



Zenith CE PED 1297





For over forty years GENERAL has been designing & manufacturing primary process control instruments for measuring Pressure, Temperature, Flow & Level. Since inception in 1966, we have earned a reputation for providing solutions to process related problems & has been a single point source for reliable precision instruments.

Today, GENERAL is the largest manufacturer of Primary Process Control Instruments in India having 7 manufacturing plants & over 400 people working in the group. All manufacturing plants are ISO 9001:2008 certified. National & International approvals are the foundations of our reputation in the industry.

Pioneering efforts in the field of Flow Elements over the last three decades, have ushered GENERAL to the forefront with sophisticated Plant & Machinery and



Testing equipments for Design & Fabrication of very large and heavy flow elements required for mega projects across the country. GENERAL's flow elements manufacturing units, spread over 3000 sq. mtr., are situated at Goa having ISO 9001:2008 certification. GENERAL is the only Indian company whose Flow Elements have obtained CE certification and approved by all major Engineering Consultants in India and around the world.

GENERAL has been supplying Flow Elements to various Industrial Sectors including Refineries, Petrochemicals, Chemicals, Fertilizers, Cement, Paper, Pharmaceutical, Power, Steel etc., in India and 30 countries spread across 5 continents. The only Indian company approved by major Refineries and Petrochemical companies in the Middle East including M/s. Kuwait Oil Company, M/s. Kuwait National Petroleum Company, M/s. Qatar General Petroleum Corporation; are also approved by M/s. Petronas, Malaysia.

With offices in all major metros in India, representation in various countries in South East Asia, Africa, Middle East and Australia, Europe & USA, we are in a unique position to have total system capability to solve customers' all problems related to flow elements to meet every stringent requirement of size, shape, metallurgy, pressure/flow and other working conditions.

With the help of latest technology to test & monitor each production process with uncompromising commitment to quality meeting the highest standards. By catering to ever growing number of applications cutting across a wide spectrum of industries in the core sector, GENERAL is able to enjoy a substantial share of the market. Qualified members of our team are engaged in customising newer solutions to solve problems, striving for continuous improvement. The result is 'Export Excellence Award' from the Ministry of Commerce - Govt of India.



Hydraulic Press of 3 tonnes capacity





INDEX





Flow Nozzles



GENERAL Flow Nozzle is used in typically highvelocity, non-viscous, erosive flow. They are suitable for determining the flow rates of fluids at high temperature and high pressure.

GENERAL Flow Nozzles are erosion-resistant, consistently accurate and virtually maintenance-free. They perform a wide variety of applications that include air, water, steam, gas, chemical substances and high temperature applications. The rounded design provides a more effective sweep-through of particles in the flow stream, which extends product life by reducing wear and potential damage. Flow Nozzles are manufactured in strict accordance with ASME MFC-3M, BS-1042 and ISO-5167 standards. For critical measurement applications, wet calibration at reputed flow laboratories can be offered. Also we have an IBR approval for our manufacturing unit hence we can provide IBR form IIIC certificate for flow nozzles.

Flow Nozzles have a smooth elliptical inlet leading to a throat section with a sharp outlet. Restriction in the fluid flow causes a pressure drop , which relates to the flow rate by applying Bernoulli's equation. The smooth inlet of the flow nozzle results in a higher coefficient of discharge than most other differential meters. This higher efficiency means greater flow capacity when compared to most other differential meters of the same size.

There are three types of Flow Nozzles

- ISA 1932, with corner taps
- ASME long radius, low beta ratio $(0.20 < \beta < 0.5)$, with throat tap
- ASME long radius, high beta ratio $(0.25 < \beta < 0.8)$, with radius taps (D & D/2)

ASME long radius, low beta ratio Nozzle with throat taps is used in steam turbine performance test As per ASME PTC-6 code.

ISA-1932 nozzle can be mounted with carrier ring or in between flanges with corner taps.

Long radius nozzle are normally with weld-in branch pipe with radius taps.

To avoid welding of dissimilar metals, nozzles are also installed in the pipe with holding ring.





Salient features & benefits

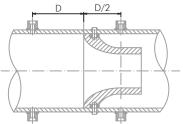
- Widely used for high pressure & high temperature steam flow
- Useful for flow measurement at high velocities
- Rounded inlet not subject to wear or damage, extending product life
- Better sweep-through effect for debris and liquids, eliminate damming effect
- Lower susceptibility to erosion
- Extended product life with no moving parts

Flow Nozzles

general

HOLDING RING TYPE FLOW NOZZLE

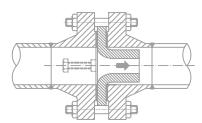
These types of nozzles are designed for installation in a pipe without flanges. The flow nozzle is installed with the help of holding ring and locating pins which are made of same material as that of pipe thereby eliminating welding of dissimilar materials and also eliminating more welding joints in a shorter pipe lengths because of high pressure areas



Long Radius High Beta Ratio Holding Ring Type Nozzle

FLANGED TYPE FLOW NOZZLE

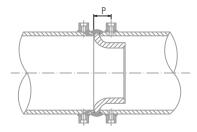
These types of nozzles are used for insertion between pipe flanges, where frequent maintenance is required in the line. These types of nozzle are very rarely used



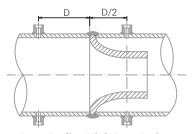
Flanged Type Flow Nozzle

WELD-IN TYPE FLOW NOZZLE

This type of nozzle has a machined tongue around its greatest diameter designed to fit between beveled ends of both inlet and outlet pipe section. The pipe sections, with the nozzle in place are firmly clamped and welded. The weld-in flow nozzle is used where flanges are not applicable such as high temperature and pressure applications in power plant installations, feed water, etc.



ISA1932 Weld-In Type Nozzle Corner Tappings

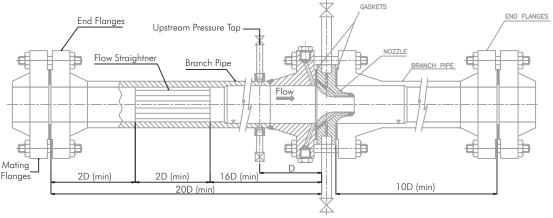


Long Radius High Beta Ratio Weld-In Type Nozzle (Radius Tappings)

FLANGED TYPE THROAT-TAP FLOW NOZZLE

Flange type throat-tap flow nozzle is used when extreme accuracy and repeatability required. In most cases this type of nozzle is purchased with a complete flow section and laboratory flow calibrated. This type of nozzles are manufactured in strict accordance with ASME performance test code PTC-6.



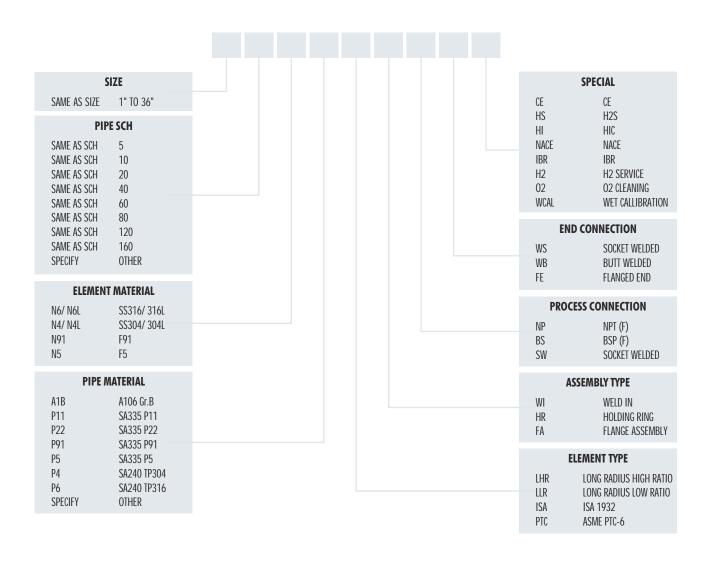


Flow Nozzle Assembly as per ASME PTC-6



Ordering Guide

Nozzle Assembly



Note: 1. Other than above information customer has to provide process data as on page no. 16

2. Default process connection size is 1/2" other than this (e.g. 3/4" or 1"), please specify.



Size: 2350 NB

OD: 2.5 mtr

Length: 13.5 mtr

Project: Adundra Sujalam Sufalam **Spreading Canal** pipe line - Gujarat



Venturi Tubes





Salient features & benefits

- Can be used on slurries and dirty fluids
- Lower susceptibility to erosion
- Low permanent pressure loss
- Extended product life with no moving parts
- Vertical or horizontal installation

GENERAL Venturi Tubes serve users with accurate measurement of non-viscous fluids in clean & dirty streams. Venturi Tubes are virtually maintenance-free and corrosion-resistant. Venturi tubes are manufactured in strict accordance with ASME MFC-3M , BS-1042 and ISO-5167 standards. These measurement standards provide users with +/-1.0% uncertainty of discharge coefficient. For critical measurement applications, wet calibration at reputed flow laboratories can be offered.

Venturi Tube is a low pressure drop metering device. It offers constant accuracy, low susceptibility to erosion, high-pressure recovery, and installation at any angle from horizontal to vertical. Corrosion-resistant and virtually maintenance-free, this measurement product performs in a wide variety of applications that include air, water, vapor, steam, gas, chemical substances, sludge and slurry applications.

The classical Venturi Tube is made up of a entrance cylinder of the same diameter as the pipe connected to a conical convergent section, a cylindrical throat, and a conical divergent section. The high pressure taps are located on the middle of inlet section and the low pressure taps are located at the middle of the throat section. A piezometer ring is sometimes used for differential pressure measurement. This consists of several holes in the plane of the tap locations. Each set of holes is connected together in an annular slot to give an average pressure.



Venturi Tubes

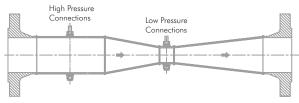




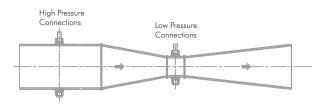
The throat restricts the fluid flow resulting in a pressure drop. This differential pressure relates to the flow rate by applying Bernoulli's equation. The angled inlet and outlet cones help control the pressure recovery, making the Venturi the most efficient of all the differential meters available. This

less than the inside diameter D of the pipe.

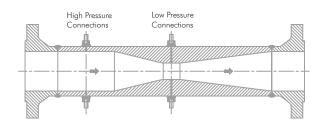
results in lower permanent pressure loss and greater capacity than other differential meters of the same size. Permanent pressure loss is generally 5% to 20% of the differential pressure, depending on the bore size selected.



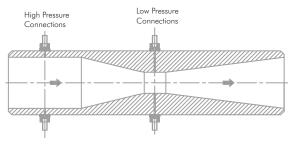
Fabricated with Flanged ends



Fabricated with Beveled ends



Machined with Flanged ends



Machined with Beveled ends

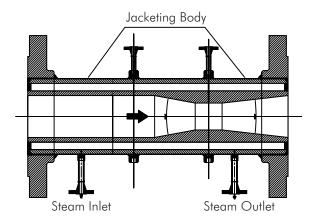


Jacketed Venturi & Venturi Nozzle

Jacketed Venturi

Jacketing is mainly provided for heating applications where processes require operating temperature to be amplified. In certain scenario a steam is passed through the jacket passage and fluid inside is heated extensively.

This is mainly applicable for smaller size from 2'' to 10''.



Jacketed Venturi

Venturi Nozzle

The Venturi Nozzle is an attractive solution for measurements with high accuracy and low residual pressure loss requirements.

This Nozzle has the same features as the ISA 1932 Nozzle except the residual pressure loss is lower.

The profile of the Venturi Nozzle is axisymmetric. It consists of a convergent section, with a rounded profile, a cylindrical throat and a divergent section.

A venturi nozzle can be achieved as truncated alternative. The divergent portion may be truncated up to 35% of its length.

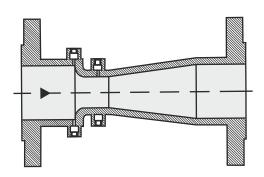
At large sizes there is the possibility to go for a sheet metal downstream cone.

The upstream tap location shall be corner taps and the throat pressure taps shall comprise at least four single pressure leading into a annular chamber.

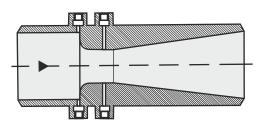
Depending on customer requirements, the typical 1/2 in. or 3/4 in. tappings have a but or socket weld, screw thread or flange connection. Tappings maybe equiped with condensate chambers and shut-off valves.

Available in wide variety of materials (SA105, SS316, F12, F22, F91,...)

The flow calculation is performed according to the ISO 5167-Part3.



Fabricated Venturi Nozzle



Machined Venturi Nozzle



Eccentric & Rectangular Venturi

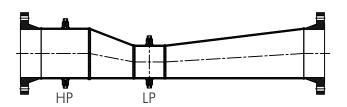
Eccentric Venturi

Eccentric venturi is one of the types of venturi used for the mixed phase (Gaseous & Liquid) of the fluid designed and manufactured by General as per the standard L.K. Spink. Eccentric venturi is also consists of four parts i.e. Inlet cylinder, convergent, Throat & Divergent as like classical venturi tubes. But the basic difference in the design of both is that either bottom or top side of the venturi is in the same plane.

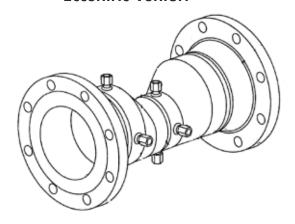
Degrees of Convergent & Divergent angles are also same as per the classical venturi tube (21 deg & 7 to 15 deg respectively).

Piezometric ring for the averaging of the readings can be provided. This is required due to the mixed phase of the gas or of the liquid.

Various materials ranging from Carbon steel to stainless steel & also Duplex Stainless steel can be provided.



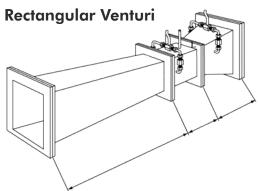
Eccentric Venturi



Rectangular Venturi

Rectangular venturi tubes are used in rectangular air ducts or furnaces as primary elements in flow measurement of gas according to the differential pressure principle. The rectangular venturi tube has single or double plane contraction with again same sections as Inlet Duct, Convergent cone, Throat & Divergent cone.

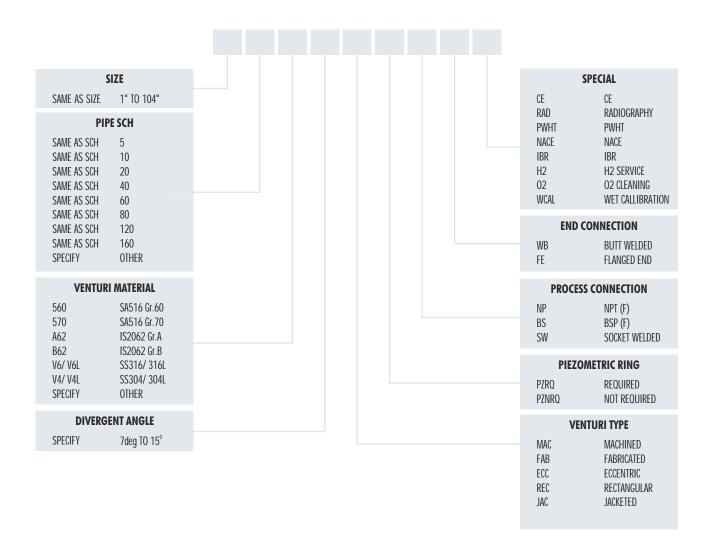






Ordering Guide

Venturi Tube



Note: 1. Other than above information customer has to provide process data as on page no. 16

- 2. Default process connection size is 1/2" other than this (e.g. 3/4" or 1"), please specify.
- 3. If the venturi is machined then forged grade of the respective venturi material will be used.

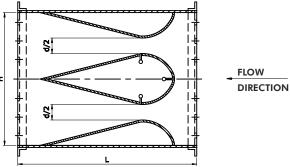
Aerofoil

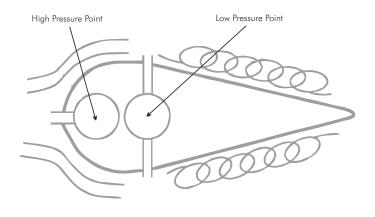


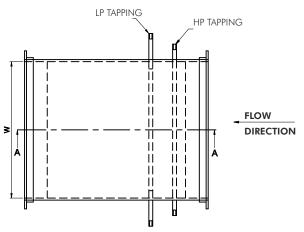


Aerofoil is primary flow element use to measure air flow in rectangular duct.

An aerofoil is having the shape of the cross section of the aircraft wing, with the function of producing a controllable net aerodynamic force.







Aerofoil works on the principle of the relationship between flow velocity and the pressure fields in frictionless flow. Since the air particles follow the curved streamlines above the upper surface there must be a centripetal force across the streamlines which is accelerating the flow towards the centre of curvature. That force must be associated with a pressure gradient across the streamlines i.e. ambient atmospheric pressure at some distance from the surface grading to a lower pressure on the upper wing surface.



Condensate Pots

We manufacture complete range of condensate pots which requires in many process industries Condensate pots are generally used for measurement of steam/vapor which condense to liquid state at the ambient temperature.

These are also used to cool down very high temperature liquids and to maintain a constant liquid head above the instrument. These can be installed in both horizontal & vertical position.

We manufacture these condensate pots as per customer's requirement and design in various sizes 2", 3" and 4" etc.

Condensate pots are manufactured in various grades of Carbon steel, Alloy steel & stainless steel. IBR Form IIIC certificate can be provided for condensate pots.

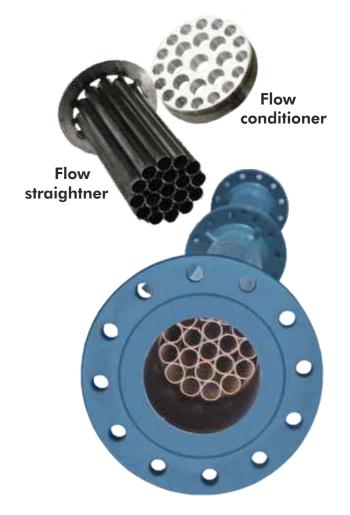


Flow straighteners and conditioners are used in conjunction with flow meters. They can smooth out turbulent and transitional flows and help meters measure more accurately

These are installed on the upstream side of flow elements to remove swirl resulting from a complicated piping layout, and to restore an acceptable velocity profile.

Flow conditioners are used to produce a swirl-free, distortion-free highly repeatable velocity flow profile for use in flow meter and pump systems. These eliminates the flow distortion effects of upstream elbows, pipe size changes, valves, dampeners and more to produce a consistent flow profile for flow meters and pumps. Most all flow meter technologies require significant upstream and downstream straight-run to meet and sustain their specified accuracy. Flow conditioners or flow straighteners are used to minimize these straight run requirements.





Some of our Valued Customers



Consultants

Chemtex Engineering of India Ltd. Dalal Consultants & Engineers Ltd. Desein Indure Ltd.

Development Consultants Ltd.

Engineers India Ltd.

Fact Engineering & Design Organisation Fichtner Consulting Engineers Pvt. Ltd.

Jacobs H&G Limited

Kvaerner Powergas India Ltd.

Lurgi (I) Ltd.

Mehtalia Associates

Metallurgical & Engineering Consultants Pvt. Ltd.

M.N. Dastoor

Pipecon Consultants

Projects & Development India Ltd.

S N C Lavalin Engineering India Pvt. Ltd.

Tata Consulting Engineers Technimont ICB Ltd.

Toyo Engineering (I) Ltd.

Uhde India Ltd.

Instrument Manufacturers

ABB Ltd.

Emerson India Ltd.

Endress + Hauser

Forbes Marshall

Honeywell Automation Ltd.

Invensys

Siemens Ltd.

Yokogawa India Ltd.

Original Equipment Manufacturers

Alfa-Laval (India) Ltd.

Bharat Heavy Electricals Ltd.

Bharat Heavy Plates & Vessels Ltd.

Daelim Engineering

Greensol Power Systems Private Limited.

Hindustan Dorr-Oliver Ltd.

Hyundai Heavy Engineering

Ion Exchange (India) Ltd.

Kirloskar Pneumatic Co. Ltd.

Larsen & Toubro Ltd.

Mazgaon Dock Ltd.

Neela Group of Companies

Nishotech Engineers Pvt. Ltd.

Pall Pharmalab

Praj Industries Ltd.

T. D. Power Systems Private Limited.

Thermax Ltd.

Thermax Babcock & Wilcox Ltd.

Triveni Engineering

Cement

Associated Cement Companies Ltd. Grasim Cement Gujarat Ambuja Cement Ltd. Manikgarh Cement Rajashree Cement

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Cadila Healthcare Ltd.

Ciba Specialty Chemicals (India) Ltd.

Core Parental

Johnson & Johnson Ltd.

Max - GB Ltd.

Orchid Chemicals & Pharmaceuticals Ltd.

Pfizer Ltd.

Ranbaxy Laboratories Ltd.

Sandoz (India) Ltd.

Torrent Pharmaceuticals Ltd.

Unichem Laboratories

Wockhardt Ltd.

Oil Exploration / Refineries / **Petrochemicals**

Bharat Petroleum Corporation Ltd. Bongaigaon Refinery & Petrochemicals Ltd. Chennai Petroleum Corporation Ltd.

Cochin Refineries Ltd.

Deepak Fertilisers & Petrochemicals Corpn. Ltd.

Gas Authority of India Ltd.

Hindustan Petroleum Corporation Ltd.

Indian Oil Corporation Ltd.

Indian Petrochemicals Corporation Ltd.

Manali Petrochemical Ltd.

Mysore Petrochemicals Ltd.

Numaligarh Refinery

Oil India Ltd.

Oil & Natural Gas Corporation India Ltd.

SPIC - SMO

Reliance Industries Ltd.

The Andhra Petrochemicals Limited

Chemical

Alkyl Amines Chemicals Ltd.

DCW Ltd.

Gharda Chemicals Ltd.

Hindustan Lever Ltd.

Hindustan Organic Chemicals Ltd.

India Glycols Ltd.

Lubrizol Índia Ltd.

Maharashtra Aldehydes & Chemicals Ltd.

National Organic Chemicals Inds. Ltd.

National Peroxide Ltd.

Punjab Alkalies & Chemicals Ltd.

United Phosphorus Ltd.

Fertiliser

Chambal Fertilisers & Chemicals Ltd.

Coromondal Fertilisers Ltd.

Deepak Fertilisers & Petrochemicals Corpn. Ltd. Godavari Fertilisers & Chemicals Ltd.

Gujarat Narmada Valley Fertiliser Co. Ltd. Indian Farmers Fertilisers Co-op. Ltd.

Indo-Gulf Fertilisers & Chemicals Corpn. Ltd.

Krishak Bharati Co-op Ltd.

Madras Fertilizers Ltd.

National Fertilizers Ltd.

Oswal Chemicals & Fertilizers Ltd.

Rashtriya Chemicals & Fertilizers Ltd.

Tata Chemicals Ltd.

The Fertilisers & Chemicals Travancore Ltd.

Zuari Agro Chemicals Ltd.

Pulp & Paper

Andhra Pradesh Paper Mills Ltd. Ballarpur Industries Ltd.

ITC Bhadrachalam Paperboards Ltd. Mysore Paper Mills Ltd.

Orient Paper Mills. Tamilnadu Newsprint and Papers Ltd.

Power Generation

Ahmedabad Electricity Co. Ltd.

A. P. State Electricity Board

Asea Brown Boveri Damodar Valley Corporation

Gujarat Industries Power Co. Ltd.

Haryana State Electricity Board Madhya Pradesh Electricity Board

Maharashtra State Electricity Board

National Thermal Power Corpn. Ltd. Punjab State Electricity Board

Reliance Energy Ltd. Siemens Ltd.

T. N. Electricity Board

U. P. State Electricity Board

Metallurgy

Bharat Aluminium Co. Ltd.

Bhushan steel

Birla Copper

Essar Steel

Godavari Power & Ispat Ltd.

Hindalco Ltd. Hindustan Copper Ltd.

Hindustan Zinc Ltd.

Ispat Industries Ltd.

Jindal Vijayanagar Steel Ltd. Kerala Minerals & Metals Ltd.

Kudremukh Iron Ore Co. Ltd.

NALCO

Neo Metalliks Ltd.

Neyveli Lignite Corpn. Ltd.

Orissa Sponge Iron Ltd.

Steel Authority of India Ltd.

Sunflag Iron & Steel Ltd.

Tata Iron & Steel Co. Ltd.

Tata Metaliks Limited. Sesa Goa Limited.

Synthetic Fibre

Apollo Fibers

Bombay Dyeing & Mfg. Co. Ltd.

Century Enka Ltd.

Central India Polyesters Ltd. Garden Silk Mills Ltd.

Indo-Rama Synthetics India Ltd.

J.K. Synthetics Ltd. Parasrampuria Synthetics Ltd. Raymond Synthetics Ltd.

SRF Ltd



Bore Calculation Input Data

Name of the fluid & State
Operating temperature / Ambient temperature
Operating Pressure (abs)
Viscosity (cP)
Maximum flow / Normal flow
Differential range
Base sp. gravity / density (only for gas)
Operating sp. gravity / density (for gas & liquid)
Specific heat ratio (Cp/Cv) only for gas
Pipe size & schedule
Pipe material
Tap type
Element material



EC CERTIFICATE OF CONFORMITY

in accordance with the requirements of the Pressure Equipment Directive 97/23/EC and the Pressure Equipment Regulations 1999, UK Statutory Instrument 1999 No. 2001 and SI 2002 No. 1267

This is to curtify that the Casally Messegement System of

General Instruments Consortium Unit: Minco (India) Pvt. Ltd. D2-34/35, Tivim Industrial Estate, Karaswada, Mapusa, Goa - 403526 INDIA

has been assemed against the requirements of Arves II. Mobile H of the Pressure Equipment Orestine 37/23 EC, and Schedule 4. Modele H of the Pressure Equipment Regulations 1889 and conforms to the requirements for the products shares below.

The design and manufacture of orifice (single and multi stage) assemblies, nozzle assemblies, venturi and averaging pitot tubes.

Approval is subject to the continued maintenance of the quality system in accordance with the requirements of the above Directive and Regulations.

Authorisation is hereby given to use the LPSY highled Body Mertification Number in association with the registements of the specified Directive and Progressions in relation to the products as identified above.

0008PFDML880810012H Cortificate No.

Original Approval 20 March 2006 6 April 2009 Current Card Scatte: 16 March 2012 Certificate Expry

LRV Notified Body Number 0038



CERTIFICATE OF APPROVAL

This is to certify that the Quality Munagement System of

General Instruments Consortium Unit: Minco (India) Pvt. Ltd., D2 - 34/35 Tivim Industrial Estate, Karaswada, Mapusa, Goa - 403 526, INDIA

has been approved by Lloyd's Register Quality Assurance to the following Quality Management System Standards.

BS EN ISO 9001:2000

The Quality Management System is applicable to The design and manufacture of single and multistage oriflus plates.

nozzles, venturis and averaging pitot tubes.

Approved Controller No. MEJMODE 1215

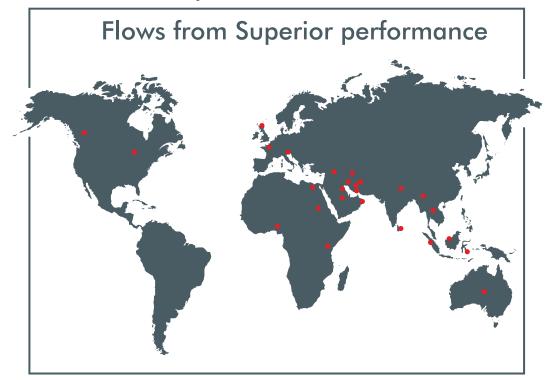
Original Agentury 310 March 2006 Classett Certificate: 28 March 2008

Centrol Liphy 13 November 2010

Security Angles South Assumer Lineins



Global Acceptance





INSTRUMENTS CONSORTIUM

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Manufacturing Plant: MINCO INDIA FLOW ELEMENT PRIVATE LTD.

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OVERSEAS NETWORK:

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