India’s International Trade of Four Specific commodities in the Recent Past Some Insights

Preface

The study uses trade indicators to analyse merchandise export and import data in a way that should be useful for the purpose of policy. The indicators provide a glimpse of the trade patterns of the world and the performance of India in comparison to various other countries. They have been used in the case of India’s exports of **Precious & Semi Precious Stones (Other than Diamond) & Tubes, Pipes & Hollow Profiles of Cast Iron** and imports of **Organo Sulphur Compound and Ball or Roller Bearing** to indicate the possible directions policy may take.

The data used in this study has been sourced from the Export Import Data Bank of the DGCI&S, Department of Commerce, and Government of India and from the United Nations Comtrade Database. Introduction notes of each commodities has been sourced from the various sights –viz Wikipedia, Britannica, The Economic Times etc.

Computations are based on data at ITC-HS four-digit level (ITC-HS Code-7103 & 7303 for export and 2930 & 8482 for import) and the latest finalized data available on the UN Comtrade Database up to year 2021 and on the DGCI&S Database up to October2022. So, trends from 2018 to 2021 have been shown when we extract the data from UN Comtrade and from 2018 to 2021 have been shown when we extract the data from DGCIS Data base.

In this report, we will see various analysis and aspects of India’s Precious as well as International export trade of Precious & Semi Precious Stones (Other than Diamond) & Tubes, Pipes & Hollow Profiles of Cast Iron and imports of Organo Sulphur Compound and Ball or Roller Bearing**.** We will use both the 4 digit Commodity codes, for our analysis, as appropriate.

Trends in India’s as well as International Trade i.e. Exports and Imports of above four Commodities are given below in different tables :

- **Table 1 : India’s top 10 Export destination of Precious & Semi Precious Stones with their shares in percentage.**
- **Table 2 : World’s top 10 Exporters of Precious & Semi Precious Stones with their shares in percentage.**
- **Table 3 : World’s top 10 Importers of Precious & Semi Precious Stones with their shares in percentage.**
- **Annex- I : Top 3 sources of Precious & Semi Precious Stones of World’s top 3 Importers.**
- **Table 4 : India’s top 10 Export destination of Pipes, Tubes & Hollow Profiles of Cast Iron with their shares in percentage.**
- **Table 5 : World’s top 10 Exporters of Pipes, Tubes & Hollow Profiles of Cast Iron with their shares in percentage.**
- **Table 6 : World’s top 10 Importers of Pipes, Tubes & Hollow Profiles of Cast Iron with their shares in percentage.**
- **Annex-II : Top 3 sources of Pipes, Tubes & Hollow Profiles of Cast Iron of World’s top 3 Importers.**
- **Table 7 : India’s top10 Sources of Organo Sulphur Compounds with their shares in percentage.**
- **Table 8 : World’s top 10 Importers Organo Sulphur Compounds with their shares in percentage.**
- **Table 9 : India’s top 10 Sources of Ball Bearing with their shares in percentage.**
- **Table 10 : World’s top 10 Importers of Ball Bearing with their shares in percentage.**

EXPORT

Precious and Semi Precious Stones (Other than Diamond)

Precious stone, or **Semiprecious stone** are the piece of mineral crystal which, in cut and polished form, is used to make jewellery or other adornments. However, certain rocks and occasionally organic materials that are not minerals (such as amber, jet, and pearl) are also used for jewellery and are therefore often considered to be gemstones as well. Most gemstones are hard, but some soft minerals are used in jewellery because of their cluster or other physical properties that have aesthetic value. Rarity and notoriety are other characteristics that lend value to gemstones.

Apart from jewellery, from earliest antiquity engraved gems and hardstone carvings, such as cups, were major luxury art forms. A gem expert is a gemmologist, a gem maker is called a lapidarist or gem cutter. The traditional classification in the West, which goes back to the ancient Greeks, begins with a distinction between precious and semi-precious; similar distinctions are made in other cultures. In modern use, the precious stones are emerald, ruby, sapphire and diamond, with all other gemstones being semi-precious. This distinction reflects the rarity of the respective stones in ancient times, as well as their quality: all are translucent with fine colour in their purest forms, except for the colourless diamond, and very hard, with harnesses of 8 to 10 on the Mohs scale. Other stones are classified by their colour, translucency, and hardness. The traditional distinction does not necessarily reflect modern values; for example, while garnets are relatively inexpensive, a green garnet called tsavorite can be far more valuable than a mid-quality emerald. Another traditional term for semi-precious gemstones used in art history and archaeology is hardstone. Use of the terms 'precious' and 'semi-precious' in a commercial context is, arguably, misleading in that it suggests certain stones are more valuable than others, when this is not reflected in the actual market value.

Gemstones are classified into different groups, species, and varieties. For example, ruby is the red variety of the species corundum, while any other colour of corundum is considered sapphire. Other examples are the emerald (green), aquamarine (blue), red beryl (red), goshenite (colourless), heliodor (yellow), and morganite (pink), which are all varieties of the mineral species beryl.

Gemstone pricing and value are governed by factors and characteristics in the quality of the stone. These characteristics include clarity, rarity, freedom from defects, the beauty of the stone, as well as the demand for such stones. There are different pricing influencers for both coloured gemstones, and for diamonds. The pricing on coloured stones is determined by market supply-and-demand, but diamonds are more intricate.[15] Diamond value can change based on location, time, and on the evaluations of diamond vendors.

The colour of any material is due to the nature of light itself. Daylight, often called white light, is all of the colours of the spectrum combined. When light strikes a material, most of the light is absorbed while a smaller amount of a particular frequency or wavelength is reflected. The part that is reflected reaches the eye as the perceived colour. A ruby appears red because it absorbs all the other colours of white light while reflecting the red.

A material which is mostly the same can exhibit different colours. For example, ruby and sapphire have the same primary chemical composition (both are corundum) but exhibit different colours because of impurities. Even the same named gemstone can occur in many different colours: sapphires show different shades of blue and pink and "fancy sapphires" exhibit a whole range of other colours from yellow to orange-pink, the latter called "padparadscha sapphire".

This difference in colour is based on the atomic structure of the stone. Although the different stones formally have the same chemical composition and structure, they are not exactly the same. Every now and then an atom is replaced by a completely different atom, sometimes as few as one in a million atoms. These so-called impurities are sufficient to absorb certain colours and leave the other colours unaffected.

Gemstones are often treated to enhance the colour or clarity of the stone. Depending on the type and extent of treatment, they can affect the value of the stone. Some treatments are used widely because the resulting gem is stable, while others are not accepted most commonly because the gem colour is unstable and may revert to the original tone.

These are broadly classified under **H.S. Code-7103**

Table - 1

India's Top 10 destination of Precious & Semi Precious Stones (H.S Code-7103)

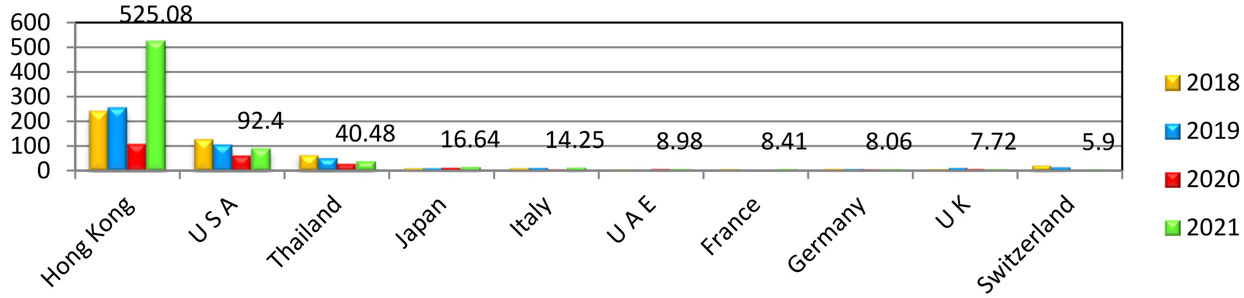
Rank	Countries	2018		2019		2020		2021	
		Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	Hong Kong	240.67	44.44	254.74	49.92	106.07	41.80	525.08	69.29
2.	U S A	126.84	23.42	105.99	20.77	60.87	23.99	92.40	12.19
3.	Thailand	63.34	11.70	51.54	10.10	28.53	11.24	40.48	5.34
4.	Japan	10.99	2.03	11.95	2.34	12.46	4.91	16.64	2.20
5.	Italy	10.92	2.02	13.25	2.60	6.00	2.36	14.25	1.88
6.	U A E	6.68	1.23	4.68	0.92	7.07	2.79	8.98	1.19
7.	France	7.31	1.35	4.16	0.82	2.36	0.93	8.41	1.11
8.	Germany	8.95	1.65	7.45	1.46	6.36	2.51	8.06	1.06
9.	U K	7.89	1.46	13.15	2.58	6.86	2.70	7.72	1.02
10.	Switzerland	21.70	4.01	15.76	3.09	1.25	0.49	5.90	0.78
	Others	36.29	6.70	27.62	5.41	15.92	6.28	29.91	3.95
	Total	541.58	100	510.30	100	253.75	100	757.85	100

Source: DGCI&S.

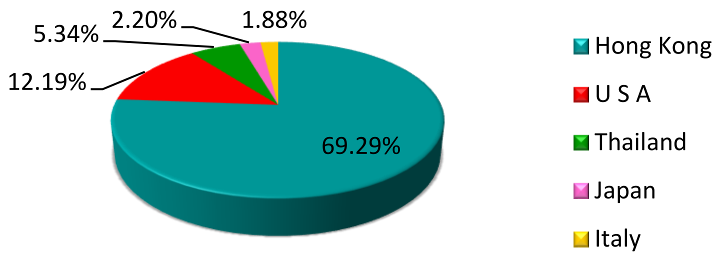
Note : India's Export including re-export

Leading importers of Precious & Semi Precious Stones from India for 2018-2021**(in million USD)**

Data label given on the basis of 2021



India's top 5 destinations of Precious & Semi Precious Stones by percentage India in 2021:



Hong Kong is the largest market for Semi Precious Stones export from India. In 2021, Hong Kong imported US $ 525.08 million worth of Precious & Semi Precious Stones from India. Which was 69.29% share of India's total export in 2021, Followed by USA and Thailand with the Precious & Semi Precious Stones shipment value being US $ 92.40 Million and Us $ 40.48 Million respectively. In 2021 India exported US $ 757.85 million worth of Precious & Semi Precious Stones showing the rise of 3 times compared to year 2020.

Table-2

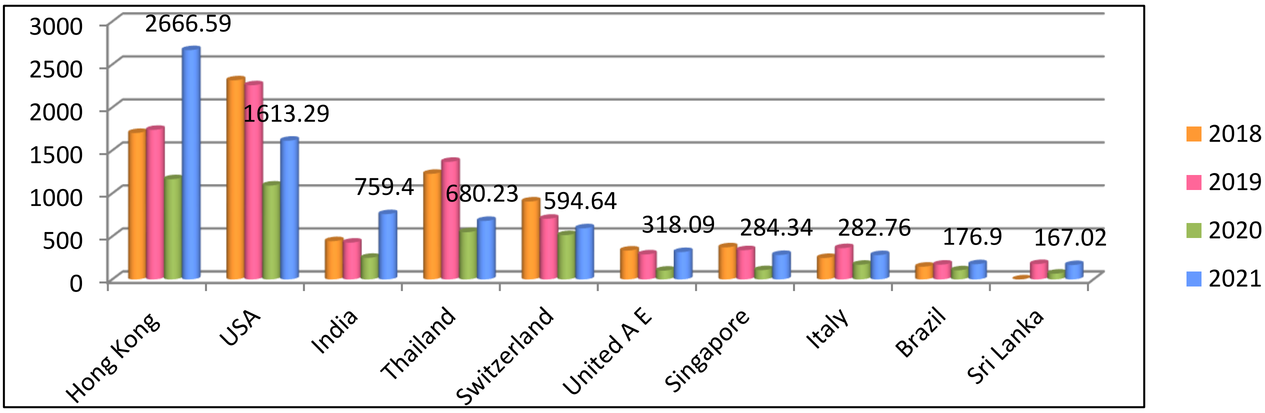
World's Top 10 exporter of Precious & Semi Precious Stones (H.S Code-7103)

Rank	Countries	2018		2019		2020		2021	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	Hong Kong	1703.33	17.11	1739.45	16.89	1165.58	23.96	2666.59	30.23
2.	USA	2315.77	23.27	2258.17	21.93	1091.46	22.43	1613.29	18.29
3.	**India**	**444.89**	**4.47**	**427.71**	**4.15**	**251.04**	**5.16**	**759.40**	**8.61**
4.	Thailand	1227.99	12.34	1367.49	13.28	549.37	11.29	680.23	7.71
5.	Switzerland	906.45	9.11	705.72	6.85	515.07	10.59	594.64	6.74
6.	United A E	335.62	3.37	290.82	2.82	101.70	2.09	318.09	3.61
7.	Singapore	372.97	3.75	339.85	3.30	107.92	2.22	284.34	3.22
8.	Italy	249.49	2.51	364.04	3.53	171.04	3.52	282.76	3.21
9.	Brazil	148.11	1.49	172.13	1.67	106.07	2.18	176.90	2.01
10.	Sri Lanka	0.00	0.00	178.81	1.74	66.87	1.37	167.02	1.89
	Others	2248.04	22.59	2455.15	23.84	739.50	15.20	1276.73	14.48
	Total	9952.66	100	10299.35	100	4865.62	100	8819.99	100

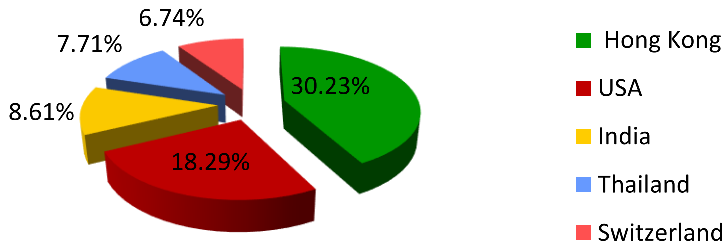
Source: UN Comtrade

Leading exporters of Wheat Flour of world from 2018 to 2021 **(Values in million USD)**

Data label given on the basis of 2021



Country wise world's leading exporter of Wheat Flour by percentage in 2021



Global sales for Precious & Semi Precious Stones exported totalled US$ 8.81 billion during 2021. That dollar amount reflects a 11.38% decrease from 2018 when Precious & Semi Precious Stones exports were worth US $ 9.95 Billion. From 2020 to 2021, the value of globally exported flours lined via a 81.87% upturn. From a country perspective, US $ 2.66 billion or 30.23 % worth of Precious & Semi Precious Stones exports worldwide during 2021 originated from Hong Kong. In second place supplier was USA (18.29%). **India** has exported US $ 759.40 million and obtained the 3rd rank in the world export of Wheat Flour in 2021

Table-3

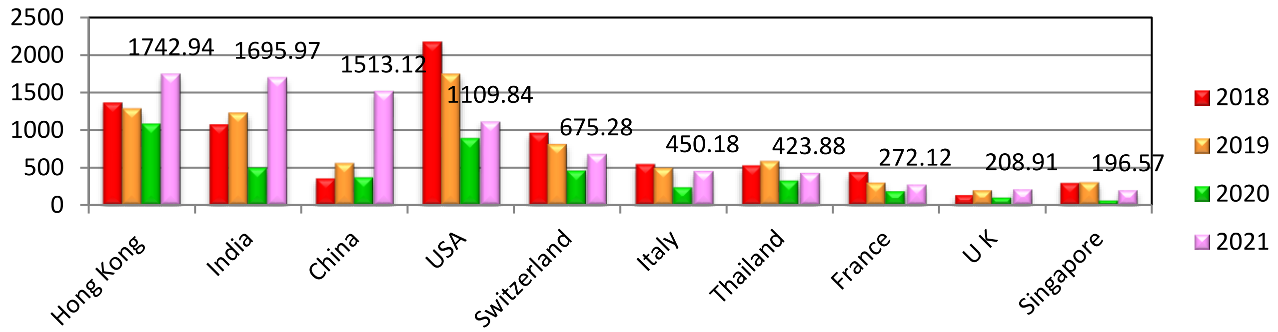
World's top 10 Importers of Precious & Semi Precious Stones (H.S Code-7103)

Rank	Countries	2018		2019		2020		2021	
		Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	Hong Kong	1361.47	15.54	1280.93	15.15	1076.47	22.72	1742.94	19.22
2.	**India**	**1072.81**	**12.25**	**1228.74**	**14.53**	**493.25**	**10.41**	**1695.97**	**18.70**
3.	China	354.80	4.05	559.24	6.61	365.60	7.72	1513.12	16.69
4.	USA	2173.56	24.82	1743.22	20.62	885.21	18.68	1109.84	12.24
5.	Switzerland	961.15	10.97	811.33	9.60	454.69	9.60	675.28	7.45
6.	Italy	544.47	6.22	495.31	5.86	232.90	4.92	450.18	4.96
7.	Thailand	527.69	6.02	583.92	6.91	322.55	6.81	423.88	4.67
8.	France	437.26	4.99	296.91	3.51	184.27	3.89	272.12	3.00
9.	U K	132.61	1.51	196.71	2.33	98.61	2.08	208.91	2.30
10.	Singapore	293.16	3.35	300.85	3.56	59.81	1.26	196.57	2.17
	Others	899.94	10.27	957.39	11.32	564.96	11.92	778.45	8.59
	Total	8758.92	100	8454.55	100	4738.31	100	9067.25	100

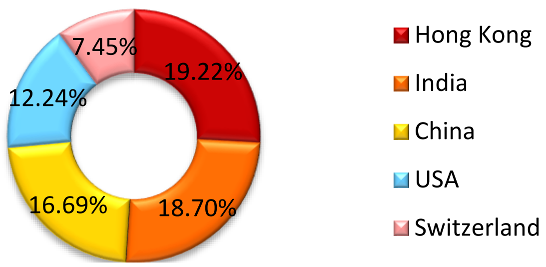
Source : UN Comtrade

Leading Precious & Semi Precious Stones importers of world from 2018 to 2021**(in million USD)**

Data label given on the basis of 2021



Country wise world's leading importers of Precious & Semi Precious Stones by percentage in 2021

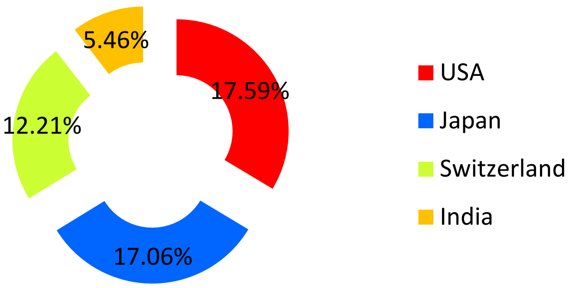


Precious and Semi-Precious stone imports amounted to US $ 9.06 in 2021 which was almost 2 times from the year 2020. Over the period under review, global precious and semi-precious stone imports reached its maximum level in 2021. In 2021 Hong Kong (US $ 1.74 B) constitutes the largest market for imported precious and semi-precious stone worldwide, making up 19.22% of global imports. The second position in the ranking was occupied by **India** (US $ 1.65 B), with the share of 18.70% of global imports. It was followed by the China and USA , with the share of 16.69% and 12.24% respectively. Over the period under review it was noticeable that USA was the top importer of Precious & Semi Precious Stones for three consecutive years from 2018 & 2019.

Annexure-1

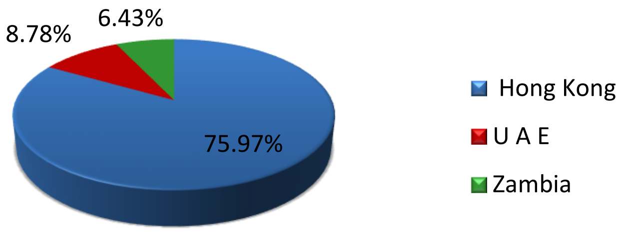
Top sources of world's top three importers of Precious & Semi Precious Stones (H.S Code-7103)

Top 3 Sources of Precious & Semi Precious Stones to Hong Kong in 2021 by percentage:



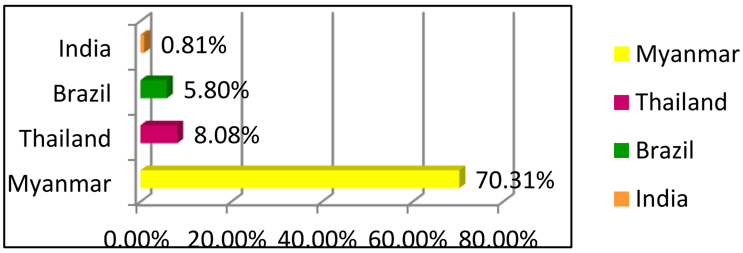
In 2021, Hong Kong imported 17.06% share of Precious & Semi Precious Stones from USA. Japan was the 2nd major source country of Precious & Semi Precious to Hong Kong, exported 17.06% share of Hong Kong's total import of Precious & Semi Precious. It was followed by Switzerland. Switzerland exported 12.21% share of Precious & Semi Precious to Hong Kong in that year. In 2021 **India** exported 5.46% of Precious & Semi Precious to Hong Kong. .**Source : UN Comtrade)**

ii) Top 3 Sources of Precious & Semi Precious Stones to **India** in 2021 by percentage***:***



In 2020 India imports most of its requirements of Precious & Semi Precious Stones from Hong Kong with a share of 75.97% ,2nd and 3rd largest exporter of the commodity to India were UAE with a share of 8.78%and Zambia with a share of 6.43% .**Source: UN Comtrade)**

iii) Top 3 Sources of Precious & Semi Precious Stones to China in 2021 by percentage***:***



China's 3 major source countries of Precious & Semi Precious in 2021 were Mayanmar (70.31%), Thailand (8.08%) and Brazil (5.80%). In that year India's export of Precious & Semi Precious Stones to was only 0.81% of China's total import. **(Source: UN Comtrade)**

Tubes, Pipes & Hollow Profiles of Cast Iron

Cast iron pipe is pipe made predominantly from gray cast iron. It was historically used as a pressure pipe for transmission of water, gas and sewage, and as a water drainage pipe during the 17th, 18th, 19th and 20th centuries.

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Cast iron pipe was frequently used uncoated, although later coatings and linings reduced corrosion and improved hydraulics. In cast iron pipe, the graphite forms flakes during the casting process, when examined under a microscope. Cast iron pipe was superseded by ductile iron pipe, which is a direct development, with most existing manufacturing plants transitioning to the new material during the 1970s and 1980s. Ductile iron pipe is different than cast iron, because the introduction of magnesium during the casting process causes the graphite to form spheres (graphite nodules) rather than flakes. While this allows the material to remain castable, the end product is much tougher than cast iron, and allows elastic behaviour at lower stress levels. Little cast iron pipe is currently manufactured, since ductile iron pipe is widely accepted as a superior product. Many public utilities, municipalities, and private industries still have functional cast iron pipe in service to this day. The oldest cast iron water pipes date from the 17th century and were installed to distribute water throughout the gardens of the Chateau de Versailles. These amount to some 35 km of pipe, typically 1 m lengths with flanged joints. The extreme age of these pipes make them of considerable historical value. Despite extensive refurbishment in 2008 by Saint-Gobain PAM, 80% remain original.

The first standardization of cast iron water pipes in Britain occurred in 1917 with the publishing of BS 78. This standard specified a dimensionless nominal size, which approximately corresponded with the internal diameter in inches of the pipe, and four pressure classes, Class A, Class B, Class C and Class D, each with a specified wall thickness and outer diameter. It is noted that the outer diameter is identical between classes with the exception of sizes 12 to 27, where Classes A and B share one diameter and Classes C and D have another, larger diameter.

In a bell and spigot joint one end of the pipe stick is flared, termed the bell or socket, to enable the opposite end of the next stick, the spigot end, to be inserted to create a joint. The gaps in these joints were stuffed with oakum or yarn to retain molten-lead, which solidified into a waterproof joint. This was a labour-intensive operation, and the quality of the seal was dependent on the skill of the labourer.

Mechanical joints were made by bolting a movable follower ring on the spigot close to the corresponding bell, which compressed a gasket in between. Many water pipes today use mechanical joints, since they are easily made and do not require special skills to install. This type of joint also allows some deflection to occur without sacrificing joint integrity, so that minor alignment adjustments can be made during installation, and the joints retain their integrity when subjected to limited subsidence. Typical joint deflections at mechanical joints today range anywhere from 3 to 5 degrees.

Ball-and-socket joints introduced more 'rounded' sockets, allowing a relatively large amount of deflection at each joint. This type of joint, still in use today, was considered a special-purpose joint, and has been used primarily in both submerged and mountainous terrain. This type of joint can typically allow around 15 degrees of deflection at each joint, making 'snaking' of the pipe possible. The advantage of this joint type was that it was quicker than bell and spigot joints, and did not require special skills or tools to install.

Push-on joints, developed in the mid 1950s, allowed a quicker and relatively non-skilled method of jointing pipe. This joint consisted of a bell with a recessed groove which held a rubberized gasket. A lubricated bevelled spigot section can be pushed into this joint with care, as not to roll the rubberized gasket, and once installed became watertight. This type of jointing system is popular today with ductile iron and Polyvinyl chloride (PVC) pipes.

These are broadly classified under **H.S. Code-7303**.

Table - 4

India's Top 10 destination of Tubes, Pipes & Hollow Profiles of Cast Iron (HS Code –7303)

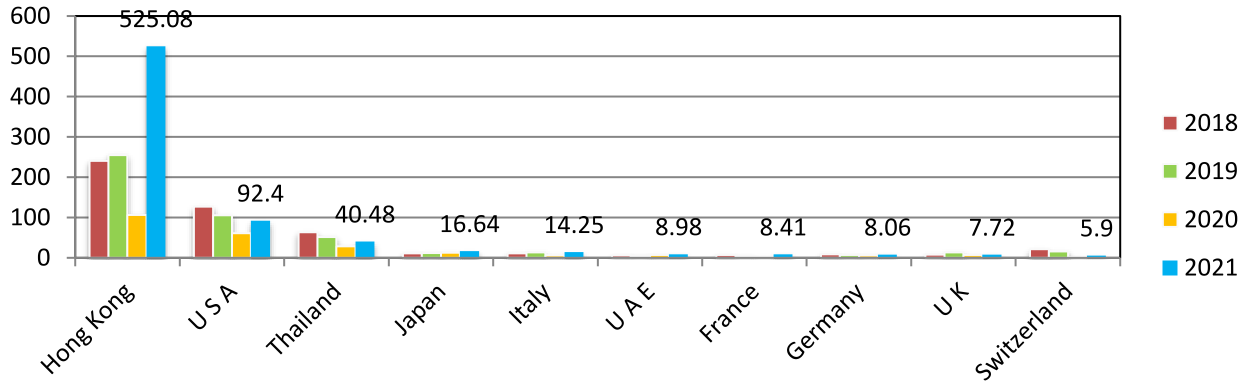
Rank	Countries	2018		2019		2020		2021	
		Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	Hong Kong	240.67	44.44	254.74	49.92	106.07	41.80	525.08	69.29
2.	U S A	126.84	23.42	105.99	20.77	60.87	23.99	92.40	12.19
3.	Thailand	63.34	11.70	51.54	10.10	28.53	11.24	40.48	5.34
4.	Japan	10.99	2.03	11.95	2.34	12.46	4.91	16.64	2.20
5.	Italy	10.92	2.02	13.25	2.60	6.00	2.36	14.25	1.88
6.	U A E	6.68	1.23	4.68	0.92	7.07	2.79	8.98	1.19
7.	France	7.31	1.35	4.16	0.82	2.36	0.93	8.41	1.11
8.	Germany	8.95	1.65	7.45	1.46	6.36	2.51	8.06	1.06
9.	U K	7.89	1.46	13.15	2.58	6.86	2.70	7.72	1.02
10.	Switzerland	21.70	4.01	15.76	3.09	1.25	0.49	5.90	0.78
	Others	36.29	6.70	27.62	5.41	15.92	6.28	29.91	3.95
	Total	541.58	100	510.30	100	253.75	100	757.85	100

Source: DGCI&S

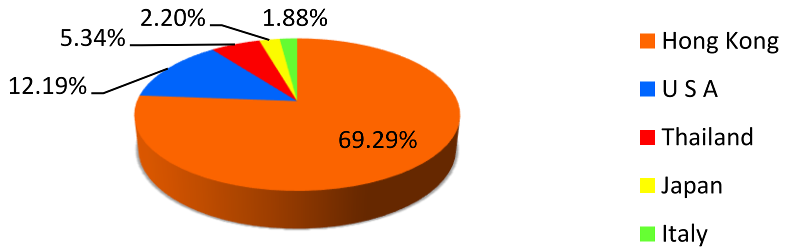
Note : India's Export including re-export

Major destinations of Indian Tubes, Pipes of Cast Iron, from 2018-2021**(Values in million USD)**

Data label given on the basis of 2021



India's top 5 major destinations of Tubes, Pipes of Cast Iron, by percentage in 2021:



In the year 2021, India has exported Tubes, Pipes and Hollow profiles of Cast Iron worth of US $ 757.85 million, which was rose by almost 3 times from 2020. Hong Kong is the largest market for Tubes, Pipes and Hollow profiles of Cast Iron export from India. In 2021, Hong Kong imported US $ 525.08 million worth of Tubes, Pipes and Hollow profiles of Cast Iron, from India, or 69.29 %, followed by USA and Thailand with 12.19% and 5.34% share of India's total export in 2021 respectively. The top 10 countries in total shared the share of 96% of the Tubes, Pipes and Hollow profiles of Cast Iron export value from India.

Table - 5

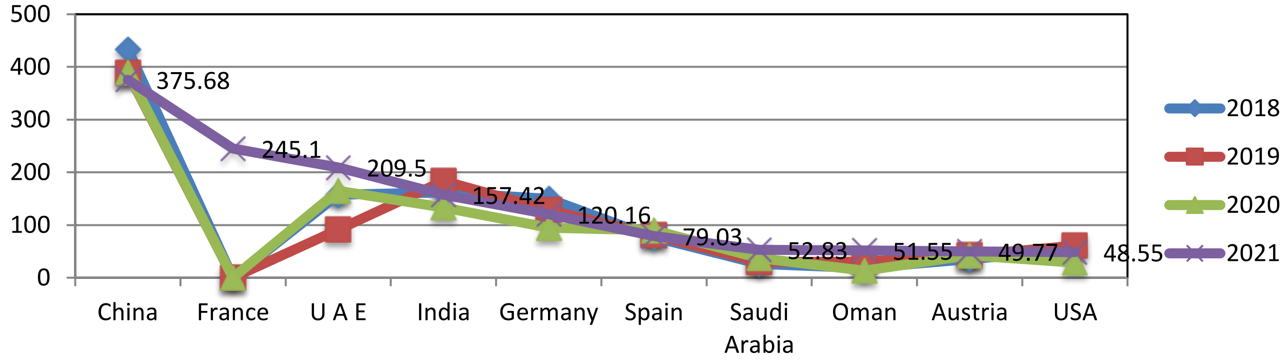
World's Top 10 exporters of Tubes, Pipes & Hollow Profiles of Cast Iron (HS Code –7303)

Rank	Countries	2018		2019		2020		2021	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	China	433.94	30.36	388.46	30.06	389.98	32.83	375.68	23.36
2.	France	0.00	0.00	0.00	0.00	0.00	0.00	245.10	15.24
3.	U A E	157.81	11.04	91.14	7.05	165.02	13.89	209.50	13.03
4.	**India**	**161.58**	**11.31**	**183.85**	**14.23**	**133.41**	**11.23**	**157.42**	**9.79**
5.	Germany	149.82	10.48	128.38	9.93	95.05	8.00	120.16	7.47
6.	Spain	76.95	5.38	80.73	6.25	89.85	7.56	79.03	4.91
7.	Saudi Arabia	26.15	1.83	29.88	2.31	37.38	3.15	52.83	3.28
8.	Oman	18.27	1.28	30.46	2.36	13.46	1.13	51.55	3.21
9.	Austria	35.09	2.46	42.61	3.30	42.89	3.61	49.77	3.09
10.	USA	52.24	3.66	60.63	4.69	28.90	2.43	48.55	3.02
	Others	317.33	22.20	256.33	19.83	191.90	16.16	218.83	13.61
	Total	1429.19	100	1292.46	100	1187.84	100	1608.43	100

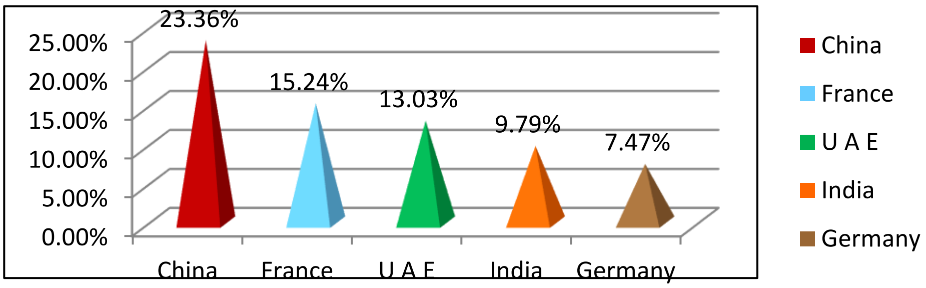
Source: UN Comtrade

Leading Tubes, Pipes of Cast Iron, exporters of world from 2018 to 2021 **(Values in million $)**

Data label given on the basis of 2021



Country wise export trends of Tubes, Pipes of Cast Iron, not roasted by percentage in 2021:



The total global export value of Tubes, Pipes and Hollow profiles of Cast Iron was US $ 1.60 Billion in 2021 which was briefly rise by 35.41% from the year 2020. China was the largest exporter of Tubes, Pipes and Hollow profiles of Cast Iron in the world in 2021. China exported US $ 375.68 Million or 23.36% share of World export of the commodity in that year. France became the 2[nd] largest exporter of it with export worth value of US $ 245.10 or 15.24% of world export in the same year. Which was followed by USA with the shipment value US $ 209.50 Million. Here it is noticeable that during the review period India was in the top three exporting countries for three consecutive years from 2018 to 2020, In the year 2021 India became the 4[th] largest exporter in the world with 9.79% share of world export of Tubes, Pipes and Hollow profiles of Cast Iron

Table - 6

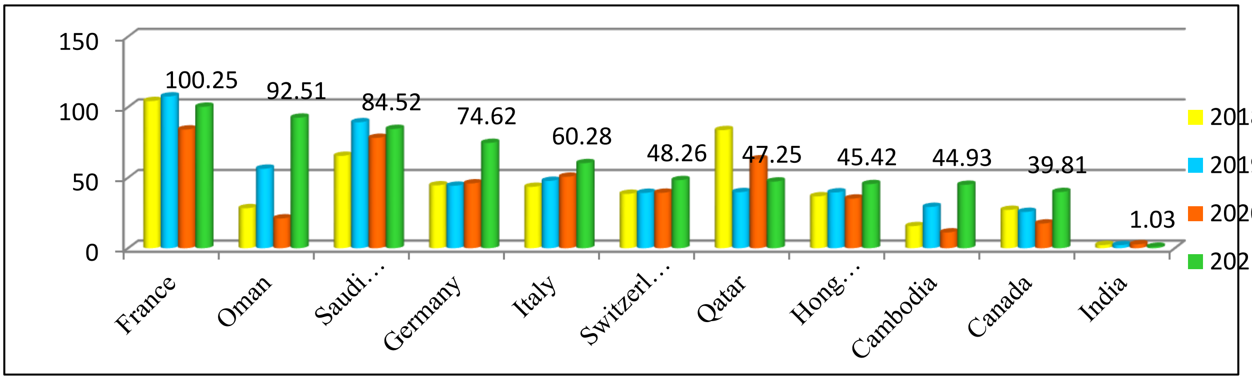
World's Top 10 Importers of Tubes, Pipes & Hollow Profiles of Cast Iron (HS Code –7303)

Rank	Countries	2018		2019		2020		2021	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	France	104.31	6.61	107.54	6.65	84.13	6.12	100.25	6.85
2.	Oman	28.37	1.80	56.31	3.48	21.11	1.53	92.51	6.32
3.	Saudi Arabia	65.47	4.15	89.28	5.52	78.21	5.69	84.52	5.78
4.	Germany	44.56	2.82	44.28	2.74	45.93	3.34	74.62	5.10
5.	Italy	43.51	2.76	47.73	2.95	50.66	3.68	60.28	4.12
6.	Switzerland	38.54	2.44	39.21	2.42	39.29	2.86	48.26	3.30
7.	Qatar	83.69	5.30	39.74	2.46	62.97	4.58	47.25	3.23
8.	Hong Kong	36.78	2.33	39.55	2.44	35.18	2.56	45.42	3.10
9.	Cambodia	15.66	0.99	29.27	1.81	11.20	0.81	44.93	3.07
10.	Canada	27.16	1.72	25.72	1.59	17.51	1.27	39.81	2.72
87.	**India**	**2.28**	**0.14**	**2.19**	**0.14**	**2.77**	**0.20**	**1.03**	**0.07**
	Others	1088.37	68.94	1097.52	67.82	926.61	67.36	824.53	56.34
	Total	1578.70	100	1618.34	100	1375.58	100	1463.40	100

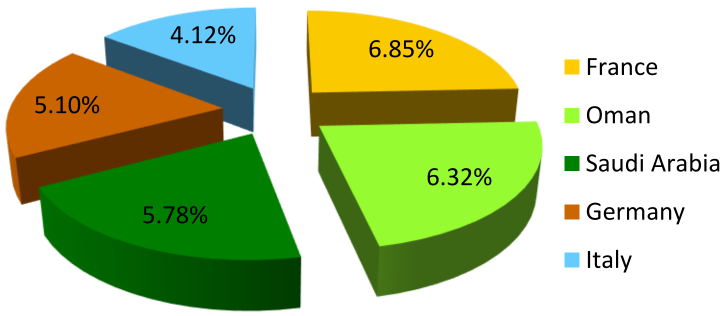
Source :UNComtrade

Tubes, Pipes of Cast Iron importers of world from 2018 to 2021 **(Values in million USD)**

Data label given on the basis of 2021



Country wise import trends of Tubes, Pipes of Cast Iron, not roasted by percentage in 2021

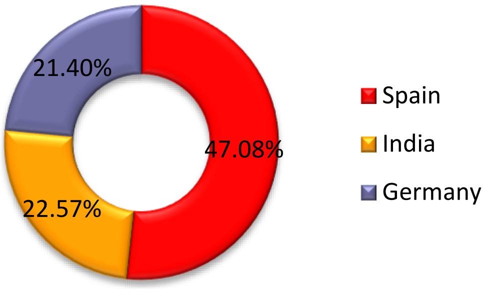


World Import of Tubes, Pipes and Hollow profiles of Cast Iron amounted to US $ 1.46 Billion in 2021. Overall, it indicated a temperate increase from 2020 to 2021. In 2021 the total imports value increased at 6.39% over the year 2020. Tubes, Pipes and Hollow profiles of Cast Iron imports attained its maximum level of US $ 1.61 Billion in 2021. France (US $ 100.25 M), Oman (US $ 92.51 M) and Saudi Arabia (US $ 84.52 M) appeared as the countries with the highest levels of imports in 2021. **India**'s import of the commodity was only US $ 1.03 million in that year.

Annexure-II

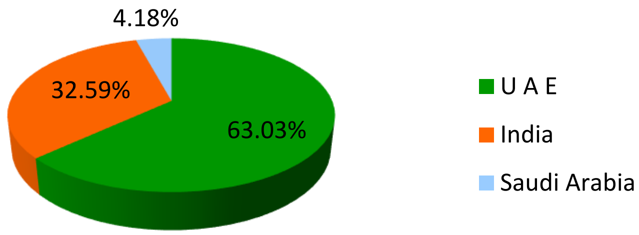
Major sources of world's top three importers of Tubes, Pipes of Cast Iron (HS Code –7303)

(i) Top 3 Sources of Tubes, Pipes of Cast Iron to France in 2021 by percentage:



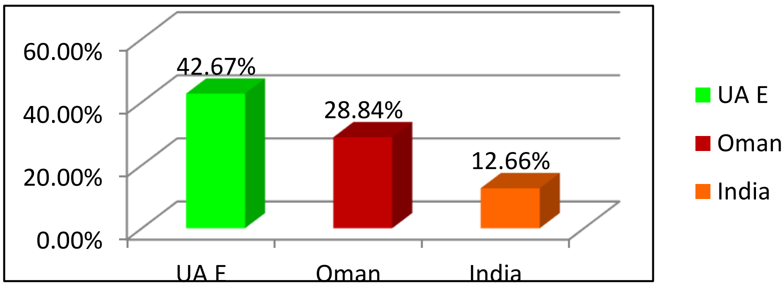
Spain was the principle source country of Tubes, Pipes and Hollow profiles of Cast Iron to France in 2021. France imported over 47% of the commodity from Spain, in the same year. **India** (22.57 %) and Germany (11.58%) were 2nd and 3rd major source countries of Tubes, Pipes and Hollow profiles of Cast Iron to France. **(Source: UN Comtrade)**

(ii) Top 3 Sources of Tubes, Pipes of Cast Iron to Oman in 2021 by percentage**:**



Oman's 3 major source countries of Tubes, Pipes and Hollow profiles of Cast Iron in 2021 were UAE (63.03%), India (32.59%) and Saudi Arabia(6.38%) in 2021 **(Source: UN Comtrade)**

(iii) Top 3 Sources of Tubes, Pipes of Cast Iron to Saudi Arabia in 2021 by percentage**:**



Almost 43% of Tubes, Pipes and Hollow profiles of Cast Iron imports of Saudi Arabia comes from UAE in 2021 which was followed by Oman (28.84 %). **India** has exported 12.66% share of Saudi Arabia's total import of Tubes, Pipes and Hollow profiles of Cast Iron in 2021 **(Source : UN Comtrade)**

IMPORT

Organo-Sulphur Compounds

Organo Sulphur Compound, also called O**rganic Sulphur Compound**, a subclass of organic substances that contain sulphur and that are known for their varied occurrence and unusual properties. They are found in diverse locations, including in interstellar space, inside hot acidic volcanoes, and deep within the oceans. Organosulfur compounds occur in the bodies of all living creatures in the form of certain essential amino acids , of the tripeptide glutathione, and of enzymes, coenzymes, vitamins, and hormones.

Typical organisms contain 2 percent sulphur dry weight. Coenzyme A (CoA), biotin, thiamine chloride (vitamin B_1), α-lipoic acid, insulin, oxytocin, sulphated polysaccharides, and the nitrogen-fixing nitrogenise enzymes are but a few examples of important natural sulphur-containing compounds. Certain simple organosulfur compounds, such as thiols, are repugnant to humans and higher animals even at extraordinarily low concentrations; they are used as defensive secretions by a variety of animal species and figure in unpleasant odours associated with polluted air and water, particularly that resulting from the use of sulphur-rich fossil fuels. However, related types of organosulfur compounds found in such foods as garlic, onion, chive, leek, broccoli, cabbage, radish, asparagus, mushroom, mustard, truffle, coffee, and pineapple are sources of olfactory and gustatory delight.

There are significant differences in the properties of these groups of related compounds. For example, thiols are somewhat stronger acids than the corresponding alcohols because the S—H bond is weaker than the O—H bond and because the larger sulphur atom better disperses the resulting negative charge as compared with oxygen. For the same reasons, selenols are even stronger acids than thiols.

In addition to routine methods of analysis that can be used with all classes of organic compounds (*see* analysis), certain procedures reflect specific characteristics of sulphur. In a mass spectrometer, organosulfur compounds frequently produce strong molecular ions in which the charge is located predominantly on sulphur. The presence of sulphur is indicated by the occurrence of sulfur-34 (^{34}S) isotope peaks, 4.4 percent of the abundance of ^{32}S. Organically bound sulphur in the form of the natural isotope ^{33}S can be directly examined by nuclear magnetic resonance (NMR) spectroscopy, although the low natural abundance (0.76 percent) and small magnetic and nuclear quadrupole moments make analysis more difficult than for protons (^1H) or carbon-13 (^{13}C). Levels of organosulfur compounds in crude petroleum as low as 10 parts per billion or less may have a detrimental effect on metallic catalysis or may cause unpleasant odours. These very low sulphur levels are detected using gas chromatographs with sulphur chemiluminescence or atomic-emission detectors with high sensitivity to detect sulphur compounds in the presence of other compounds.

Most crude oils contain organosulfur compounds such as thiols, sulphides, and polysulfide's, presumably formed from the reaction of hydrocarbons with elemental sulphur, in turn generated from microbial action on sulphate in rocks. As the oil ages, the thiols and sulphides are slowly converted into more stable compounds such as benzothiophene. Molybdenum-containing hydrodesulphurization catalysts are used in the removal of the undesirable sulphur compounds from petroleum, giving hydrocarbons and hydrogen sulphide as the final products. Polythiophene conductors are of great interest for use in molecular electronic devices. Research has led to the preparation of macrocyclic α-conjugated oligothiophenes; for example, α-cyclothiophene, which has a perfect hexagonal "honeycomb" solid state structure.

These are broadly classified under **H. S. Code- 2930**

Table - 9

India's Top 10 Sources of Organo-Sulphur Compounds (HS Code : 2930)

Rank	Countries	2018		2019		2020		2021	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	China	126.24	43.53	120.63	45.04	136.32	48.71	217.18	53.31
2.	Singapore	56.69	19.55	48.23	18.01	48.36	17.28	76.23	18.71
3.	Japan	21.62	7.46	26.90	10.05	26.42	9.44	37.82	9.28
4.	U S A	24.08	8.30	18.47	6.90	17.07	6.10	18.77	4.61
5.	Malaysia	12.53	4.32	12.21	4.56	8.68	3.10	15.74	3.86
6.	Belgium	15.94	5.50	11.44	4.27	12.32	4.40	12.63	3.10
7.	Spain	0.57	0.20	2.28	0.85	6.19	2.21	10.07	2.47
8.	Germany	14.39	4.96	4.97	1.86	5.50	1.97	4.55	1.12
9.	France	5.81	2.00	2.38	0.89	2.99	1.07	4.48	1.10
10.	Hong Kong	1.15	0.40	2.45	0.91	1.42	0.51	1.85	0.45
	Others	10.95	3.78	17.84	6.66	14.58	5.21	8.10	1.99
	Total	289.97	100	267.80	100	279.85	100	407.41	100

Source: **DGCI&S**

Note : India's Import including Re-import

The above data indicates that India's import of Organo Sulphur Compounds has grown to US $ 407.41 million in 2021 from US $ 279.89 million in 2020, which shows a growth of 45.59% from the previous year's import i.e. in 2020. In the year 2021 India's major sources of Organo Sulphur Compounds were China (US $ 217.18 Million), Singapore (US $ 76.23Million), Japan (Us $ 37.82 Million, USA (US $ 18.77 Million) and Malaysia (US $ 15.74 Million). These 5 countries in total sold US $ 365.74 Million value of Organo Sulphur Compounds import into India which shows nearly 90% of total import value of Organo Sulphur Compounds imported by India from these 5 countries in 2021

Table - 10

World Top 10 Importer of Organo-Sulphur Compounds (HS Code : 2930)

Rank	Countries	2018		2019		2020		2021	
		Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	USA	793.76	10.65	817.98	11.32	901.07	11.79	970.23	10.99
2.	China	707.02	9.49	767.36	10.62	751.11	9.83	850.78	9.63
3.	Brazil	606.79	8.14	685.65	9.49	701.65	9.18	846.30	9.58
4.	Germany	383.22	5.14	347.91	4.81	368.43	4.82	441.77	5.00
5.	**India**	**289.81**	**3.89**	**267.82**	**3.71**	**280.84**	**3.67**	**407.75**	**4.62**
6.	Rep. of Korea	329.80	4.43	334.89	4.63	306.87	4.02	391.29	4.43
7.	Japan	308.53	4.14	281.50	3.89	279.95	3.66	328.61	3.72
8.	Spain	262.06	3.52	244.97	3.39	278.70	3.65	325.72	3.69
9.	Indonesia	188.70	2.53	163.42	2.26	166.42	2.18	246.59	2.79
10.	Belgium	216.32	2.90	182.88	2.53	196.44	2.57	217.88	2.47
	Others	3366.95	45.18	3134.15	43.36	3410.84	44.63	3804.40	43.08
	Total	7452.95	100	7228.53	100	7642.32	100	8831.32	100

Source :UN Comtrade

The worth value of Global import of Organo Sulphur Compounds was nearly US $ 8.83 Billion in 2021 which was rose at 15.56 % from the year 2020. USA has became the world's largest importer of Organo Sulphur Compounds among world's largest importers. Imports 11% share of world's import of Organo Sulphur Compounds in 2021 followed by China and Brazil. In the same **India**'s imports of Organo Sulphur Compounds have hit an all-time high and its share in the world-wide export market of this product was 4.62 % of total world import trade value of Organo Sulphur Compounds and ranked in 5^{th} position in the world

Ball or Roller Bearing

A **ball bearing** is a type of rolling-element bearing that uses balls to maintain the separation between the bearing races.

The purpose of a ball bearing is to reduce rotational friction and support radial and axial loads. It achieves this by using at least two races to contain the balls and transmit the loads through the balls. In most applications, one race is stationary and the other is attached to the rotating assembly (e.g., a hub or shaft). As one of the bearing races rotates it causes the balls to rotate as well. Because the balls are rolling they have a much lower coefficient of friction than if two flat surfaces were sliding against each other.

Ball bearings tend to have lower load capacity for their size than other kinds of rolling-element bearings due to the smaller contact area between the balls and races. However, they can tolerate some misalignment of the inner and outer races.

Although bearings had been developed since ancient times, the first modern recorded patent on ball bearings was awarded to Philip Vaughan, a Welsh inventor and ironmaster who created the first design for a ball bearing in Carmarthen in 1794. His was the first modern ball-bearing design, with the ball running along a groove in the axle assembly.

There are several common designs of ball bearing, each offering various performance trade-offs. They can be made from many different materials, including: stainless steel, chrome steel, and ceramic (silicon nitride (Si_3N_4)). A hybrid ball bearing is a bearing with ceramic balls and races of metal.

The calculated life for a bearing is based on the load it carries and its operating speed. The industry standard usable bearing lifespan is inversely proportional to the bearing load cubed Nominal maximum load of a bearing, is for a lifespan of 1 million rotations, which at 50 Hz (i.e., 3000 RPM) a lifespan of 5.5 is working hours. 90% of bearings of that type have at least that lifespan, and 50% of bearings have a lifespan at least 5 times as long. For a bearing to operate properly, it needs to be lubricated. In most cases the lubricant is based on elastohydrodynamic effect (by oil or grease) but working at extreme temperatures dry lubricated bearings are also available.

Lubrication can be done with a grease, which has advantages that grease is normally held within the bearing releasing the lubricant oil as it is compressed by the balls. It provides a protective barrier for the bearing metal from the environment, but has disadvantages that this grease must be replaced periodically, and maximum load of bearing decreases (because if bearing gets too warm, grease melts and runs out of bearing). Time between grease replacements decreases very strongly with diameter of bearing: for a 40 mm bearing, grease should be replaced every 5000 working hours, while for a 100 mm bearing it should be replaced every 500 working hours.

Lubrication can also be done with an oil, which has advantage of higher maximum load, but needs some way to keep oil in bearing, as it normally tends to run out of it. For oil lubrication it is recommended that for applications where oil does not become warmer than 50 °C, oil should be replaced once a year, while for applications where oil does not become warmer than 100 °C, oil should be replaced 4 times per year. For car engines, oil becomes 100 °C but the engine has an oil filter to maintain oil quality; therefore, the oil is usually changed less frequently than the oil in bearings.

If the bearing is used under oscillation, oil lubrication should be preferred. If grease lubrication is necessary, the composition should be adapted to the parameters that occur. Greases with a high bleeding rate and low base oil viscosity should be preferred if possible.

During the 20th century, improvements in bearings went hand-in-hand with the great advances in the automotive, machine tool and military industries. The choice of rolling elements expanded from balls to rollers, tapered rollers and spherical rollers. Bearings could support greater forces and combined (axial and radial) loads.

Metallurgical processes improved as humanity's understanding of chemistry increased, leading to harder, and more wear-resistant materials. Improved lubricants made it possible for bearings to operate at higher speeds and temperatures. New and improved bearings are today put to use in a variety of machines, big and small, from dental drills to the Mars Rover spaceship.

These are broadly classified under **H. S. Code 8482**

Table - 7

India's Top 10 Sources of Ball Bearing (HS Code :8482)

Rank	Countries	2018		2019		2020		2021	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	China	521.97	42.26	412.20	38.22	356.10	42.73	553.55	42.46
2.	Germany	209.54	16.97	200.50	18.59	133.33	16.00	215.63	16.54
3.	Japan	133.81	10.83	130.47	12.10	84.18	10.10	141.68	10.87
4.	U S A	60.18	4.87	44.20	4.10	37.29	4.47	54.91	4.21
5.	Singapore	38.79	3.14	52.34	4.85	33.71	4.05	44.77	3.43
6.	Korea RP	35.63	2.89	35.88	3.33	28.05	3.37	38.23	2.93
7.	Italy	37.35	3.02	28.56	2.65	21.54	2.59	32.95	2.53
8.	Netherland	4.94	0.40	5.20	0.48	15.44	1.85	30.57	2.34
9.	Thailand	22.58	1.83	21.32	1.98	17.27	2.07	29.31	2.25
10.	France	24.70	2.00	24.95	2.31	13.67	1.64	22.72	1.74
	Others	145.60	11.79	122.76	11.38	92.73	11.13	139.30	10.69
	Total	1235.08	100	1078.38	100	833.31	100	1303.61	100

Source: **DGCI&S**

Note : India's Import including re-import

Ball or Roller Bearing import to India in 2021 stood at US $ 1.30 Billion and US $ 1.23 Billion in 2018, which shows a Positive growth of more than 6% from the 2018 of India's import value of Ball or Roller Bearing. Major three source countries of the commodity to India in 2021 were China (US $ 553.55 Million), Germany (US $ 215.63 Million) and Japan (US $ 141.68 Million). These 3 countries in total sold US $ 910.86 Million value of Ball or Roller Bearing exported to India which rounds up to 69.88% of the total Ball or Roller Bearing import into India

Table - 8

World Top 10 Importer of Ball Bearing (HS Code :8482)

Rank	Countries	2018		2019		2020		2021	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	China	3718.87	10.53	3615.45	10.90	4332.72	14.89	5368.57	14.73
2.	Germany	4808.45	13.62	4257.09	12.83	3501.89	12.04	4410.80	12.10
3.	USA	3351.52	9.49	3207.22	9.67	2490.30	8.56	3331.66	9.14
4.	France	1874.53	5.31	1701.86	5.13	1310.23	4.50	1570.28	4.31
5.	Mexico	1461.17	4.14	1391.64	4.19	1097.05	3.77	1423.93	3.91
6.	Italy	1449.32	4.10	1321.73	3.98	1040.87	3.58	1379.48	3.79
7.	**India**	**1235.15**	**3.50**	**1078.12**	**3.25**	**834.31**	**2.87**	**1303.18**	**3.58**
8.	Rep of Korea	1055.50	2.99	1004.84	3.03	867.13	2.98	1054.78	2.89
9.	Brazil	706.67	2.00	700.16	2.11	595.07	2.05	907.24	2.49
10.	Netherlands	766.71	2.17	760.92	2.29	692.30	2.38	805.59	2.21
	Others	14888.48	42.16	14139.33	42.62	12334.60	42.39	14886.09	40.85
	Total	35316.34	100	33178.35	100	29096.47	100	36441.60	100

Source :**UNComtrade**

Global Imports of Ball or Roller Bearing, the top five importers of Ball or Roller Bearing in 2021 were China (US $ 5.36 B), Germany (US $ 4.41 B), USA (US $ 3.33 B), France (US $ 1.57B) and Mexico (US $ 1.42 B), accounted for 14.73%, 12.10%, 9.14%, 4.31 % and 3.91% respectively of world import value of Ball or Roller Bearing. The import value of Ball or Roller Bearing into **India** amounted to US $ 1.30 Billion in the year 2021 and ranked in 7th position in the world with the share of 3.58% of total Global import value of Ball or Roller Bearing. This was increase from the previous year