

**REPORT OF DOMESTIC MANUFACTURING  
OF ITEM HAVING HIGHER IMPORT &  
SCOPE OF EXPORT**

**ON**

**VALVES METALLIC**

**PREPARED BY**

**D. D. GAJBHIYE, IEDS  
JOINT DIRECTOR  
MSME-TESTING STATION  
BHOPAL (M. P.)**

## INDEX

S. N.	PARTICULARS	PAGE NO.
01	INTRODUCTION	3
02	CATEGORIZATION OF PRODUCT	4
03	COMMERCIAL DETAILS	
	01. HSN Code of Product	06
	02. NIC Code of Product	06
	03 Clusters Already existing on the product	06
	04. Possibility to create clusters on the product	06
	05. Probable areas where the products product manufacturing can be established	06
	06. Number of industries registered as MSMEs	07
	07. Data about imports of the products	07
	08. Data for the exports of the product	07
	09. Scope for number of units can be established further	07
04	TECHNICAL DETAILS	
	01. Sector in which the product is falling	08
	02. End users of the products/ sectors	08
	03. Governing International Specifications	08
	04. Process Flow Chart	09
	05. Qualitative Parameters of Project	10-14
	06. Details of product licenses to be obtained	15
	07. Equipments required for manufacturing	15
	08. Test facilities required for the product	15-16
	09. The technology existing for the manufacture of product	17
	10. Suggested modern technology for implementation	17
	11. Raw Materials and availability	18
05	DETAILED PROJECT REPORT	23-31
06	SCHEMES AND CONSULTANCY SERVICES	31-33

## **INTRODUCTION**

A valve is a device that regulates controls or directs the flow of a fluid by opening, closing, or partially obstructing fluid flow. A valve is a device that regulates, directs or controls the flow of a fluid (gases, liquids, fluidized solids or slurries) by opening, closing or partially obstructing various passageways. Valves are technically called as valves fittings, but are usually discussed as a separate category. In an open valve, fluid flows in a direction from higher to lower pressure. The word is derived from the Latin word “valva”, the moving part of a door, in turn from *volvere*, to turn, roll.

Valves have many uses, including controlling fluid flow for irrigation, industrial uses, controlling process and residential uses such as on/off and pressure control to dish and clothes washer and taps in the home. Even aerosols have a tiny valve built in valves are also used in the military and transport sectors.

Basically, it controls flow & pressure. Different types of valves are used to serve these functions. There are mainly about 9 Different Types of Valves used in Piping such as Gate Valve, Globe Valve, Check Valve, Plug valve, Ball Valve, Butterfly Valve, Needle Valve, Pinch Valve and Pressure Relief Valve. The item proposed is basically a casting, machined & assembled product. The castings of metals and alloys of copper, zinc, tin, aluminium, lead, alloy steel, CI etc. come under the group of non-ferrous & Ferrous castings. Some of the prominent valve castings are Brass, Bronze, Aluminium Bronze, Gun Metal, Stainless Steel, Cast Iron etc. are used to manufacture various types of valves for domestic and industrial applications.

## CATAGORIZATION OF PRODUCT:

ITEM SERIAL NO.	317
ITEM	VALVES METALLIC
PRODUCT CODE	-----
VALUE OF IMPORTS	974 Cr.( AS PER THE DATA OF 2019-20)
QUALITY AND STANDARDS	AS PER NATIONAL & INTERNATIONAL STANDARDS
MONTH AND YEAR OF PREPARATION	MAY' 2021
PREPARED BY	D. D. GAJBHIYE, JOINT DIRECTOR MSME-TESTING STATION, BHOPAL (M. P.)

### 01. COMMERCIAL DETAILS

#### Market Potential:

The global industrial valves market size was valued at USD 48.1 billion in 2020 and is projected to reach USD 85.7 billion by 2025. It is expected to grow at a Compound Annual Growth Rate (CAGR) of 12.3% during the forecast period. Increasing demand for valves from the pharmaceuticals industry due to the outbreak of the COVID-19 pandemic, growing focus on the development of smart cities globally, rising need for connected networks to maintain and monitor industrial equipment, and surging requirement for establishing new nuclear power plants and revamping existing ones are the key driving factors for the industrial valves market.

The world is facing an economic crisis caused by the COVID-19 pandemic outbreak. The pandemic has affected the oil & gas industry badly, with oil prices slashing like never before. Major producers of oil are running out of storage space for extracted oil, and the demand is on a declining trend. This has resulted in a huge gap between supply and demand. Oil & gas is one of the key industries using valves. The water & wastewater treatment and energy & power industries are also among the key end-users of valves. These industries

are also witnessing a shrinking demand due to the pandemic situation globally. There is a restriction on foreign trades due to the lockdown of international borders, non-operational distribution channels, and various government laws to take precautionary measures for public health and safety. However, it is expected that there will be an increasing focus on hygiene and sanitation due to the rise in people's concern for a better and safer lifestyle. An increase in demand from the energy & power sector is also likely to drive the industrial valves market for the energy & power end-use industry gradually from 2021 to 2025. Metallic valves are non-ferrous & ferrous castings depending upon applications, are fast consuming items and the area of application for these items are vast due to their certain inherent advantages of mechanical and chemical properties.

The industrial valves market is segmented on the basis of type, function, material, accessories, size and application. The growth among segments helps to analyse niche pockets of growth and strategies to approach the market and determine your core application areas and the difference in your target markets.

On the basis of type, the industrial valves market is segmented into gate valve, globe valve, ball valve, butterfly valve, diaphragm valve, check valve, plug valve, pinch valve, needle valve, pressure relief valve and others.

On the basis of function, the industrial valves market is segmented into isolation, regulation, safety, relief valve, special purpose and non-return.

On the basis of material, the industrial valves market is segmented into ductile iron, carbon steel, plastic, brass, bronze, copper, aluminium and others.

The industrial valves market is also segmented on the basis of accessories into hydraulic filter, power cable, mounting screws and bolts, seal kits, dust protection cover and others.

On the basis of size, the industrial valves market is segmented into 1 inch to 6 inch, 6 inch to 12 inch, 12 inch to 24 inch, 24 inch to 48 inch and above 48 inch.

On the basis of application, the industrial valves market is segmented into oil and gas, water and waste treatment, chemical, energy and utilities, food and beverages, pharmaceutical, agriculture, marine, automotive, metals and mining, paper and pulp and others.

### **Market Dynamics:**

**Driver:** Increasing demand for valves from healthcare and pharmaceuticals industries due to the outbreak of the COVID-19 pandemic

**Restraint:** Lack of standardized norms and governing policies

**Opportunity:** Implementation of valves in water & wastewater treatment plants to handle sanitation-related issues with the rapid spread of COVID-19

**Challenge:** Adverse impact of COVID-19 pandemic on key end-user industries such as oil & gas and energy & power

On-off/Isolation valves to account for a larger share of the industrial valves market by 2025. Steel industrial valves accounted for the largest market share in 2019. Steel industrial valves accounted for the largest market share in 2019. Globe valves to account for the largest market share upto 2025. Oil & gas to account for the largest market share during the forecast period expected by 2025.

- **HSN Code of the Product:**
  - 84819090 - Metal Ball Valve
  - 84818030 - Industrial Valve
  - 84818090 - Metal Ball Valve Red [For Water Filter]
  - 84812000 - Mechanical Valve
  - 84818049 - Gun Metal Valves size 40 mm.
  - 84099111 - Valves, inlet & exhaust, piston, Piston rings, piston assemblies
- **NIC Code of the Product:** Manufacture of other pumps, taps and valves etc.- 28132
- **Clusters already existing on the Product if any**

Majority of industries including service enterprises are observed in the state of Punjab, Karnataka, Maharashtra, Tamil Nadu, Uttar Pradesh, Rajasthan, MP, Haryana and West Bengal. Considering population of enterprises, existence of clusters may be presumed in these states of country as per data available on the Udyam Registration portal. (Sourced: Udyam Registration Portal).
- **Possibility to create established clusters on the product-**

Subject to availability of data from IC offices of the respective states. However, creating cluster in the sates of Jharkhand, Chhattisgarh, Bihar, Telengana, Andhra Pradesh, Haryana, Gujrat is possible of this segment of industries as per data available on the Udyam Registration portal. (Sourced: Udyam Registration Portal).
- **Probable areas or Districts where the products project manufacturing or project can be established -**

There is Possibility to establish projects for manufacturing of metallic valves in the states of as Jharkhand, Chhattisgarh, Bihar, Telengana, Andhra Pradesh, Assam, MP, Odisha etc. in the states of the country.

- **Number of Industries registered as MSME is available in the Manufacturing of the Product :**

5304 Nos. Of units ( as per Udyam Registration portal)

- **Data about Imports of this products for the past Three years :**

2017-18	2018-19	2019-20
831.277852 Cr.	981.645622 Cr.	974.701027 Cr.

- **Data available for exports well against this product for the past two years**

2017-18	2018-19
234.876599 Cr.	272.013751 Cr.

- **Scope for the number of unit's number of years can be established further**

a) Average per unit cost = Rs 2930/- ( Average of 05 types of valves for industrial and domestic applications of SS, Gun Metal, M.S, Steel valves and Cast Iron)

b) Demand in terms of rupees to be met =

Average of Imports for the year 2017-18&2018-19/Average per unit cost Rs 929208.167 / Rs. 2930 = 31,71,360 Nos.( Average) Of valves to be manufactured per annum.

Scope in the domestic Market: In addition to this 31,71,360 Nos.(ave.) of valves are imported on annual basis.

Approximately 600 Nos. of units need to be established in all to cater the projected annual demand of metallic valves.

## **02. TECHNICAL DETAILS**

- **Sector in which the product is falling:** Industrial Manufacturing Sector (Engineering Industries falling under Metallurgy & Mechanical trade)
- **End users of the products/ Sectors -** Processing and storage in Petroleum Refineries, Electric Power Plants, Food Processing Plants, Processing and storage in Nuclear Plants, Pharmaceutical, Domestic water supply,

Administrative/ commercial water supply in the sectors like municipal corporation, public health engineering, irrigation deptt., Agriculture sectors etc.

- **Governing international specification:**

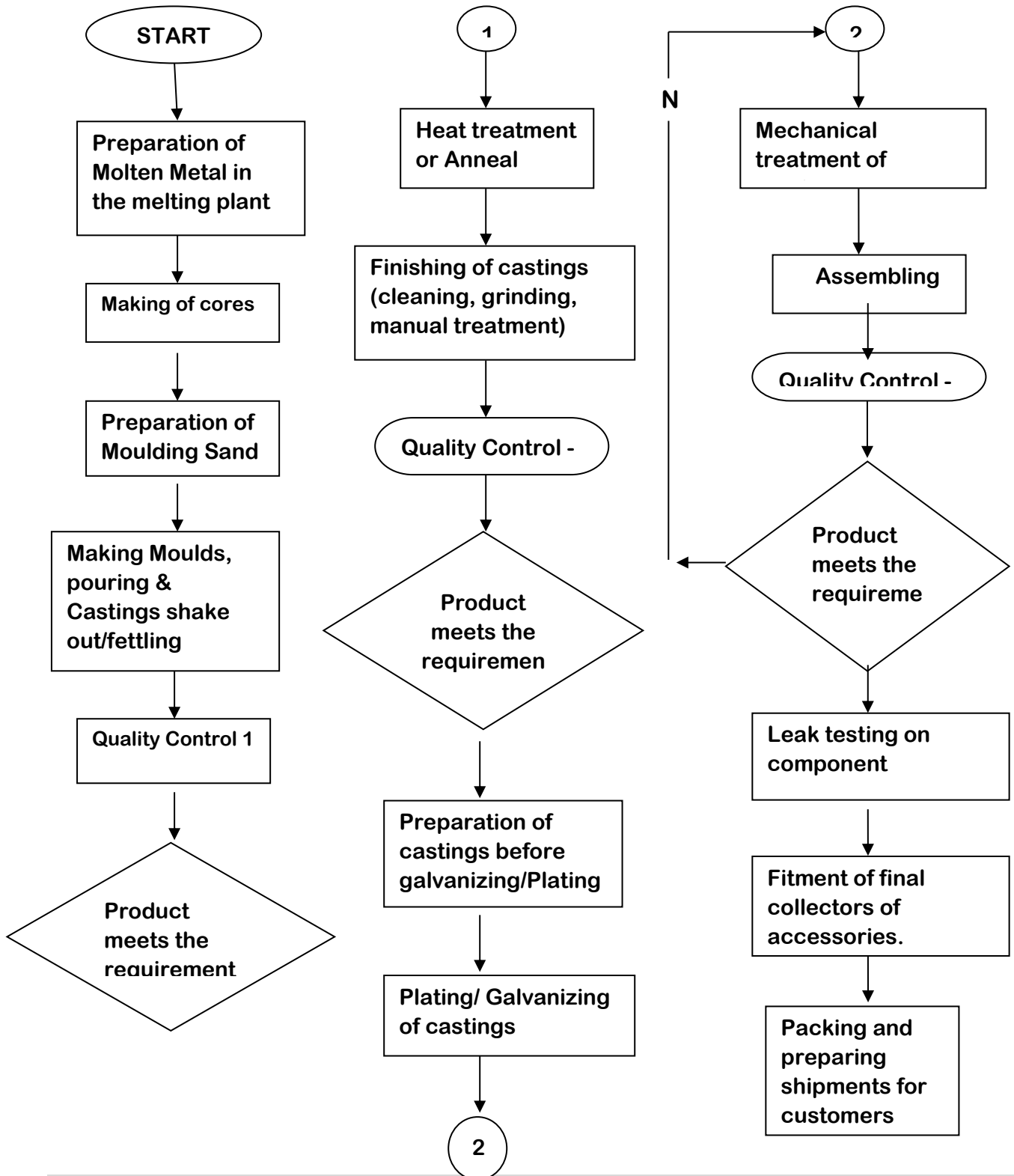
Standards mainly followed at international level are: DIN, ASTM, GOST, GB, JIS, ANSI, BS etc. Details of some of them are as mentioned below:

Sl. No.	Standards	Particulars
01	ASME B31.1	Valves standards, excluding cast iron and bronze valves
02	ASME B31.3	lists four valve standards, excluding cast iron and bronze valves.
03	ASME B31.4	lists eight valve standards, once excluding cast iron and bronze valves.
04	ASME B31.8	five valve standards, excluding cast iron and thermoplastic valves
05	BS EN 16767:2020	Industrial valves. Metallic check valves
06	BS EN 12266-1:2012	Industrial valves. Testing of metallic valves. Pressure tests, test procedures and acceptance criteria. Mandatory requirements
07	GOST 9697-87 R	Stop valves. Main parameters
08	GOST R 23866-87	Single-seated, double seated and cage control valves. Basic parameters
09	GOST 31294-2005	Direct-acting safety valves. General specifications
10	GB12232	General valve -- flanged ends iron gate valve
11	GB12233	Wedge RF Flange Gate Valve
12	GB12238	Standard Cast Iron Butterfly Valve Flange Style
13	JIS B 0100:1984	Glossary of terms for valves
14	JIS B 2001:1987	Nominal size and bore of valves
15	JIS B 2002:1987	Face-to-face and end-to-end dimensions of valves
16	JIS B 2003:1994	General rules for inspection of valves
17	JIS B 2004:1994	General rules for marking on valves



- **Flow process chart of the manufacturing**

Process of manufacture of metallic valves is based on sand casting method. The moulds are prepared for particular items. The metal is melted in an induction furnace. The molten metal is poured in the moulds and after cooling the product, it is machined, assembled and packed.



- **Qualitative parameters of the product:**

The standards are followed as per BIS and International standards and the items proposed are mainly governed by National and International quality standards such as BIS, ASTM, BS, GB, JIS, GOST etc. The products are made as per customer's specifications for mechanical and chemical properties.

Valves are categorized as follows:

1. **Industrial Valve** – Valves which are used in big projects and for industrial purpose is known as industrial valves. It is found in virtually every industrial process, including water & sewage processing of oil, gas & petroleum, food manufacturing, chemical & plastic manufacturing and many other fields.
2. **Domestic Valve** – Valves which are used in houses are known as domestic valves. People in developed nations use valves in their daily lives, including plumbing valves, such as taps for tap water, gas control valves on cookers, small valves fitted to washing machines and dishwashers, safety devices fitted to hot water systems and poppet valves in car engines.

Ways of Operating Valves:

**Hand wheel & Lever Operated:-** These kind of valves is called manually operate valves. They are operated by a handle, lever, pedal or wheel. It may also automatic, driven by changes in pressure, temperature, or flow. These change in pressure, temperature or activates the valve, examples of this type of valves found commonly are safety valves fitted to hot water systems or boilers.

**Actuator Operated Valves:-** Electrical actuator on a valves in a power plant. A Black Hand wheel is visible on the actuator, which allows manual positioning of the valves. The valve actuator opens or closes the butterfly disc of the valves based on electrical signal sent to the actuator another valves actuator is visible in the background, with windows to indicate the valve position of the valve used for the automation of the industrial valves, actuator can be found of all kinds of process plants. They are used in waste water treatment plants, power plants, refineries, mining and nuclear process, pipelines. Valve actuators play a major part in automating process control. The valves to be automated vary in both design and dimension. The diameters of the valves range from a few inches to a few feet.

**Limit Switch Operated Valves:-** It is a switch operated by the motion of a machine part or presence of an object. They are used for controlling machinery as part of a control system, as safety interlock, or to count objects passing a point (1) a limit switch is an electromechanical device that consists of an actuator mechanically linked to a set of contacts to make or break an electrical connection. limit switches are used in a variety of application and environment because of their ruggedness, ease of installation, and reliability of operation, they can determine the presence or absence, passing, positioning and end of travel of an object. They were first used to define the limit of travel of an object; hence the name “Limit Switch”.

The Indian standards are mainly followed are as mentioned bellow:

Sl. No.	Spec. No.	Product Description/ Particulars
01	IS 10459 : 1983	Specification for general purpose plug valves
02	IS 10605 : 1989	Steel globe valves (Flanged And Butt Welded Ends) for petroleum, petrochemical and allied industries - Specification (First Revision)
03	IS 10611 : 1983	Specification for steel gate valves (Flanged And Butt - Welded Ends) for petroleum, petrochemicals
04	IS 10989 : 1984	Specification for cast or forged steel check valves (Flanged Or Butt Welding Ends) for petroleum, petrochemicals, chemicals and allied industries
05	IS 11132 : 1985	Specification for ammonia valves
06	IS 11611 : 1992 (1 Revision)	Fire test for valves (Including Soft Seated Quarter Turn Valve) - Method of test (First Revision)
07	IS 11699 : 1986	Specification for steel plug valves for petroleum, petrochemical and allied industries
08	IS 11790 : 1986	Code of practice for preparation of butt welding ends for pipes, valves, flanges and fittings
09	IS 11791 : 1986	Specification for diaphragm type valves for general purposes
10	IS 12992 : Part 1 : 1993	Safety relief valves - Spring loaded - Specification: Part 1 design

11	IS 12992 : Part 2 : 1990	Spring loaded safety relief valves specification: Part 2 testing
12	IS 13095 : 2020 (1 Revision)	Butterfly Valves for General Purposes ( First Revision )

**Different Types of Valves:**



**Threaded Valve**

**Flange Valve**

**Butt Weld Valve**

**Socket Weld Valve**

**Wafer type Valve**

**Lug Type Valve**



**Butterfly valves- 15 mm-100mm**



**Globe Valves-1/2"-16"**



**Pressure relief valve**



**Gate Valve**



**Check Valve**



**Ball Valve**



**Bronze globe valve**



**Float valve**



**Plug Valve**



**Needle Valve**



**Pinch Valve**



**Non-Return valves**



**Foot Valve**

## **TYPES OF VALVES & SPECIFICATIONS**

<b>Sl. No.</b>	<b>VALVE TYPE</b>	<b>STANDARD</b>	<b>SIZE RANGE</b>
01	Sluice Valve	IS 14846	50 mm to 2000 mm
02	Gate Valve	IS 14486: BS 5150	50 mm to 2000 mm
03	Gate Valve	BS : 1414	50 mm to 600 mm
04	Swing Check valve ( single Door)	IS: 5312 ( Part 1)/ BS 5153	50mm to 600mm
05	Swing check valve ( Muli door)	IS 5312 ( part II)	500 mm to 1200 mm
06	Globe valve	IS : 9339/BS 5152	50 mm to 350 mm
07	Air Valve	IS 14845	50 mm to 200 mm
08	Double flanged Butterfly valve	IS : 13095/BS 5155	50 mm to 2000 mm
09	Wafer type Butterfly valve	IS : 13095/BS 5155	50 mm to 300 mm
10	Dual Plate Non return valve	API 594	50 mm to 1400 mm
11	Ball Float valve	As per GK catalogue	50 mm to 300 mm
12	Foot valve	IS : 4038	50 mm to 450 mm
13	Y Type Strainer	As per Manufacturer standard	25 mm to 500 mm
14	Basket ( Stop) strainer	As per Manufacturer standard	26 mm to 600 mm
15	Ball Valve	BS : 5351	25 mm to 200 mm
16	Knife edge gate valve	As per Manufacturer standard	50 mm to 900 mm

- **Details of the product licence to be obtained:**

1. Company Certifications-Company ISO 9001 – 2015
2. F.M. Approvals
3. ISI Approvals
4. NSF Listing-NSF 61/372 Certificate
5. UL Certification
6. CE EN 331 Certifications for GAS Valves
7. TPI Certification for Valves
8. Water Meter FCRI certificate
9. Approval from Designers & Implications like : AE Com Approval, Integrated Building Consultants, Indian Plumbing Association, Maple Engg, MEP Consulting Engineers. Etc
10. CE, RoHS, GS, ISO 9001, ISO 14000, IATF16949, HSE, ASME

- **Equipment required for manufacturing of the product:**

Sl. No.	Description	Qty	Amount in Lacs
	<b>Foundry Shop</b>		
01	75 kw/150 kg, 1000 Hz, 1500-1600 deg. induction furnace complete with control panel, hydraulic tilting arrangement, water cooled and standard set of bus bar with crucible including all accessories	01	20.00
02	Power operated molding machine complete with electric motor and accessories	01	5.00
03	Core oven/heating chamber	01	3.00
04	Moulding boxes and ladles	01set	2.00
05	Fettling equipments, patterns and tools	01 set	2.00
06	Hot Metal Mixture – 01 Ton Capacity	01	2.25
07	Heat treatment Furnace	01	1.50
	<b>Mech. Workshop</b>		
08	General purpose lathe with 2 HP motor and starter	01	3.00
09	Bench drilling machine of 25 mm capacity with 1HP motor with starter	01	0.60
10	Ferrous & Non-ferrous metal cutting machine	01	0.64
11	Double ended bench grinding m/c with 2 HP motor	01	0.75
12	Electronic Weighing machine up to 1000 kgs	01	0.75
13	Pneumatic hand grinder	01	0.40
14	Welding machine 400 amp air cooled complete with welding set	01	0.35

15	15 HP Air compressor complete with air tank and other accessories	01	2.25
	Other Office Exp.		
16	Office furniture and fixture	LS	2.00
17	Electrification and installation of machinery	LS	2.00
	<b>Total</b>		<b>48.49</b>
		<b>Say</b>	<b>48.50</b>

- **Test facilities required for the product**

The unit can at least set up their own captive testing laboratory for chemical, mechanical and metallurgical testing with mandatory certification.

Sl. No.	Name of Equipment/ Machine	Qty	Capacity	Amount (in Lacs)
01	Universal Testing Machine	01	600 KN	10.00
02	Universal Hardness Testing Machine	01	HRA, HRB, HRC, BHN	2.00
03	Outside Micrometer	01	0-25 mm	0.036
04	Digital Dial Vernier Calliper	01	300 mm	0.085
05	Depth Guage / Bore Guage	01	100 mm	0.04
06	Optical Emission Spectrometer for material characterisation of with Fe, Cu & Al	01	--	25.00
08	Metallurgical microscope	01	--	4.50
08	NDE: Radiography Testing, Magnetic Particle, Dye Penetrant	01	--	8.00
			<b>Total</b>	<b>50.66</b>

In addition to above mentioned testing parameters, Engineering Testing, Fire testing, Cryogenic Testing, Type-Testing, API RP591 Evaluation, Fugitive Emissions Testing, Valve Failure Analysis etc. are also conducted as per National and International specifications.

- **The technology existing for manufacturing of the product**

Sand Casting, Directional Crystallization, Thermal Gravity Casting, Precision Die Casting, Lost Wax Casting, Clay Wet sand. Core Type: Resin Sand Core, Die Casting Machine Type: Hot & Cold Chamber Die Casting Machine, Precision Die Casting, Shell Casting.



For precision casting with improved grain size & mechanical properties pressure die casting method is in practice for special purpose applications. In pressure die casting the molten metal is introduced under pressure into a metallic die and allowed to solidify to produce near-net-shapes. Two types of die casting machines known as cold chamber and hot chamber are usually used. The production rate depends on casting thickness, specified properties of the cast metal and the complexity of the cast shape. This technique produces castings of very good surface finish with high dimensional accuracy. The process provides high yield due to absence of riser and feeding system. Production rate is high and the casting generates more metallurgical integrity. Finer grains and absence of porosity make the casting mechanically compact. Casting size, weight, design and melting point of cast metal limit the use of the process. Cost of die confines the process only to relatively small parts. The cold chamber machine is used for the alloy which has higher melting point than the zinc-alloy. Higher pressure is applied, so lower molten metal feeding temperature is used. Casting traps lesser.

- **Suggested modern technology for implementation or available in the market:**

1. Metal Additive Manufacturing (AM) is a fascinating technology that has gained acceptance over the past several years. Metal AM has found a foothold in the aerospace and automotive industries, and it's beginning to expand into other trades as well. While plastic 3D printing has been around for over 30 years, metal AM is relatively young, but the potential growth is substantial.
2. Computer Aided Design and manufacturing (CAD-CAM).
3. Pressure Die Casting
4. Investment casting
5. Mechatronics enabled manufacturing.

- **Raw material required and availability covering raw material standards Indian/International standards -**

Raw materials mainly used for manufacturing of different types of valves is mentioned below and they are indigenously manufactured and supplied in the country.

#### Materials Used in Valves

<b>Metallic materials</b> (for the valve body and internal components such as the stem, ball and disc)	<b>Nonmetal materials</b> (for the gasket, packing and seat)
--	---

<p><b>[Iron-based]</b></p> <p>Carbon steel and cast iron (An alloy consisting mainly of iron and carbon)</p> <p>Alloy steel (A steel to which one or more alloying elements, other than carbon, (e.g., Ni, Cr, Mn, W and Mo) have been deliberately added to achieve a particular physical property)</p>	<p><b>[Nonferrous]</b></p> <p>Copper alloy (Bronze, brass)</p> <p>Light alloy (Any one of various metal alloys consisting mainly of aluminum (Al) or magnesium (Mg) to which one or more alloying elements have deliberately been added (e.g., Cu, Zn, Si))</p>	<p><b>[Rubber-based]</b></p> <p>EPDM (Ethylene-propylene rubber)</p> <p>NBR (Acrylonitrile-butadiene rubber)</p> <p>FKM (Fluoro elastomer)</p>	<p><b>[Plastic-based]</b></p> <p>PTFE (Poly tetra fluoro ethylene)</p> <p>PA (Polyamide resin)</p>
--	---	--	--

**Typical Materials for Gate Valves, Globe Valves and Check Valves**

Base material	Valve body	Stem	Disc
Bronze / Brass	Bronze (CAC401, CAC 406) Brass (C3771)	K metal (C3531)	Bronze Brass
Cast iron	Gray cast iron (FC200, FC300)	Stainless steel Brass	Gray cast iron
Ductile iron	Ductile iron castings (FCD-S)	Stainless steel	Stainless steel
Cast steel	Carbon steel castings for high temperature / pressure service (SCPH 2)	Stainless steel	Stainless steel
Stainless steel	Stainless steel castings (SCS13A, SCS14A)	Stainless steel	Stainless steel

**Typical Materials for Ball Valves**

Base material	Valve body	Stem	Ball
Bronze / Brass	Bronze (CAC401) Brass (C3771)	K metal (C3531) Stainless steel	Brass Stainless steel
Cast iron	Gray cast iron (FC200)	Stainless steel	Stainless steel

Ductile iron	Ductile iron castings (FCD-S)	Stainless steel	Stainless steel
Cast steel	Carbon steel castings for high temperature / pressure service (SCPH 2)	Stainless steel	Stainless steel
Stainless steel	Stainless steel castings (SCS13A,SCS14A)	Stainless steel	Stainless steel

Typical Materials for Butterfly Valves			
Base material	Valve body	Stem	Disc
Cast iron	Nodular graphite cast iron (FCD450-10)	Stainless steel	Stainless steel Nodular graphite cast iron + Nickel plating
	Gray cast iron (FC200) IS: 210 Gr. 200.	Stainless steel	Stainless steel Nodular graphite cast iron + Nickel plating Nodular graphite cast iron + Nylon lining
Aluminum	Aluminum alloy (ADC12)	Stainless steel	Stainless steel
Stainless steel	Stainless steel castings (SCS13A)	Stainless steel	Stainless steel

Valve Body Material Characteristics	
Body material	Characteristics
Gray cast iron (FC200)	Gray cast iron has a long history that dates back many centuries. It is used mainly for valves in relatively low-pressure and low-temperature service. It is also used in a wide range of applications, from kitchen utensils to art pieces.
Gray cast iron (FC200)	Gray cast iron has a long history that dates back many centuries. It is used mainly for valves in relatively low-pressure and low-temperature service. It is also used in a wide range of applications, from kitchen utensils to art pieces.

Nodular graphite cast iron (FCD450-10)	Invented in 1948, this metal is increasingly in demand, as it conveniently combines the excellent machinability characteristic of cast iron with a toughness that is comparable to copper. Because of this toughness, it is also called ductile cast iron.
Ductile iron castings (FCD-S)	
Carbon steel castings for high temperature / pressure service (SCPH2)	Carbon steel is tough and has excellent hardness, tensile strength and impact value. It is commonly used in industrial plants for high temperature / pressure applications.
Stainless steel castings (SCS13A,SCS14A)	Although comparatively expensive, stainless steel has superior corrosion resistance, heat resistance, low-temperature resistance and excellent mechanical properties.
Bronze (CAC401,CAC406)	Bronze is an alloy of copper to which tin, zinc and lead are added to achieve particular physical properties. Historically, it was the first metal used for casting. Brass is an alloy of copper and zinc. Both alloys have excellent machinability and corrosion resistance and are used for relatively small valves in low-pressure service.
Brass (C3771)	

1. Cast iron-This is mainly used for comparatively low pressure and low temperature applications.
2. Ductile cast iron-This is commonly used in steam, water, gas and oil pipeline systems because of its wide range of working temperatures and pressures. It offers high performance for its cost.
3. Stainless steel-Because of its excellent corrosion resistance and durability, this material is commonly used in a wide spectrum of applications, ranging from the petrochemical industry to general plant systems.
4. Bronze-Bronze is an alloy of copper, tin, zinc and lead. Because of its good wear resistance, corrosion resistance and machinability, bronze is ideal for complex castings. It is also suitable for valves used in low/medium pressure service.
5. Brass-Brass is an alloy of copper and zinc. It has excellent forgeability and machinability and is more economical than bronze.
6. Cast iron lining-Nylon 11 and epoxy resin are powder-coated on the inner and outer surfaces of an iron valve, creating a lining that is useful for

preventing red, rusty water. It is also suitable for use in drinking water supply lines.

7. **Cast steel**-Because of its wide range of working temperatures and pressures, cast steel is commonly used for pipelines in oil fields, refineries and petrochemical plants.
8. **Special alloy steel**-This metal has the highest resistance to corrosion and pitting corrosion.

#### **Specifications:**

##### **a) Brass Valves**

1. **ASTM A216 Grade WCB Carbon Steel Valves**
2. **IS 13114 (1991): forged brass gate, globe and check valves**
3. **IS 778 (1984): Copper Alloy Gate, Globe and Check Valves**
4. **API 600/BS1414, API 598/BS EN 12266-1, ASME B 16.10, ASME B 16.5, ASME B 16.25, ASME B 16.34**

##### **b) Bronze valves:**

1. **ASTM B148 C95800- Ball Valve and Ni-Al bronze Butterfly Valve**
2. **IS 1703: 2000: Product Manual Forwater Fittings-Copper Alloy Float Valves**
3. **IS 778 (1984): Copper Alloy Gate, Globe and Check Valves for ...**

##### **c) Cast Iron Valves:**

1. **IS 9338 (1984): cast iron screw-down stop valves.**
2. **IS 14845 (2000): Resilient Seated Cast Iron Air Relief Valves**
3. **IS 9890 (1981): General Purpose Ball Valves**
4. **IS 9321: 1979: Material For Alloy Cast Iron Valve Seat Inserts**

##### **d) Stainless Steel:**

1. **IS 9890 (1981): General Purpose Ball Valves.**
2. **API 600/BS1414, API 598/BS EN 12266-1, ASME B 16.10, ASME B 16.5, ASME B 16.25, ASME B 16.34.**
3. **IS 13095: 2020 Butterfly Valves for General Purposes (First Revision)**

### **3. PROJECT REPORT**

- **The detailed bankable Project report of the product (Financial, space/ manpower requirement, Technology, Quality requirement, etc.)**

#### **BASIS OF ASSUMPTION:**

1. Working days per year are 300 days with 8 hours per shift.
2. Profile prepared on the basis of 75% capacity utilization of the melting furnace.
3. Average interest rate is 10.5% on total investment.
4. Cost of machinery and equipment is as currently prevailing.
5. Labour wages are based on the market wages prevalent in the local market.
6. Installed capacity is 1200 kg per day.
7. 2 % metal loss has been considered for calculation which may vary from foundry to foundry.
8. 60% yield with 10% average rejections has been considered for calculation.

#### **IMPLEMENTATION SCHEDULE:**

Sl. No.	Activity	Period in Months
01	Project report preparation	0-2
02	Obtaining provisional registration	0-2
03	Procurement of machinery	3-9
04	Building and shed hiring	4-5
05	Installation of machinery	9-10
06	Procurement of raw materials	10-11
07	Recruitment of labour	10-11
08	Trial production	11-12

09	Commercial production	12 onwards
----	-----------------------	------------

### Production Capacity (per annum):

At 75 % efficiency:

Qty. : 243.00 MT

Value : Rs. 486 lakh

Motive Power : 90 HP

### Pollution Control

The product is manufactured basically in a foundry unit, being a pollution Intensive Industry needs to obtain no objection certificate from the Pollution Control Board. Every care should be taken to minimise the gaseous as well as solid pollution.

### Energy Conservation

Foundry Industries particularly where Induction furnace is used require huge energy in the form of electricity. Optimum use of electricity leads to reduced production cost. To minimise electricity by using right equipment or motor is possible. Energy audit will certainly help to decide the right equipment or motor for specific application without hampering the production process.

### Financial Analysis:

#### A) Fixed Capital

##### (i) Land and Building

Covered area of 300 sq. mt. Rs. 20,675/-  
(Rented) @ Rs.6.50 per sq. feet)

##### (ii) Plant & Machinery :

a) Equipment required for manufacturing of the product:Rs 48.50  
b) Testing facilities : Rs 50.66

(iii) Preliminary and pre-operative expenses like legal expenses, cost of project report preparation, establishment cost, travelling, start up expenses, consultancy, fees, estimation fees, interest during construction, trial run expenses : Rs 3.00

**Total Rs 102.16**

## B. Working Capital (per month)

### (i) Personnel

Sl. No.	Designation	No.	Salary	Amount
01	Manager	01	25000	25000
02	Supervisor	01	20000	20000
03	Sales Executive	01	15000	15000
04	Chemist/ Laboratory Incharge	01	15000	15000
05	Typist-cum-Clerk	01	12000	12000
06	Accountant	01	12000	12000
07	Storekeeper	01	12000	12000
08	Peon/Watchman	02	10000	20000
09	Furnace operator	01	15000	15000
10	Skilled Workers	02	15000	30000
11	Semi-skilled Workers	03	13000	39000
12	Unskilled Workers	03	11000	33000
13	Maintenance fitter	01	15000	15000
	<b>Total salary and wages</b>			<b>2,63,000</b>
	<b>Additional perquisites @ 15% of salaries and wages</b>			<b>39,500</b>
	<b>Total</b>			<b>3,02,450</b>
	<b>Say</b>			<b>3.02,500</b>

### (ii) Raw Material

Sl. No.	Particulars	Qty. Tons	Rate	Amount (Rs. Lakh)
01	Copper Zinc Tin Aluminium MS SS CI-Scrap	28.35	1.50 LS	42.50
02	Fluxes	LS	LS	1.00
03	Sand	LS	LS	0.50



04	Accessories like Rubber, Valve sheet, Stopper, Caps etc	LS	LS	1.00
	<b>Total</b>		<b>(Rs.)</b>	<b>43.00</b>

(i) Utilities

(iii) Utilities

(a) Power -9,000 kwh 54,000  
@ Rs. 6.00 per kwh

b) Water 3,000

**Total 0.57**

(iv) Other Contingent Expenses ( P.M)

Sl. No.	Description	Value
01	Rent	20675
02	Stationery, postage, telephone	5000
03	Packaging	15000
04	Repair and maintenance	50000
05	Consumable store, lubricants, degasses, oils etc.	50000
06	Transportation	50000
07	Misc. expenses	25000
08	Selling expenses	5000
	<b>Total</b>	<b>220675</b>

**(v) Total Recurring Expenditure (per month)** = Rs. 49.00 lakh

**(vi) Working Capital (for 3 months)** = Rs. 147.00 lakh

**C. Total Capital Investment**

1. Fixed Capital Rs. 102.16 lakh

2. Working Capital (for 3 months) Rs. 147.00 lakh

**Total Rs. 249.16 lakh**

**FINANCIAL ANALYSIS**

<b>(1) Cost of Production (per year)</b>	<b>(Rs.)</b>
1. Total recurring cost	588.00
2. Depreciation on machinery and equipment @ 10%	9.41
3. Depreciation on furnace @ 15%	4.0125
4. Depreciation on moulds fixture and furniture @ 25%	1.00
5. Interest on total investment @ 10.5% (Average)	26.16
<b>Total</b>	<b>628.58</b>

**(2) Turnover (per year) (Rs. Lakh)**

Metallic valves of different compositions like Brass, Bronze, MCI, SS, MS - 243 MT @2.70 Lakh/MT(Average)	656.10
- Return from sales runner risers and rejection etc. 27.00 MT @ 1.50Lakh/MT	40.50



- **DETAILS OF TEST FACILITIES AVAILABLE IN INDIA**

1. National Test house
2. IITs, NITs & State Engg. Colleges
3. MSME- TCs & TSs
4. PPDCs
5. Testing laboratories owned by State govt.
6. CSIR Laboratories
7. Organisations like Kirloskar, L &T, TATA & laboratories associated with individual manufacturers of the product.
8. DRDO
9. Indian Railways
10. Fluid Control Research Institute, Palakkad Kerala– 678623
  
11. Third party inspection agencies are :  
Export Inspection Agency, Bureau Veritas, SGS India Ltd., Crown Agent Services, Bhilai Steel Plant (SAIL), National Federation of Co-operative Sugar Factories Ltd., Tariff Advisory Committee, Tata Consulting Engineers, M.N. Dastur & Co. Ltd., National Thermal Power Corporation (NTPC), Development Consultants India Ltd., (DCPL), National Hydro Power Corporation (NHPC), RITES, DET NORSKE VERITAS , ENGINEERS PROJECTS LIMITED, PROJECT & DEVELOPMENT INDIA

LIMITED, DEVELOPMENT CONSULTANT LIMITED, TECHNICAL DEVELOPMENT COMMITTEE

• **Details of Raw materials suppliers**

1. Krishna Copper Private Limited, GIDC, Killa-pardi, Gujarat- 396125
2. Kaushal Copper Corporation, A, Gulalwadi., 156, Kika St, Panjarpole, Bhuleshwar, Mumbai, Maharashtra- 400004
3. Parshwamani Metals,25, Vadgama Building, 4<sup>th</sup> Floor, Room No: 7, 3<sup>rd</sup> Panjrapole Lane, Near C P, Cawasji Patel Tank, Bhuleshwar, Mumbai, Maharashtra- 400004
4. Special Metals, Shop No. 10, 125, C.P. Tank Road, Grant Road, Mumbai – 400004, Dist. Mumbai, Maharashtra
5. Padmavati Steel & Engg. Company, 14/16, Kanta Terrace, Shop No. 1, Dr. Wilson Street Near VP Road Police Station, Girgaon, Mumbai – 400004, Dist. Mumbai, Maharashtra
6. Sysco Piping Solutions Inc. No. 141, Shamlu Bhavan, 1<sup>st</sup> Floor, Room No. 2, N. D. Road, Sikka Nagar, Dr. Deshmukh Lane, Mumbai – 400004
7. Jatin Industries, No. 87/2B, GIDC, Phase 1, Vatva Industrial Estate Vatva, GIDC Vatva, Ahmedabad – 382425, Dist. Ahmedabad, Gujarat
8. Audhe Industrties,3D, RMT Bungalow Road, Sai Nagar, SIDCO, Coimbatore – 641021
9. Agrawal Iron & Castings,6/234, Mandoli Extension, Shahdara, Delhi – 110093
10. Jayant Impes Pvt. Ltd, Shop No. 4, Deccan Bank Bldg, 215/217, R. R. Mohan Roy Road, Grant Road, Mumbai – 400004, Dist. Mumbai, Maharashtra

11. Jain Steels Corporaton, Shop No. 700, Gali Kundewalan, Ajmeri Gate, New Delhi – 110006

12. Kavita Engg Company Shop No. 210, 1<sup>st</sup> Floor, Anuradha Shopping Center Near Dena Bank, Khadia Gate, Kalupur, Ahmedabad – 380001.

- **Details of machinery suppliers :**

1. M/s. Inductotherm (India) Pvt. Ltd.  
Plot SM-6 Behind Colgate Palmolive, Bol, GIDC, Phase 2, Sanand, Gujarat- 382170
2. M/s. The Wesman Engineering Company Ltd.8, May Fair Road, Kolkata – 700 019.  
M/s. Chennai Metro Pvt. Ltd.  
SP 100 A, Ambattur Industrial Estate, Chennai – 600 058.
03. M/s. Fine Testing Machines Sales and Service, 359, Lake Town, Block – A, Kolkata – 700 085
04. M/s. HMT Ltd. 31, Chowringhee Road, Kolkata—700071
05. M/s. Indo Japanese Proto Type Training Centre  
Baltikuri, Dasnagar,  
Howrah, Kolkata.
06. FIE – FUEL INSTRUMENTS & ENGINEERS PVT. LTD. ( FIE Group )  
Plot No. 68 to 89, Parvati Co-op. Industrial Estate Ltd.,  
Yadrav ( Ichalkaranji ) – 416 145, Tal. Shirol, Dist. Kolhapur,  
Maharashtra, India.
07. Electronic And Engineering Company India Pvt Ltd  
Parikh Farms, Survey No. 200 201  
Dadra – 396230, Dadra And Nagar Haveli And Daman And Diu, India

#### **04. SCHEMES AND CONSULTANCY SERVICES**

- **Existing schemes available and their details**

a) Techno Managerial consultancy

- b) Credit linked capital subsidy scheme for technology upgradation (CLCSS)
- a. Credit Guarantee fund trust for Micro & Small Enterprises (CGTMSE)
- b. Entrepreneurship & Skill development programme (ESDP)
- c. Micro & Small Enterprises Cluster development (MSE-CDP).
- d. Technology Upgradation & Competitiveness scheme for MSME's
  - Design Clinic scheme
  - Lean Manufacturing competitiveness scheme (LMCS)
  - Financial support to MSMEs in ZED certification scheme.
  - Support for entrepreneurial and managerial development of MSME through incubators.
  - Building awareness on Intellectual Property Rights.(IPRs).
  - Tool Rooms & MSME Technology centres.
- e. Procurement & Marketing support (PMS) scheme
- f. Procurement for Micro and Small enterprises (MSEs), PPP-2012

- **Proposed schemes (if existing is not suitable)**

State Govt. May be suggested to consider this product as a priority sector.

- **Details of agencies who can provide guidance (CSIR, MSME, Sector Councils etc.):**

- a. CSIR
- b. M/o MSME- DI's, Technology centres, MSME- Testing centres & testing stations, MSMETDC
- c. BIS& similar international / global agencies.
- d. IIT, NITs
- e. National Institute of Design
- f. Export promotion councils.
- g. DGFT, M/o Commerce & Industries

\*\*\*\*\*