FLUID CONTROLS®
ENGINEERING CONNECTIONS EVERYDAY



HOSES & HOSE CONNECTORS

TABLE OF CONTENTS

1 OUR HERITAGE

2 OUR INNOVATION

3 OUR HOSE PRODUCTS

4 HOSE SELECTION GUIDE

6 RUBBER HOSES

10 METALLIC, PA & BRAIDED HOSES

12 HOSE CONNECTORS

14 HOSE ASSEMBLIES

16 HOSE TESTING

OUR HERITAGE

OUR COMPANY

Fluid Controls® was established by Dr. Y.E. Moochhala, a Ph.D. from Northwestern University, in 1974, with a vision to deliver high quality and high-performance products which delight customers. With 50 years of experience in engineering connections, Fluid Controls® offers end-to-end "Make in India" solutions for various applications – from design & engineering services to supply of high-performance products. Fluid Controls® products ensure precision connections that are designed based on specific application requirements and which perform to international standards.







OUR PRODUCTS

The Fluid Controls® approach is to offer customers comprehensive "Make in India" solutions for instrumentation needs – from design & engineering services to supply of products. And, with 50 years of experience, Fluid Controls® has demonstrated both experience and performance. Our products include connectors and adaptors for tubes and hose, valves, manifolds, DIN clamps and SAE flanges and engineered tube and hose assemblies. Our specialized products include prefabricated instrument hook-ups, high pressure needle valves, gas valves for turbine applications, block and bleed valves and O2 clean fittings for pharma and bio-tech applications.



OUR QUALITY ETHOS

CUSTOMER DELIGHT

RIGOROUS TESTING
& CERTIFICATION PROGRAM

NO COMPROMISES



50
YEARS

5 DECADES OF FOCUS ON
DESIGN FOR CUSTOMER NEEDS
& PRODUCT PERFORMANCE

OUR INNOVATION



भारत सरकार
विज्ञान और प्रौद्योगिकी मंत्रालय
वैज्ञानिक और औद्योगिक अनुसंधान विभाग
GOVERNMENT OF INDIA
MINISTRY OF SCIENCE AND TECHNOLOGY
Department of Scientific and Industrial Research

F. No. TU/IV-RD/4166/2023
Dated: 1st May, 2023

To
M/s. Fluid Controls Pvt. Ltd.
Unit No. 102, J.V. Patel ITI Compound,
B. Madhurkar Marg,
Mumbai – 400 013
(Maharashtra)

Subject: RENEWAL OF RECOGNITION OF IN-HOUSE R&D UNIT(s)

Dear Sirs,

This has reference to your application for renewal of recognition of your in-House R&D unit(s) beyond 31-03-2023 by the Department of Scientific and Industrial Research.

2. This is to inform you that it has been decided to accord renewal of recognition to the in-House R&D unit(s) of your firm at **GAT No. 378/1, Chakan Talegaon Road, Kharabwadi, Khed, Pune (Maharashtra)** upto **31.03.2026**. Terms and conditions pertaining to this recognition are given overleaf.

3. Kindly acknowledge the receipt of this letter.

Yours faithfully,
(Dr. P. K. Dutta)
Scientist - 'G'





OUR R&D CENTER

Since inception, Fluid Controls® has engaged in original R&D and has an ethos of developing products which are indigenous replacements of imported products. Today, Fluid Controls® is approved as an "In-House R&D Unit" by Department of Scientific & Industrial Research (DSIR), Government of India. Our R&D center is located at Chakan, Pune and offers design and engineering services, including 3D modelling, FEA and prototyping via SolidWORKS and Ansys.

OUR TESTING CAPABILITIES

The Fluid Controls Test Laboratory is accredited to NABL Certification in accordance with ISO/IEC 17025:2017. The Laboratory houses state-of-the-art performance testing and metrology equipment, capable of conducting high pressure, vibration and reliability tests.

OUR CERTIFICATIONS

Fluid Controls® has the latest system and performance certifications:

- ISO 9001:2015, ISO 14001:2015, ISO 45001:2018, PED, IRIS, NABL (ISO/IEC 17025:2017)
- Product Performance Certifications include ASTM F1387-99 (2012), ISO 19879, NGV, ISO 15500, ECER 110, DIN Single Ferrule Connectors PDA, ABS PDA for Connectors, Valves and Manifolds, MSS-SP-99, API 607 and Fugitive Emission, certifications to IEC and EN standards for corrosion and shock/vibration for connectors

OUR ACHIEVEMENTS

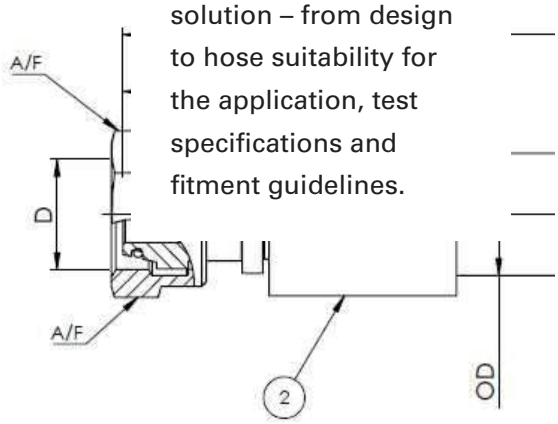
- Over 25 new products developed in recent years
- First Global Patent awarded
- CII Industrial Innovation Award for Medium Scale Manufacturing 2019
- One of the Top 25 Innovative Companies of the Year at CII Industrial Innovation Awards 2019 & 2021
- National Winner for Quality Innovation Award by the Indian Society of Quality 2021
- Excellence in Technical Innovation by ISA Maharashtra Section at PPA Meet 2020
- Urban Infra Solutions Provider of the Year 2019

OUR HOSE PRODUCTS

Fluid Controls® offers hoses, hose connectors and hose assemblies for industrial applications with high quality in-house crimping and assembly testing. Our engineers work closely with customers to understand their requirements and provide them with solutions for hoses and hose assembly solutions. Hose connectors and hose assemblies are tested at our in-house laboratory prior to despatch.

ENGINEERING

The Fluid Controls Engineering Team reviews customer requirements and specifications and provides a comprehensive solution – from design to hose suitability for the application, test specifications and fitment guidelines.



HOSES

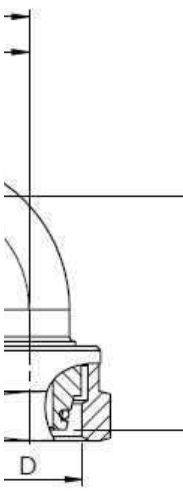
Fluid Controls® sources hoses from reputed hose manufacturers or those approved by customers. All hoses are quality checked at source and stored.

HOSE CONNECTORS

With 50 years of expertise in designing and manufacturing a range of connectors and adaptors, Fluid Controls® has an in-depth understanding of connectors. It is this proficiency that enables us to provide solutions for hose connectors.

HOSE ASSEMBLIES

To facilitate customer inventory management and ensure faster turnarounds, Fluid Controls® offers customers designed and integrated hose assemblies. These assemblies are engineered at our facility with 3D and layouts. Sourced hoses and in-house manufactured connectors are crimped and assembled at our facility. Each hose assembly is tested and transport-worthy protective packaging is provided. Fluid Controls® also offers on-site fitment of hose assemblies or site supervision during installation if required.



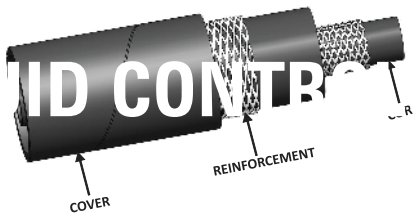
HOSE SELECTION GUIDE



A HOSE IS A FLEXIBLE HOLLOW TUBE MADE OF RUBBER, PLASTIC OR METAL AND DESIGNED TO CONVEY FLUID FROM ONE LOCATION TO ANOTHER.

FLUID CONTROLS

HOSES HAVE THREE MAJOR COMPONENTS:



HOSE CORE: THIS IS THE INNER MOST PORTION OF THE HOSE AND IS MADE OF MATERIAL WHICH IS NOT REACTIVE TO THE MEDIA USED AND WILL CONVEY THE MEDIA WITHOUT ANY LEAKAGE.

HOSE REINFORCEMENT: THIS STRENGTHENS A HOSE AND ENABLES IT TO WITHSTAND PRESSURE. REINFORCEMENT CAN BE OF VARIOUS TYPES (BRAIDED, SPIRAL, HELICAL).

HOSE COVER: THIS IS USED TO PROTECT THE CORE AND THE REINFORCEMENT FROM THE EXTERNAL ENVIRONMENT.

When replacing an existing hose or building a new system, selecting the right hose is crucial. An effective way to remember hose selection criteria is to remember the word... **STAMPED**

S **SIZE:** The inside diameter of the hose must be adequate to keep pressure loss to a minimum and avoid damage to the hose due to heat generation or excessive turbulence.

T **TEMPERATURE:** When selecting a hose, the fluid temperature and the ambient temperature should be considered and the hose must be capable of withstanding the minimum and maximum system temperature.

A **APPLICATION:** The hose selected should fulfill application requirement and questions to be asked when finalizing the appropriate hose / hose assembly include. Where will the hose be used? What is the fluid and/or ambient temperature? What are the working and surge pressures? What are the thread connection types needed? Is there an excessive abrasion in the application area? Are there routing requirements?

M **MATERIAL TO BE CONVEYED:** Some applications require specialized oils or chemicals to be conveyed through the system. The hose selected (including hose tube, cover, couplings and O-rings) has to be compatible with the fluid used.

P **PRESSURE RATING:** The system pressure (working and surge) is a very important factor in hose selection. This is the most important in the hose selection process. Fluid Controls® DOES NOT recommend using hoses on applications having pressure spikes greater than published working pressures of the hose.

E **ENDS OR COUPLING:** End connections can be identified using the Fluid Controls® Catalogue and Measuring Tools or Coupling Identification section and an appropriate connector can be selected for fitment on the hose.

D **DELIVERY:** Using the Nomographic Chart, the hose ID should be determined to ensure efficient transportation of fluid.

RUBBER HOSES

In many hydraulic circuits, rigid pipes and tubes are used to transfer fluid/media between different components. Pipes and tubes are rigid in order to bridge spaces in a controlled manner. In smaller circuits with space constraints, however, the rigidity of pipes and tubes poses an issue. Using flexible hoses in these applications can help overcome space constraints.

Rubber Hoses are divided into 5 major categories:

INDUSTRIAL HOSES:

Industrial hose properties are temperature resistance, media resistance, fatigue resistance & ozone resistance. They also provide a high resistance to solvents and different chemicals.

FUEL HOSES:

Fuel hoses are used to transfer fuels from the tank to the engine. Fuel hoses are reinforced with several layers to hold the pressure generated in the vehicle's fuel system. Rubber hoses with enhanced carbon can also reduce the permeability of gasoline.

FIRE HOSES:

Fire hoses are used in firefighting systems to carry water. The inner core of the hoses is made of water-resistant rubber and the outer cover is made from rubber which is resistance to heat and abrasion.

AUTOMOTIVE HOSES:

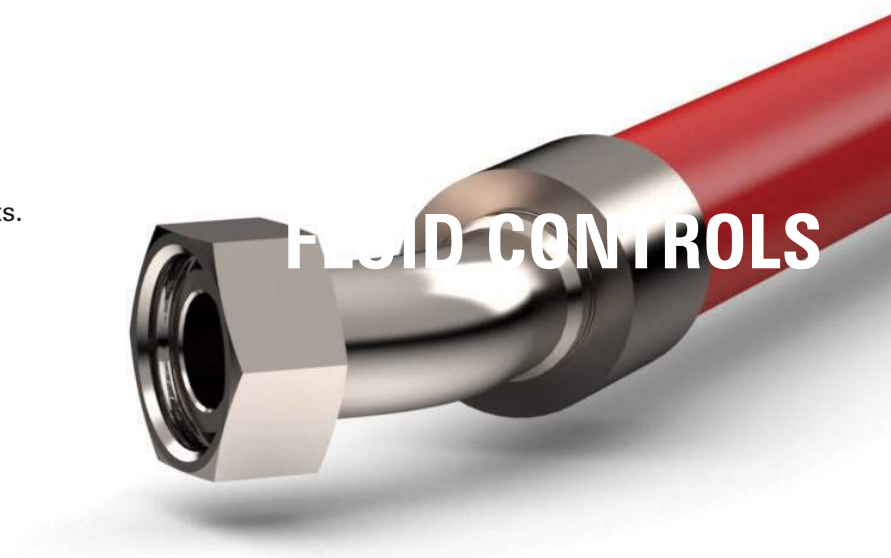
Also known as engine hoses, Automotive Hoses are used in automobiles to transfer lubricants or coolants. They carry fluid to the engine, radiator and other vehicle components. Automotive hoses help in fuelling, lubrication and also cool vehicle components to keep them from malfunctioning.

RADIATOR HOSES:

Radiator hoses are used to remove excess heat from coolant before it seeps into the engine and are resistant to coolant at elevated temperatures.

INDUSTRIAL APPLICATIONS

- Agriculture
- Aviation or Aerospace
- Chemical
- Construction
- Coolant
- Cryogenic
- Discharge
- Exhaust
- Fire
- Food and Beverage Processing
- Fresh Air
- Garden or Landscaping
- Heavy Industry
- HVAC
- Marine
- Medical or Pharmaceutical
- Oil or Fuel industry



RUBBER HOSES RANGE:

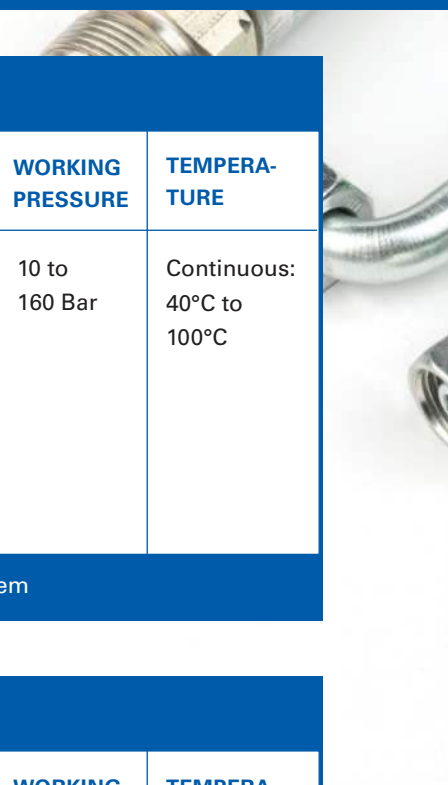
CONSTRUCTION STANDARD	RUBBER HOSE TYPE	APPLICATIONS
EN853	1SN, 2SN, 1ST, 2ST	Medium pressure applications (10 to 250 bar). For use with petroleum and water based fluids. Best used in off-road vehicles and agricultural equipment.
EN854	1TE, 2TE, 3TE	Very low to medium pressure applications (10 to 160 bar). For use with petroleum and water based fluid. Best used in off-road vehicles, agriculture equipment, static equipment and hydraulic systems. Also suitable for rail & metro brake piping applications.
EN856	4SP, 4SH, R12, R13	High pressure applications (140 to 450 bar). For use with petroleum and water based fluid, hydraulic SAE oils. Best used in heavy off-road equipment such as cranes, mining equipment, and the oil and gas industry.
EN857	1SC, 2SC	High pressure applications (80 to 400 bar). For use with petroleum and water based fluids. Suitable for equipment piping where installation space is compact and narrow.
SAE J30	CNG Hose	Very low pressure applications (up to 5 bar). Best suitable for CNG applications.

RUBBER HOSE EN 853

HOSE	TYPE	STANDARD	CORE	REINFORCEMENT	COVER	WORKING PRESSURE	TEMPERATURE
RUBBER HOSE EN 853	1 SN & 2 SN Hose	SAEJ517-100R1AT/ EN853-1SN & EN853-2SN/ISO 1436	Synthetic rubber resistant to mineral and vegetable oil based hydraulic fluids	One layer of high tensile steel wire braid for 1SN hose & two layers of high tensile steel wire braid for 2SN hose	Weather and wear resistant synthetic rubber	10 to 415 Bar	Continuous: 40°C to 100°C
RUBBER HOSE EN 853	1 ST & 2 ST Hose	SAEJ517-100R1A/ EN853-1 ST & 2ST		One and two layers of high tensile steel wire braid for 1ST & 2ST hose respectively			

Applications: Hydraulics Systems, Coolants, Water & Air. Suitable for Agricultural / Stationary Equipment & Hydraulic Systems

RUBBER HOSES RANGE



RUBBER HOSE EN 854

HOSE	TYPE	STANDARD	CORE	REINFORCEMENT	COVER	WORKING PRESSURE	TEMPERATURE
RUBBER HOSE EN 854	1TE, 2TE & 3TE Hose	EN 854	Synthetic rubber resistant to mineral and vegetable oil based hydraulic fluid	One layer of textile braid for 1TE, 2TE & two layers of textile braid for 3TE hose respectively	Weather and wear resistant synthetic rubber	10 to 160 Bar	Continuous: 40°C to 100°C

Applications: Hydraulics Systems, Coolants, Water and Air. Suitable for Railway Braking System

RUBBER HOSE EN 856

HOSE	TYPE	STANDARD	CORE	REINFORCEMENT	COVER	WORKING PRESSURE	TEMPERATURE
RUBBER HOSE EN 856	4SP, 4SH, R12, R13 Hoses	EN 856 - 4SP / ISO 3862/SAE J517-R12	Synthetic rubber that is resistant to mineral and vegetable oil based hydraulic fluid	Four high tensile steel wire spirals for 4SP, 4SH & R12 hose & four or six high tensile steel wire spirals for R13 hose	Weather and wear resistant synthetic rubber	165 to 450 Bar	Continuous: 40°C to 120°C

Applications: Hydraulic Fluid in accordance with ISO 6743-4, Coolants, Water and Air



RUBBER HOSE EN 857

HOSE	TYPE	STANDARD	CORE	REINFORCEMENT	COVER	WORKING PRESSURE	TEMPERATURE
RUBBER HOSE EN 857	1SC & 2SC Hose	EN 857-1SC & EN 857-2SC / ISO 11237-1	Synthetic rubber that is resistant to mineral and vegetable oil based hydraulic fluid	One high tensile steel wire braid for 1SC & two high tensile steel wire braids for 2SC hose	Weather and wear resistant synthetic rubber	88 to 400 Bar	Continuous: -40°C to 100°C

Applications: Hydraulics Systems, Coolants, Water and Air

RUBBER HOSE SAE J30

HOSE	TYPE	STANDARD	CORE	REINFORCEMENT	COVER	WORKING PRESSURE	TEMPERATURE
RUBBER HOSE SAE J30	R6 Hoses	SAE J30 - R6	Synthetic rubber that is resistant to mineral and vegetable oil based hydraulic fluids	Single textile reinforced	Weather and wear resistant synthetic rubber	5 Bar	Continuous: -40°C to 100°C

Applications: Suitable for CNG Fitted Vehicles

METALLIC, PA & BRAIDED HOSES

CORRUGATED METALLIC HOSES

STANDARD & QUALIFICATION CRITERIA	HOSE DETAILS	TYPE	SIZE RANGE	TYPE OF FLUID & TEMPERATURE	WORKING PRESSURE	TEMPERATURE
ISO 10380	Corrugated Metal Hose-Non Braided	Stainless Steel	4-100MM	Steam / Air / High Temperature Fluid	1-26 Bar	-68 to 200°C
ISO 10380	Corrugated Metal Hose-Braided				19-153 Bar	

Construction:
Core Annular corrugated flexible metal hoses with or without braiding
Hose Material: Stainless steel AISI 304, AISI 321 and AISI316L
Braiding Material: Stainless steel AISI 304 and 316 L
Application: Suitable for high temperature application and abrasive environment

PA HOSES

STANDARD	HOSE DETAILS	TYPE	SIZE RANGE	TYPE OF FLUID & TEMPERATURE	WORKING PRESSURE	QUALIFICATION CRITERIA
DIN 73378	Polyamide Tubes for Motor Vehicle Fuel Transfers	Stainless Steel	1.5-14 MM	Fuel Transfer/ -40°C to 100°C	8-42 Bar depending on tube size	DIN 73378, SAE J517
DIN 74324	Polyamide Tubes for Motor Vehicle Air Brake Systems					

Lightweight, flexible hose designed for Pneumatic, Hydraulic, Fuel and Oil installations, Lubrication and Chemicals.
Available in a wide range of colors: natural, black, blue, green, red, yellow and orange.

PTFE & PTFE+ METALLIC BRAIDED HOSE (AVAILABLE WITH ELECTRICAL & NON ELECTRICAL CONDUCTIVE CORES)

HOSE DETAILS	BRAIDING TYPE	SIZE RANGE	TYPE OF FLUID & TEMPERATURE	WORKING PRESSURE	QUALIFICATION CRITERIA
PTFE	PTFE with-out braiding	3-19 MM	All fluids up to 260°C	13-80 Bar (depends On Tube Size)	SAE J517 -100R14
PTFE+ Single Metalic Braiding	PTFE+SS304 braided	3-28 MM	All fluids from -54 to 260°C	44-224 Bar (depends On Tube Size)	SAE J517 -100R14
PTFE+ Double Metalic Braiding	PTFE+SS304 braided	3-29 MM	All fluids from -54 to 260°C	60-310 Bar (depends On Tube Size)	SAE J517 -100R14

All PTFE / Metal Braided Hoses are to internal Fluid Controls standards

Available with Electrical & Non Electrical Conductive Cores

Applicable Standard: SAE J517-R14

Core: Sintered tube of polytetrafluoroethylene (P.T.F.E)

Reinforcement: Single or double braiding of stainless steel wire (304 series)

Application: PTFE hoses have excellent temperature characteristics both in high and low temperature environments. They have excellent chemical resistance, non-contamination properties, low co-efficient of friction and resist deterioration.

Temperature: Continuous: -50°C to 200°C

HOSE CONNECTORS

Hose Connectors are used to connect hoses & flexible tubing to a variety of equipment such as valves, pressure pumps, hydraulic cylinders or any other hydraulic systems. These connectors are assembled onto hoses using different methods such as crimping and welding.



Hose Connectors offered by Fluid Controls® are available in different configuration and sizes with various material combinations. Key features include:

- Design to national & international standards and as per customer specifications. Customisation for specific application requirements also possible
- Connectors are coated to avoid corrosion and environmental conditions (for example, carbon steel connectors are coated with Zinc or Zinc-Nickel)
- Commonly used connector materials are stainless steel, carbon steel, brass. Combinations and exotics are also offered by Fluid Controls®

CONNECTION	DESIGN STANDARD	HOSE CONNECTOR STANDARDS
O Ring Face Seal End	ISO 8434-3 / SAE J1353	ISO 12151-1 Material Sizes Pressure Range
24 Deg. Cone Connector with O ring/DKO Type Nut	ISO 8434-1, DIN 2353	ISO 12151-1 Material Sizes Pressure Range
Flanged End	ISO 6162-1 or ISO 6162-2, SAE J518, Butt Weld & Socket Weld Flange	ISO 12151-3
Metric Stud End	ISO 6149	ISO 12151-4
37 Deg. Cone Connector	ISO 8434-2, SAE J514	ISO 12151-5
60 Deg. Cone connector with O ring, DKO Type Nut	ISO 8434-6, SAE J514	ISO 12151-6
BSPP/BSPT	ISO 7/ISO228	Internal
NPT/NPTF	ASME B1.20.1	Internal
SAE Flange	SAE J518	Internal
Metric	BS 3643-1	Internal
JIS 30 Deg, 37 Deg, 45 Deg & 60 Deg. Cone Connection	JIS B2351 and B8363	Internal
Single Ferrule Connectors	ISO 8434-1, DIN 2353	Internal
Double Ferrule Connectors	Fluids Controls® Design	Internal



FLUID CONTROLS

HOSE ASSEMBLIES

A hose assembly consists of a specific length of hose with a properly chosen connector attached on each end. The choice of the hose and the end connectors are determined by the application environment (pressure, temperature, media etc.) To facilitate customer inventory management and ensure faster turnarounds, Fluid Controls® offers customers designed and integrated hose assemblies. Sourced hoses and in-house manufactured connectors are crimped and assembled at our facility.

FLUID CONTROLS® HOSE ASSEMBLIES PROCESS:

Engineering & Hose Selection

This is the first step, where customer requirements are decoded and modeled to determine the right hose to be used for the application.

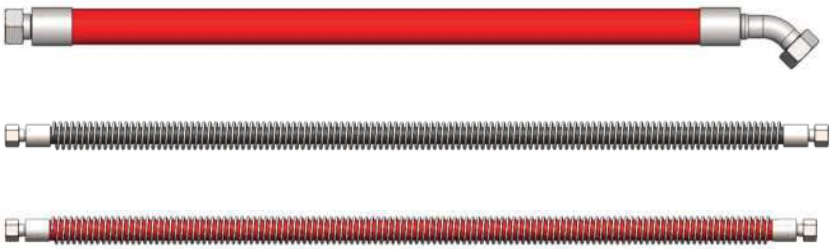
Connector Selection

Based on Solid Modelling / FEA, appropriate connectors and the method for attaching the connectors onto the hose (crimping) is derived. This is validated during prototype trials to ensure that during joining there is no leakage and the assembly is fit for purpose. Once the hose, connectors, and method of crimping are configured, other accessories such as sleeves or springs are determined.

A broad guide to connector compatibility is given below:

HOSE MATERIALS	HOSE ASSEMBLY (HOSE TO CONNECTOR ATTACHMENT METHOD)	SIZE RANGE	TEMPERATURE RANGE	PRESSURE RANGE	MATERIAL	CONNECTION TYPE
Rubber Hoses	Crimping, Clip Connectors, Clamps, Detachable Threaded Sleeves	1/4 to 2"	-54°C to 125°C	Up to 450 Bar	Stainless Steel, Carbon Steel, Brass	DKO, JIC Type, ORFS Type, Stub End, Flange End, Thread End, Weldable/ Brazed end, Single Ferrule, Double Ferrule
Polyamide/ PTFE	Push Lock, Crimping, Detachable Threaded Sleeves	1/4 to 1.1/4"	-54°C to 250°C	Up to 300 Bar		
Metallic Hoses	Welding/Brazing	1/4 to 4"	-60°C to 350°C	Up to 140 Bar		

Testing offered for connectors is based on customer requirements. Fluid Controls® offers Hydro Proof Pressure Testing, Pneumatic Proof Pressure Testing, Burst Pressure Testing, Impulse Pressure Testing, Low/high Temperature Testing, Fire & Smoke Compliance, Corrosion Resistance Testing



Hose for brake application with fire retardant sleeve

Spring guarded hose for brake application without fire retardant sleeve

Spring guarded hose for brake application with fire retardant sleeve

Prototyping

Prior to bulk manufacturing, and based on Solid Modelling FEA, a physical prototype is developed and type tested to ensure application requirements are fulfilled.

Manufacturing the Hose Assembly

Crimping is a critical process, as during the fitment the assembly experiences the maximum load and improper crimping may lead to leakage or slippage.

The hose end is first prepared by cutting the hose to required lengths, and the cut length is then deburred. At Fluid Controls®, the deburring operation is done by an automated skiving machine.

After deburring, the connectors are crimped on the hose end. Fluid Controls® uses a FINN Power electronic hose crimping machine with the appropriate die and load amount. This action permanently deforms the connectors and ensures they tightly grip the hose, thus ensuring a leak-proof connection.

In case welding or brazing is required to connect the connectors onto metallic hoses, Fluid Controls® can provide services for this type of fitment.

If protection accessories such as sleeves and/or springs are needed, Fluid Controls® provides these as required. These accessories are assembled onto the hose before or after crimping, based on specification and geometry.



HOSE TESTING

Each hose assembly undergoes a variety of tests.

HOSES:

Hoses procured from manufacturers undergo tests specified by customers (for example, Burst Test, Proof Test, Leakage Test, Impulse Test). These hoses tests are witnessed by Fluid Controls® inspectors or Third Party Inspectors.

HOSE CONNECTORS:

The connectors undergo tests such as salt spray test, plating test, cyclic closing and opening test, leakage test etc.

HOSE ASSEMBLIES:

Each hose assembly is tested for leakage prior to despatch. Fluid Controls® has a Maximator Hose Test Bench capable of testing burst, proof and leakage as per applicable standards.



FLUID CONTROLS LIMITED

(Formerly known as Fluid Controls Pvt. Ltd.)

Corporate Office: 5th Floor, The International, 16 Maharshi Karve Road, New Marine Lines, Mumbai 400 020, INDIA

Registered Office: Gat. No. 378/1 (Part), Kharabwadi, Talegaon-Chakan Road, Chakan, Khed, Pune- 410501, INDIA

Tel.: +91-22-6823 8000 **I Fax:** +91-22-6823 8001 **I** sales@fluidcontrols.com **I** www.fluidcontrols.com

FC-CO-HA-02-ge