Control Valves for ASUs

Control Valve Solutions for the Cryogenic World

Prepared by FCC | September 2026



AGENDA

Contents

01 Overview



- About us
- Team Chart

02 Products



- ASU & LNG products
- Cryogenic Globe
- Top Entry Cryogenic Globe
- Cryogenic BFV (DOV/TOV)

03 Manufacturing



- Clean Room Specification
- Assembly & Testing Procedure
- Clean Room Inspection
- Cryogenic Testing

04 Credentials



- Gallery
- ASU & LNG proven track record

WHAT WE ARE

About Us

Integrated Facility

Integrated Control Valve Facility, with R&D, Design, Manufacturing & Marketing, all under one roof!

Focused on

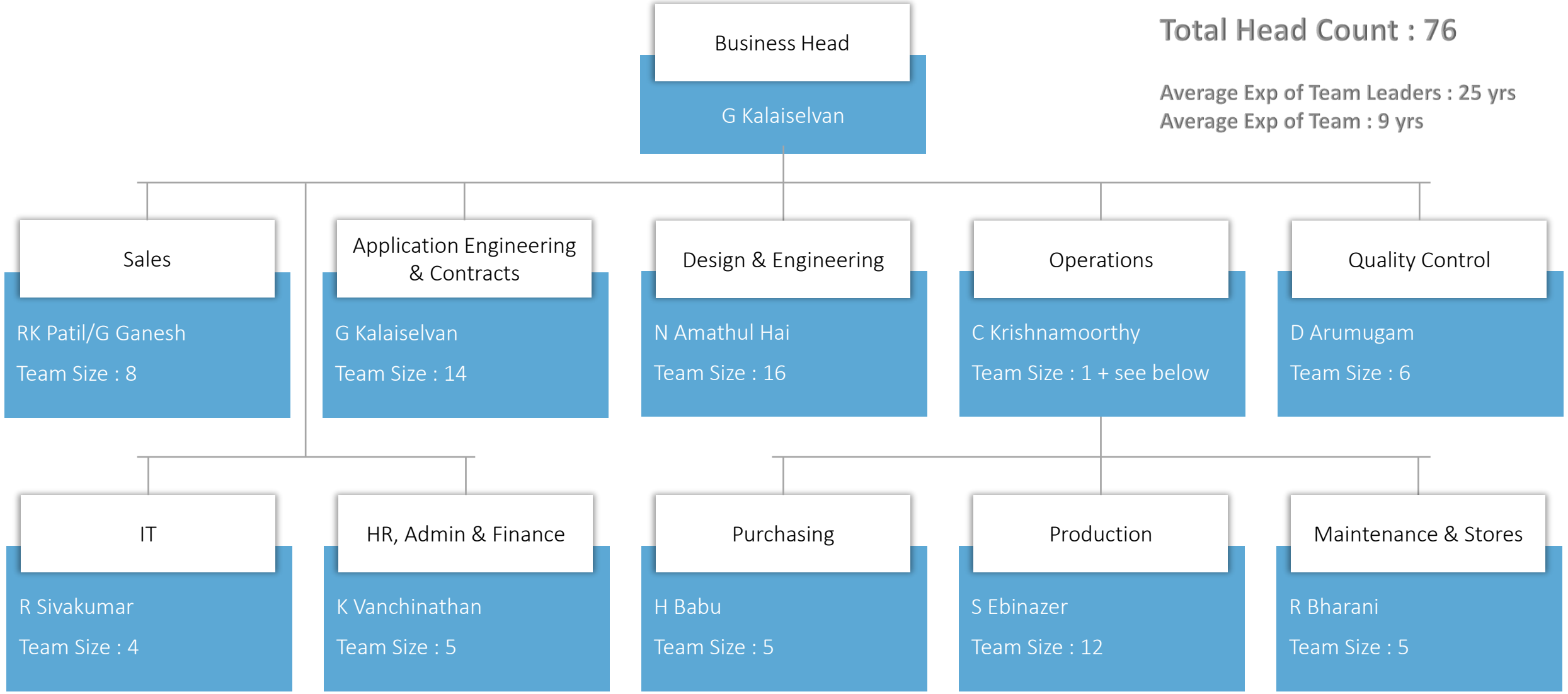
Oil & Gas, **LNG, Air Separation**, Refinery, Fertilizer, Power and Water Industry

Our values

Integrity | Accountability | Excellence



Team Chart


Business Head
G Kalaiselvan
Total Head Count : 76
Average Exp of Team Leaders : 25 yrs
Average Exp of Team : 9 yrs
Sales
RK Patil/G Ganesh
Team Size : 8
Application Engineering & Contracts
G Kalaiselvan
Team Size : 14
Design & Engineering
N Amathul Hai
Team Size : 16
Operations
C Krishnamoorthy
Team Size : 1 + see below
Quality Control
D Arumugam
Team Size : 6
IT
R Sivakumar
Team Size : 4
HR, Admin & Finance
K Vanchinathan
Team Size : 5
Purchasing
H Babu
Team Size : 5
Production
S Ebinazer
Team Size : 12
Maintenance & Stores
R Bharani
Team Size : 5

ASU & LNG Products

Products

- Cryogenic yard valves
- Cold-box valves (top-entry design)
- Bellow seal valves
- Warm-service globe control valves
- Large-size double & triple offset butterfly valves
- Monel valves, aluminium body valves, HTB1 valves
- BAM-certified soft parts
- Optional seal boot



Codes & Standards

Design & Testing for Cryogenic Valves

- ✓ **ISO 28921-1:2022 – Part 1**
  Design, manufacturing & production testing
- ✓ **ISO 28921-2:2015 – Part 2**
  Type testing
- ✓ **BS 6364**
  Valves for cryogenic service



Cleaning for Oxygen & Nitrogen

- ✓ **EIGA Doc 33/18**
  Cleaning of equipment for oxygen service
- ✓ **ASTM G93**
  Cleanliness levels & cleaning methods
- ✓ **CGA G-4.1**
  Cleaning of equipment for oxygen service



Certification & Approvals

- ✓ **ISO 9001**
  Quality Management Systems
- ✓ **OSHAS 45001**
  Safety Management Systems
- ✓ **EMS 14001**
  Environment Management Systems
- ✓ **PED 2014/68/EU**
  Quality Management Systems



Cryogenic Globe

Key Features

- Designed for both cold box and yard installations
- Extension lengths available to suit installation requirements
- Cold box flange available in adjustable or welded configuration, with optional seal boot arrangement
- Flanged, butt weld and socket weld end connections
- Large selection of trim sizes, including low-noise and anti-cavitation options
- Inherently characterized trims available in linear, equal-percentage and other special characteristics.
- Class VI shut-off available with soft seat
- Cleaned and degreased for oxygen service as per customer requirements
- Standard materials: CF8M body, 316 trim and Nitronic 50 stem
- Size & Rating: upto 12” 600#; 6” 1500#



Top Entry Cryogenic Globe

Key Features

- Cryogenic extension integrally welded to the valve body
- Extension lengths available to suit specific installation requirements
- Plug and seat extractable from outside the cold box
- Large selection of trim sizes, including low-noise and anti-cavitation options
- Inherently characterized trims available in linear, equal-percentage and other special characteristics.
- Radiographic testing (RT) available for all welds



Cryogenic BFV (DOV/TOV)

Key Features

- Extension lengths to suit installation
- Cold box flange adjustable or welded. Optional seal boot arrangement is also available
- Cold box flange adjustable or welded. Optional seal boot arrangement is also available
- Cleaned and degreased for oxygen service as per customer requirement
- Class VI with soft seat available
- End connections: Lugged or Flanged
- Std Materials: CF8M body, 316 Disc & Nitronic 50 shaft
- Size & Rating: upto 16” 600#



Cold Box – Seal Boot

Why Seal Boot is Used?

Prevents Ice Formation
Stops moisture from entering the stem/bonnet area, which can freeze in cryogenic temperatures and block the movement.

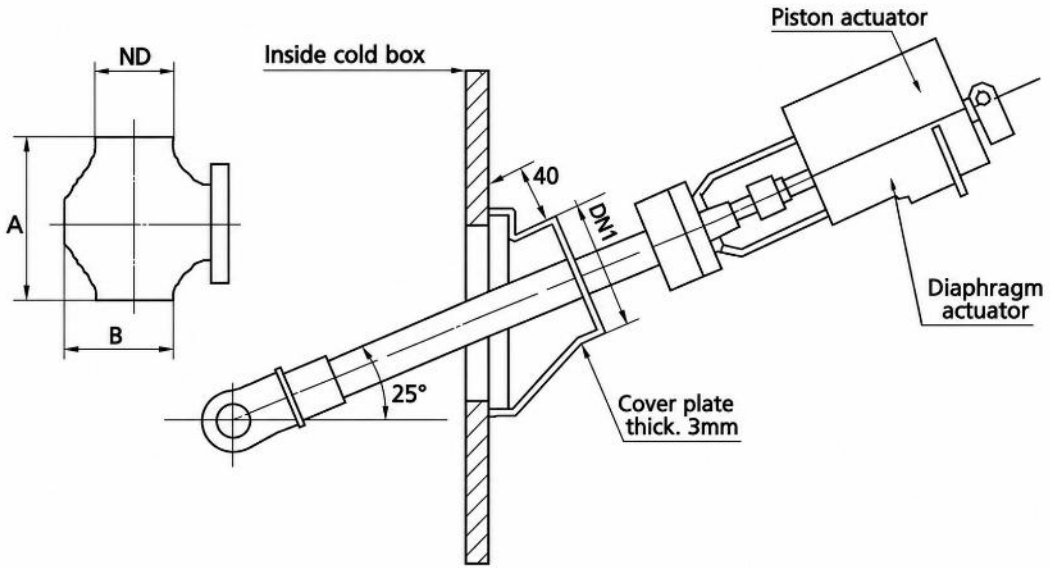
Keeps the Stem Protected
Protects the stem and moving parts from low-temperature exposure, moisture and external contaminants.

Maintains Smooth Operation
Reduces risk of jamming or high operating torque due to ice build-up.

Improves Reliability
Extends service life by keeping the internal parts clean and dry.

Blocks Dust and Moisture
Seals the gap and prevents ingress of dust, water and atmospheric moisture.

Essential for Cryogenic Service
Helps maintain safe and trouble-free operation in very low-temperature environments (e.g., LNG, liquid nitrogen, oxygen plants).





Clean Room Specification

Parameter	Specification
Cleanroom standard	ISO 14644
Cleanroom classification	ISO Class 7; 0.5µm, 1µm, 5µm
Room size	650 sq ft
Buffer zone	200 sq ft
Pre-cleaning zone	300 sq ft
Air changes	60 ACPH
Personnel (max)	3 (assembly & testing) + 2 (inspection)
Positive pressure (min)	15 Pascal
Filter size	Primary 10µ; Final 0.3µ (HEPA)
Temperature	24ºC ± 2ºC
Relative humidity	55% ± 5%
AHU capacity	8000 CFM
Oxygen level	19.5–23.5% vol
Air velocity	0.3-0.4 m/s @ 0.15–0.3 m below supply duct at 9 different locations

The Clean room shall be fitted with Oxygen Level Monitor and Humidity & Temperature Monitor

Parameter	Specification
Preventive monitoring	Pressure & velocity monitoring
Material handling capacity	1000 kg (EOT crane)
Seat leak test (test rig)	Up to 4” valves
Seat leak test (test flanges)	6” to 12” valves
Functional test	Open/close, air & electrical fail action, positioner calibration, hysteresis & linearity, SOV trip, limit-switch continuity
Valves handled at a time	1–4”: 15 • 6–8”: 10 • 10”+: 5
Valve & actuator height	2.6 m – up to 12” valve
Trolley	SS304, 4-tier (2 tonnes)
Work bench (L×B×H)	2 m × 1.25 m × 1.8 m
Calibration frequency	Once a year

Consumables & Soft Parts

1 Clean room Consumables

Aqueous Cleaner
Loctite SF 7840 Natural Blue

Solvent
Isopropyl Alcohol

Liquid Leak Detector
Snoop

Lubricant
KRYTOX NRT 8908

Coverall Suit
For personal protection

Lint-Free Gloves
For clean handling

Goggles
Eye protection

Disposable Shoe Cover
Maintains cleanroom hygiene



2 BAM Certified parts

Description	Brand	Material	GOX / LOX Compatibility Testing Ref.
Gasket	Sigraflex Folie Type 'E'	Graphite	BAM 2-1432/2014 E
Gland Packing	Trelleborg Turcon – M12	PTFE	BAM 2-1541/2013 E
Balance Seal	Trelleborg Turcon – M12	PTFE	BAM 2-1541/2013 E
Soft Seat	Trelleborg Turcon – M12	PTFE	BAM 2-1541/2013 E
Gland Packing	Dyneon TF4303	PTFE	BAM AZ II-1473/2009 V
Balance Seal	Dyneon TF4303	PTFE	BAM AZ II-1473/2009 V
Soft Seat	Dyneon TF4303	PTFE	BAM AZ II-1473/2009 V

Overall Process

1 Preparation for assembly & Component Inspection,

All valve components shall be cleaned as per the procedure prior to assembly in the clean room.

All test flanges and bolting are **degreased prior to use** in the Clean Room

Component inspection is performed in the buffer zone

All personnel must **wear the special nylon clothing provided**

2 Assembly & Final inspection

Valve Assembly is performed in the main clean room.

All valve tests (seat leak test & functional tests) are carried out with **bottled Nitrogen** — air must never be used as the test medium

Particular attention must be paid to handling components inside the valve. Assembly tools are provided; special tools are subjected to the **cleaning operation** before use.

3 Packing after Assembly

After completion of valve assembly, Inspection & Final cleaning, the valve is covered with a thick polythene bag, Sealed and vacuumized, prior to transferring to outside the clean room for safe carton box / wooden box for shipment.



Label with the below text is fixed on the Polythene cover "CLEANED FOR OXYEN SERVICE – KEEP SEALED UNTIL REQUIRED FOR USE“

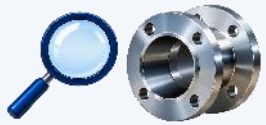
Assembly & Testing Procedure for O_2 Service

1 Clean Components



Components cleaned with 'approved cleaning agent'

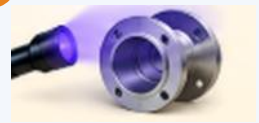
2 White Light Test



Components checked under white light

Test Pass

3 UV Light Test



Components checked under UV light

Test Pass

4 Wipe Test



Components checked with wipe test

Test Pass

5 Transfer to Clean Room



Transfer cleaned components to clean room

Test Fail *Test Fail* *Test Fail*

6 If any test fails, disassemble and rework

7 Assemble the Valve



Assemble the valve as per GA & specification sheets

8 Apply KRYTOX NRT 8908



Apply KRYTOX NRT 8908 on fasteners

9 Seat Leak Test (N_2)



Seat leak test with N_2

Test Pass

10 Inspection

Final Inspection by QC

11 Packing & Labeling



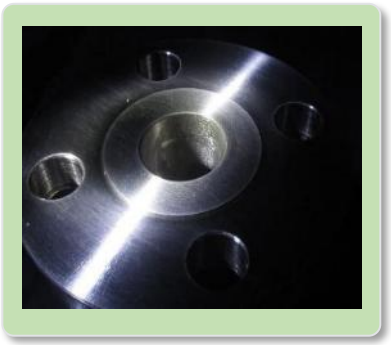
Valve packed and labelled 'CLEANED & ASSEMBLED FOR O_2 SERVICE'

Clean Room Inspection

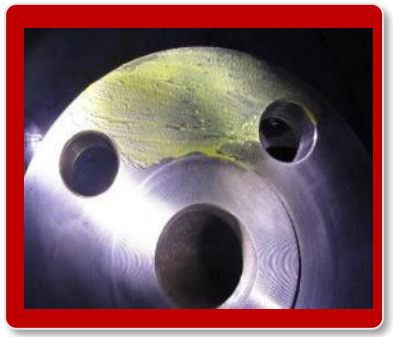
What to inspect…	Inspection		
	White Light	UV Light	Wiping
1 Visual examination should be free from, • Moisture, Cleaning agents, Flux residues from brazing, soldering or welding • Adhered scale, weld spatter, fibers or other foreign matter • Organic material such as oil, grease, paint and non-approved adhesives and sealants			
2 Visual examination of surfaces under Ultra-Violet light (Wavelength 320-380) should be free from • Hydrocarbon fluorescence or significant quantities of textile fiber.			

When visual inspection or a wipe test is not possible, the chlorinated solvent method shall be used to perform the inspection.

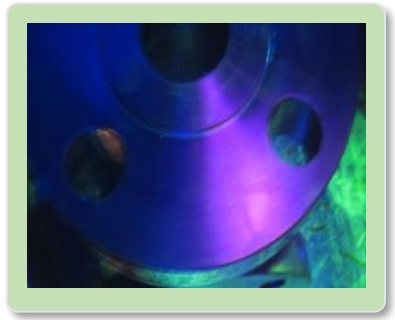
PASS

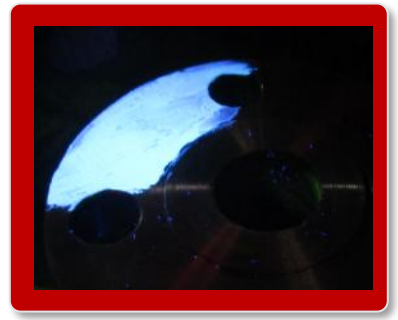


FAIL



White light inspection





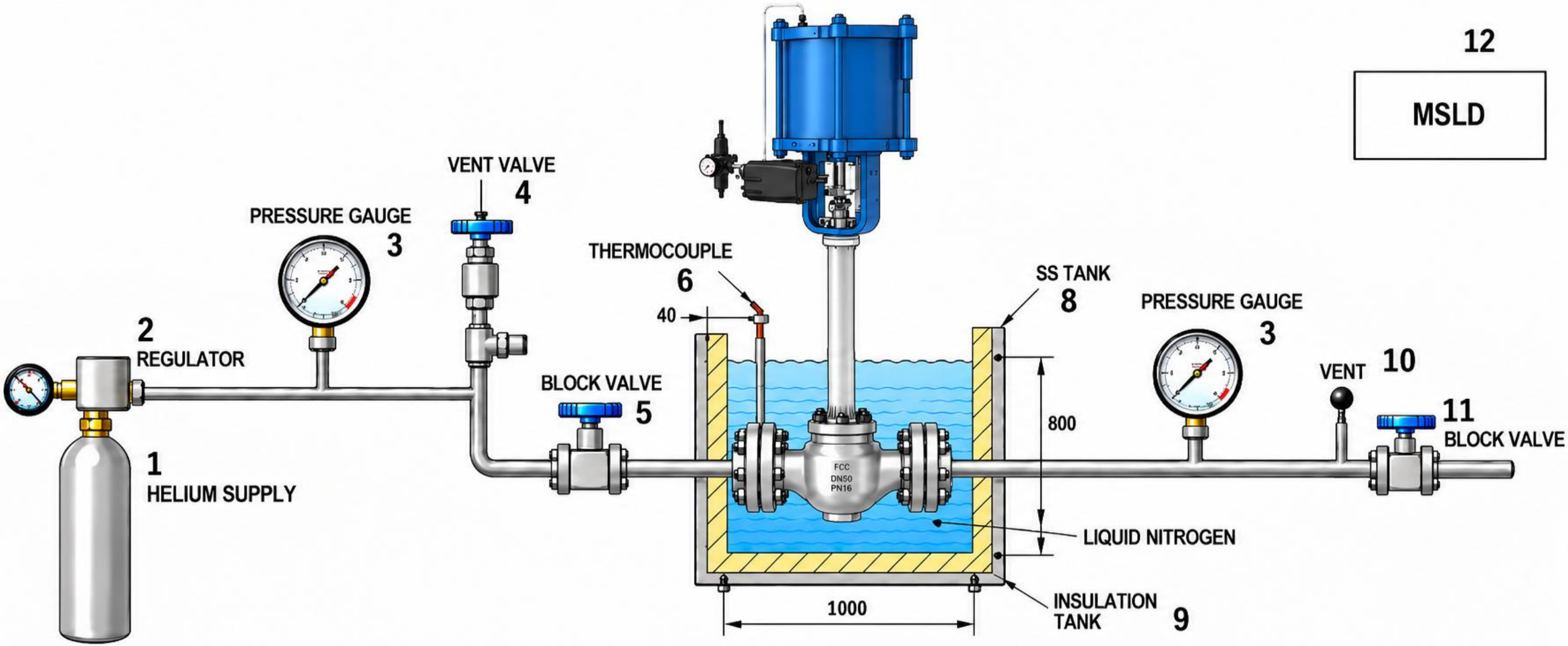
UV light inspection





Wipe Test

Cryogenic Test Schematic



Cryogenic Test



Valve mounted on the cryogenic test rig prior to LN_2 immersion



Valve under liquid-nitrogen immersion during cryogenic soak test

Safety in Cryogenic Testing

1

Material suitability for Cryogenic Temperature

All tubing, fittings, test flanges, fasteners, gaskets, needle valves etc. shall be of stainless steel & suitable for -196 deg C

2

Pressure build-up after completion of the Test

Incase of any cryogenic high pressure gas test, ensure that the gas pressure is released immediately after the cryogenic test. This protocol must be followed without fail

3

Personal Protective Equipment

- Wear suitable protective clothing, gloves, goggles and face shields
- Use respiratory protection when required by the hazards

4

Ventilation & Air Quality

- Ensure adequate ventilation in cleaning areas
- Work upwind of solvent vapor accumulations outdoors
- Use breathing apparatus where oxygen deficiency is possible

5

Safe Chemical Handling

- Read the Safety Data Sheet (SDS) before using cleaning agents
- Avoid skin contact and inhalation of harmful vapors
- Never use prohibited chemicals — carbon tetrachloride, trichloroethane

6

Fire & Confined Space Safety

- Keep solvents away from flames, sparks and welding operations
- Prevent flammable mixtures during purging and solvent handling
- Establish safe work procedures before entering confined spaces

7

Safe Disposal & Training

- Train personnel in safe use, handling and disposal of cleaning agents
- Dispose of chemicals per applicable regulations
- Follow manufacturer recommendations and safety procedures



Technicians with full PPE prior to cryogenic testing

Clean Room



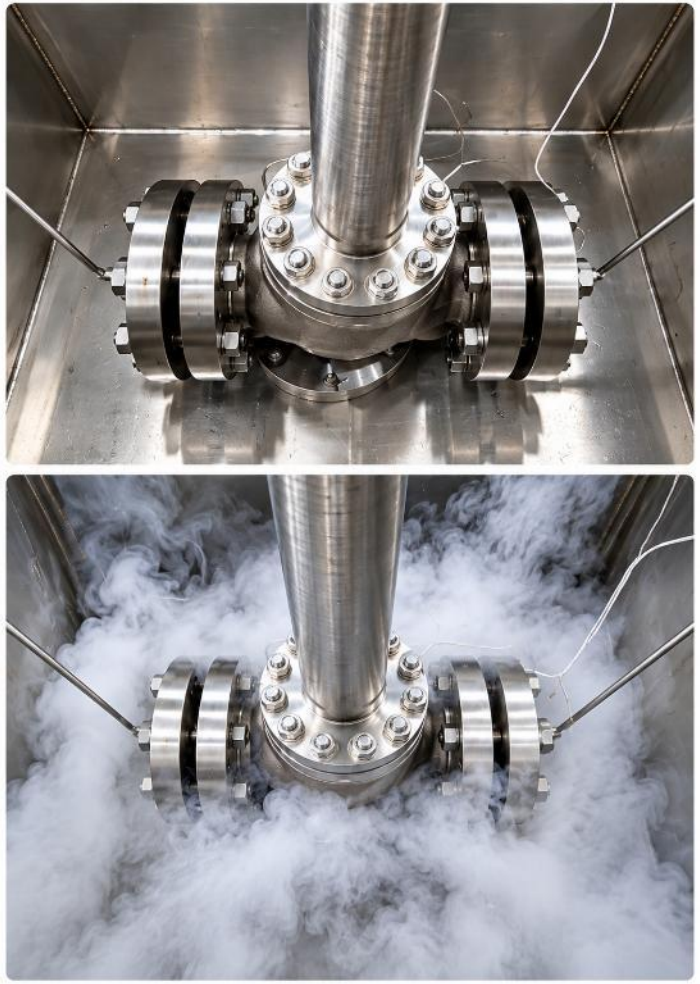
Component Cleaning







Cryogenic Testing

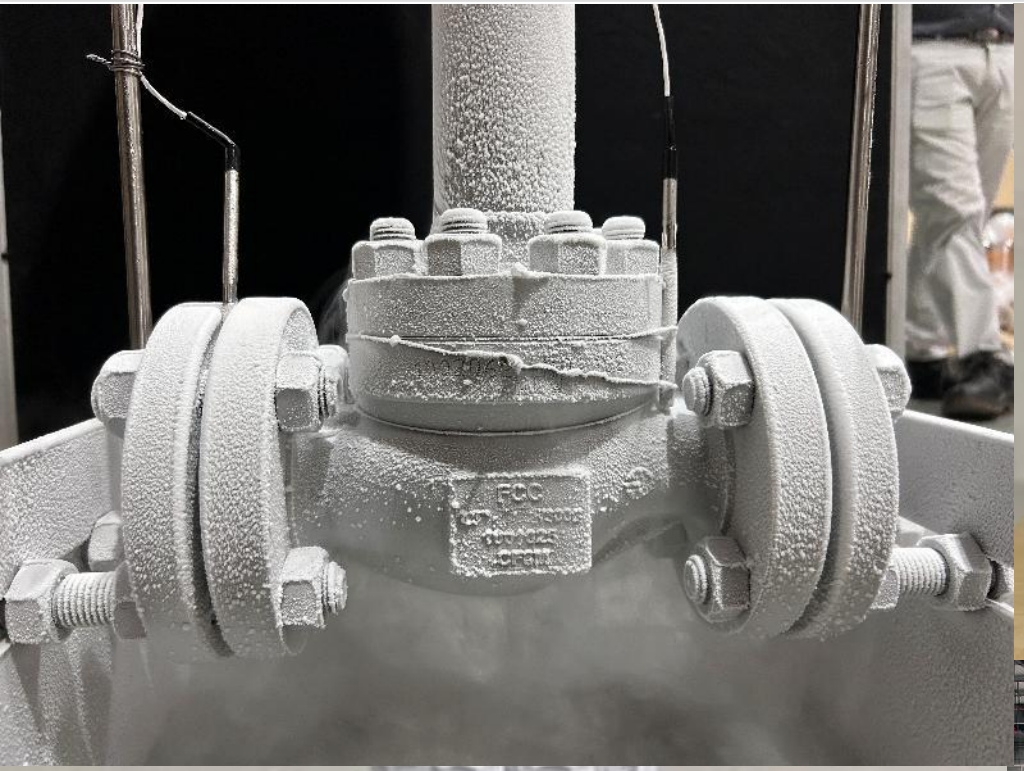






GALLERY

Cryogenic Valves















ASU & LNG proven track record

Greenville LNG

DenEB Air Gases

इसरो isro

ELLENBARRIE INDUSTRIAL GASES LTD

INOX AIR PRODUCTS

NovaAir an Air Liquide company

INOXCVA INOX India Ltd.

AIR WATER

CHART



Thank You for your attention!

Doing the Right Things, the Right Way, with Passion & Courage