

**Aura** designs , manufactures and provides Fluid Connectors, Needle Valves, Instrument Manifolds, RTD/Thermocouple sensors and it's associated accessories. Aura was founded in 1995 in **India** with a 100% owned subsidiary in the **United States**. Our customers range in size and scope across the globe : from upstream to down stream oil and gas, Refinery, Petrochemical complexes, Major Power and Utility companies, Biotech and Food Processing, Fertilizer and Chemicals, HVAC, Temperature and Pressure sensor OEM's. Our 100% owned **state of the art manufacturing** facilities in New Delhi – India spans 8000 square feet and uses **CNC** machines, Lathe, Traub and other special purpose machines to produce high precision products and “**custom built** “ parts and has been **ISO 9001:2015** compliant since 2001 as certified by TUV Germany.

At Aura our **mission** is clear and unequivocal: to help our clients gain and sustain competitive advantage. We accomplish this goal through a continuous process of innovation and maintaining complete control of the entire supply chain: in house manufacturing and our owned warehousing and distribution in the United States and India. Complementing this we have our extensive network of distributors in Europe, Africa and Asia which allows us to service clients on the ground.

Our products meet almost all global standards and conform to **ASTM F1387**, Alberta Boiler Safety Association (**ABSA**), Technical Safety and Standards Authority (**TSSA** )- Canada to name a few.

We service more than **145 clients** in the United States and Canada since 1997 and a proud list of clients in India, Europe and Middle East. Major approvals include: EIL, NTPC, BHEL, PDIL, Emerson, Yokogawa, ABB, Honeywell, Western Gauge, Gulf Petroleum, Aramco - Al Khaliji Joint Venture, Bangladesh Gas, Siirtec Nigi, Pyromation, to name a few.

Our Good Manufacturing Practices cover quality systems for design, manufacturing, packaging, labeling, storage, installation and shipping. At Aura we follow a **100% QA** procedure in that no parts are shipped without inspection and that all raw material are 3<sup>rd</sup> party spectrographic tested for specification. With Material tracing, internal stage wise documentation, web based order tracking systems, we have automated our supply chain and the effort persists.

Our management team has built three successful enterprises. We have hundreds of years of corporate experience at ABB, Yokogawa Electric Corporation, Emerson, Jacobs, Foster Wheeler, Rockwell Automation. Internally, we respect our talented personnel and their creative spirits and love them like our own family. We've learnt that greatest successes are achieved when vision and execution work hand in hand and that **personal touch** must always take priority over procedures when it comes to **customer service**. These virtues allows us to compete and stand tall against much larger global rivals and attain yet another year of stellar performance. Our dual development approach : leveraging facilities across multiple locations and time zones helps us achieve a 24x7 solution.

**AURA** double ferrule compression fittings have attained an unmatched reputation as precision components that eliminate costly, hazardous leaks in Instrumentation and process tubing.

The product range includes :

- TUBE TO MALE THREAD : Male Connector, Male Elbow, Male Run Tee, Male Branch Tee, Male Adapter.
- TUBE TO FEMALE THREAD : Female Connector, Female Elbow, Female Run Tee, Female Branch Tee, Female Adapter.
- TUBE TO TUBE : Straight Union, Bulkhead Union, Reducing Union, Union Elbow, Tee, Union Cross.
- ACCESSORIES : Reducer, Tube End Closure, Fitting End Closure, Hex Nut, Front Ferrule, Back Ferrule.

**AURA** double ferrule Compression Fittings are available from 1/16" OD to 1" OD tubing and are machined from SS 316 which meet specifications of ASTM A276. Fittings design meets the requirement codes of :

- ANSI B31.1 - for Power Piping
- ANSI B31.3 - for Petroleum Refinery & Chemical Plants
- ASME Sec VIII - for Boiler & Pressure Vessels

The Advantages of such fittings are :

- Facility of assembling with self aligning front and back rings.
- Low tightening torque (the nut is of non-binding design).
- Controlled tightening effect, distortion of the tube without rupture of fibers, minimum reduction of tube bore size.
- No twisting of the tube when fitting.
- Withstands high vacuum and pressure.
- Re-usable, can be assembled and taken apart several times.
- Recommended for use with thin and thick walled tube.

AURA precision tube fittings are available with NPT/BSPT/BSP/ISO/UNF Threads.

As part of the standard QA program, all Aura fittings conform to various test procedures as adapted and laid down by such standard as ASTM F1387. As a standard design, the nut threads are silver plated so as to increase their resistance to seizing and galling of nuts on body.

Maximum Allowable Working Pressure Chart for Stainless Steel Tubing in psi																
Fully Annealed 304SS / 316SS seamless stainless steel tube as per ASTM A269 or equivalent. Hardness : Rb80 or less																
Tube O.D. (Inches)	Tube Wall Thickness in Inches															
	0.010	0.012	0.014	0.016	0.020	0.028	0.035	0.049	0.065	0.083	0.095	0.109	0.120	0.134	0.156	0.180
1/16"	5600	6800	8100	9400	12000											
1/8"						8400	10700									
3/16"						5400	7000	10100								
1/4"						4000	5100	7500	10200							
5/16"							4000	5700	8000							
3/8"							3300	4800	6500							
1/2"							2500	3600	5100	6700						
5/8"								2900	4000	5200	6000					
3/4"								2400	3300	4200	4900	5800				
7/8"								2000	2800	3600	4200	4600				
1"									2400	3100	3600	4200	4700			
1-1/4"										2400	2900	3400	3600	4100	4800	
1-1/2"											2300	2700	3000	3400	4000	4900
2"												2000	2200	2500	2900	3600

DESCRIPTION	:	Precision double ferrule compression tube fittings
DESIGN STANDARDS	:	Meets requirement code of : <ul style="list-style-type: none"><li>- ANSI B31.1 – for power piping</li><li>- ANSI B31.3 – for petroleum refineries/chemical plants</li><li>- ASME Sec. VIII – for boilers and pressure vessels.</li><li>- SAE-J-514 – for wall thickness</li></ul>
THREADS	:	Available with : <ul style="list-style-type: none"><li>- NPT, BSP, BSPT, ISO, UNF Threads</li><li>- Pipe threads conform to ANSI B2-1</li><li>- Straight threads conform to ANSI B 1-1 (unified threads clause 2A &amp; 2B)</li></ul>
MATERIAL OF CONSTRUCTION	:	<ul style="list-style-type: none"><li>- Straight Fittings – Barstock, ASTM A-276 316 SS/Brass.</li><li>- Angle Fittings – Barstock, ASTM A-276 316 SS / Forgings, ASTM A-182 G F 316, Brass.</li><li>- Ferrules – Barstock, ASTM-A-276 316 SS (Minimum Hardness Rockwell B – 90) / PTFE / Brass / Nylon / D</li></ul>
TESTING	:	Following tests are carried out at various stages of manufacture. All tests carried out are in accordance with ASTM F1387. <ul style="list-style-type: none"><li>- Visual / Dimensional check</li><li>- Pneumatic Pressure Test – at 1000 psi</li><li>- Hydraulic Leak Test at 4,500 psi</li><li>- Pressure Impulse &amp; Vibration test – at vibration frequency of 23-47 Hz with 5 mm amplitude and simultaneous pressure cycling at 0-3000 psi and at 30-40 CPM for a minimum of 20 million cycles.</li><li>- Minimum Burst Pressure Test – at a steady rate of 3000 psi per min. up to 12,000 psi.</li><li>- Make &amp; Break Test – hydraulically tested at 4500 psi.</li><li>- Temperature Cycling Test – temperature increased from ambient to 320 C in 60 min., held for 60 min., reduced to ambient, then tested hydraulically at 10,000 psi.</li><li>- Vacuum Test – at 700 m bar vacuum, deterioration in vacuum not to exceed 20 m bar in 20 mins.</li></ul>

**TUBE PREPARATION**

- Ensure that the tube being used does not have any visible patch scars within 1 1/2" of the tube ends.
- Clean tube ends and remove any foreign material.
- Use a tube cutter to cut the tube to size. If using a tube cutter is not possible, ensure that the tube is cut at a right angle and the ends are free of burrs.

**TIGHTENING**

- Check to ensure that all connection parts are assembled in the right order. Body, followed by the front ferrule, then the back ferrule and finally the nut.
- Insert the tube end completely through the nut, back ferrule and front ferrule until it makes contact with the body shoulder.
- Hand tighten the nut until it turns no further.
- Make a mating zero position scribe mark on the body and the nut.
- Hold the body firmly with a back up wrench and tighten the nut 1 ¼" turns from the zero point using a wrench. The fitting is now fully tightened and ready to hold the rated pressure.
- Ensure that the wrenches used are of the correct size.

**RETIGHTENING AFTER DISCONNECTION**

- Before reconnection, ensure that the taper surface of the body and the surface of the front ferrule are clean and free of any foreign material.
- Insert the tube end into the body and hand tighten the nut until the front ferrule is in full contact with the taper surface of the body.
- Using a wrench, tighten the nut approximately ¼ turn.

**AURA PART NUMBERING AND ORDERING INFORMATION**

- Aura follows a unique part numbering system to identify each type of fitting. The part numbering system is built up as follows :-
- The first one or two digits denotes the O/D size of the fitting. '1' stands for a sixteenth of an inch. For example 2 = 1/8", 5 = 5/16", 8 = 1/2".
- In the case of metric standard O/Ds, the first one or two digits directly denotes the O/D size of the fitting. For example , 4 = 4 mm, 2=12 mm so forth. Also, in the case of metric size fittings, the first one or two digits are followed by 'm'.
- The letters following the O/D identification denote the type of fitting. For example, AMC stands for Aura Male Connector.
- The last one or two digits represent the thread size and are expressed in sixteenths of an inch. For example, 2=1/8", 8 = 1/2".
- Standard fittings have the following features:-
- Material : 316 SS, fabricated from bar stock.
- Pipe threads : NPT
- Ferrules : Double compression
- Other standards / materials to be specified while ordering

**1. VISUAL EXAMINATION :**

Fittings are checked for overall finish, workmanship and dimensions. Dimensional checks are carried out using Ring / Plug step gauges (with minimum / Maximum limits) and go/no-go gauges.

**2. PNEUMATIC PRESSURE TEST :**

Test assemblies of suitable length are prepared with different sizes and types of fittings, tube fittings tightened 1-1/4 turn past snug. Each test assembly is then pressurized to 2000 psi pneumatic and is kept for fifteen minutes under pressure. If no leakage is found, the assembly is disassembled and inspected per paragraph 7.

**3. HYDRAULIC TEST :**

After the completion of pneumatic test, the test assemblies are tightened 1-1/4 turn past snug, and the loop pressurized to 4,500 psi Hydraulic / Hydrostatic pressure and kept for 15 minutes. If no leakage is found, the assembly is disassembled and inspected per paragraph 7.

**4. PRESSURE IMPULSE & VIBRATION TEST :**

- After the completion of Hydraulic test, the test assemblies are tightened 1 ¼ turn past snug.
- The test assembly is subjected to vibration frequency in the range of 23-47 Hz with an amplitude of 5 mm and simultaneous pressure cycling at 0-3000 psi and at  $35 \pm 5$  cpm with the Hydraulic / Hydrostatic media.
- This test is run for a minimum of 20,000 vibration cycles along with pressure impulse. No leakage will be allowed.
- On completion of test, the test pieces are disassembled and inspected per paragraph 7.

**5. MAKE & BREAK HYDROSTATIC TEST**

- After completion of pressure impulse and vibration test, the test assemblies are tightened 1 1/4 turn past snug.
- The test assemblies are then assembled and disassembled. This operation is repeated five times.
- The test assembly is then pressurized to 60000 psi hydraulically / hydrostatically, held under this pressure for five minutes and checked for leaks.
- If no leakage is found, the pressure is released and the “make and break” operation is repeated 25 times.

- After completing the above operation, the test assembly is subjected to 10,000 psi hydraulic / hydrostatic pressure and held for fifteen minutes. If no leakage is found the test assemblies are disassembled and inspected per paragraph 7.

**6. TEMPERATURE CYCLING TEST :**

After the completion of make and break hydrostatic test, the assemblies are tightened 1 1/4 turn past snug. The test assembly is then subjected to a temperature cycling test by increasing the temp. From ambient to 320° C in approximately 60 minutes and held for 60 minutes. The temperature is then gradually reduced to ambient / minimum possible temperature. This test is carried out for a total of 3 cycles, each cycle of approx...3 hours duration.













On completion of temperature cycling test, the assemblies are pressurized to 10,000 psi hydraulically / hydrostatically and held under pressure for 15 minutes. If no leakage is found, the test pieces are disassembled and inspected per Paragraph 7.











7. After each disassembly of the test pieces the components and tubing are critically examined for :
- Damage to “O” ring
  - Formation of fatigue cracks at thread roots.
  - Damage of ferrules
  - Damage to sealing faces.
  - Damage or cracking of tube (not to be counted as coupling failure, unless attributable to fitting of coupling in tube)

All above tests are carried out in-house. Random samples from large batches are periodically subjected to Helium Leak Test at an independent laboratory.



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