with the currently installed transmitter(s). Namely, the required temperature compensation elements, solutions grounds and preamplifiers are integrated directly into the replacement sensors, as prescribed by the existing instrumentation manufacturers.

Fully Supported Hardware

Electro-Chemical Devices (100% Compatible, FULL SUPPORT)
T-20, T-21, T-27, T-28, T-29, T-30, C-22

Foxboro (100% Compatible, FULL SUPPORT)
870, 871, 872, 873, 874, 875

Leeds and Northrup (Honeywell) (100% Compatible, FULL SUPPORT)
7030, 7075, 7076, 7079, 7081, 7082 , 7083, 7084

Uniloc-Rosemount (100% Compatible, FULL SUPPORT)
1000, 1001, 1002, 1003, 1050, 1181 , 1054, 1054A, 1054B, 1055, 2081, 3081, 81, 54pH/ORP, 54e

Fully Supported Hardware

Endress+Hauser (100% Compatible, FULL SUPPORT)
CPM 223/253, CPM 152, CPM 431

Mettler Toledo (100% Compatible, FULL SUPPORT)
1120, 1140, 2050, 2100, 2220, 2400, 2500, 2800X

TBI-Bailey Controls (100% Compatible, FULL SUPPORT)
TB515, TBN580, TB701/702, TB82pH, TB84pH

Supported Hardware with Known issues

Uniloc-Rosemount (Limited Compatibility, Some Known Issues)
1054, 1054A & 1054B

Great Lakes Instruments (Most models supported, Some minor known issues)
33, 53, 60, 62, 63, 70, 83, 90, 95, 570, 670, 671, 690, 691, 692

Signet (Limited Compatibility, Some Known Issues)
710 et. al., 2720, 9030, 9040, 8710

IC Controls (Limited Compatibility, Some Known Issues)
652, 654, 655, 656

Supported Hardware with Known issues

Johnson Yokogawa (Limited Compatibility, Some Known Issues)
pH/ORP 200, pH/ORP 400, pH/ORP 202, pH/ORP 402

PLEASE INQUIRE FOR ANY INSTRUMENTATION NOT LISTED

4) Integrated electronic components

This allows us to support our OEM compatible pH, ORP and Ion Selective sensors for most major manufacturers such as Great Lakes (GLI), Rosemount (Uniloc), Foxboro, Endress Hauser (E+H), Mettler Toledo (Ingold), Johnson Yokogawa, Hach, Orion, and TBI Bailey (ABB). Simple hook-up schematics are provided with each sensor to interface with the OEM instruments.

pH/ORP/Ion Selective Sensor Hookup Schematics

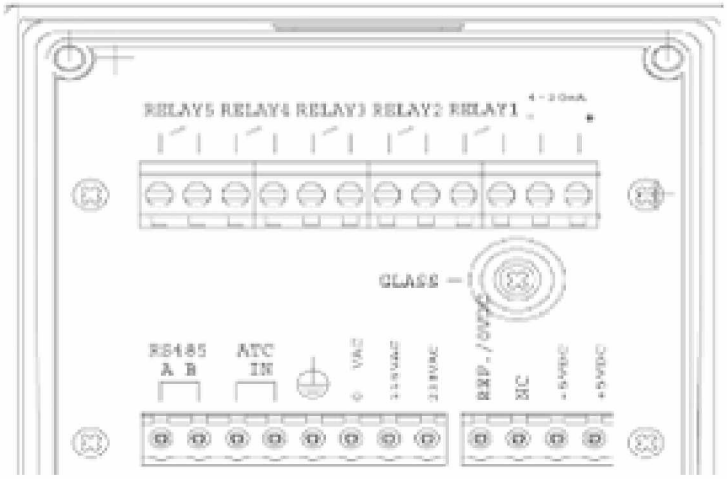
Uniloc / Rosemount	Foxboro	Great Lakes Instruments	No Preamplfiier Hook-Ups
1003	870IT	570	No Preamp (BNC Connector)
1050	870IT (No Preamp)	671	No Preamp (Lead Wires)
1054	872	672	External Preamp (Standard)
1054A	873 Dual Channel (DPX)	690	External Preamp (Differential)
1054B	873	692	No Preamp to External (Non-Differential) 54epH
1181		70	Battery Powered External Preamp
2081 (FM Approved)	Jenco	5-Wire Differential (Includes P33, P53, P63 & 692P)	Three Wire TC Hookup
2081 (Non-FM Approved)	Jenco 6311 (with Preamp)		
3081 / 81 / 54 (with Preamp)	Jenco 6311 (No Preamp)	Endress & Hauser	
3081 /81 / 54 (No Preamp)		Most Models w/Standard Hookup	Johnson Yokogawa
2081 (Non-FM Approved)	ECD		202 & 402 Analyzers

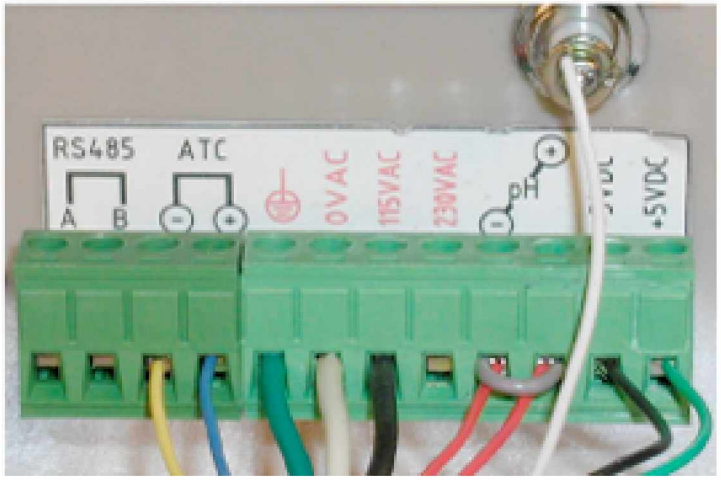
4) Integrated electronic components

ASTI's website contains the most up to date list of supported instrumentation and hook-up schematics. Others manufacturers may also be supported, although you should inquire to the factory to ensure compatibility.

Connection from Iotron™ Sensor to Terminal Block on back of Transmitter (READ CAREFULLY)

Cable Color Coding	Sensor Cable Lead Value	Terminal Label As given on Meter	Terminal Value (See Diagram Below)
Blue	RTD	ATC (-)	ATC IN
Yellow	RTD	ATC (+)	ATC IN
Red	Reference Input	pH (-)	Reference
Red	Reference Input	There no label on meter for this terminal connection	NC (Common)
White	pH/ORP Input (Signal)	pH (+)	Glass
Black	- 5V	- 5 VDC	- 5 VDC
Green	+ 5V	+ 5VDC	+ 5VDC





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