



CBI  
*Ministry of Foreign Affairs*

# **CBI Product Factsheet:**

## **Seals in Europe**

## Introduction

The new seals of tomorrow will have unique thermal management features and durable overall seal product life, in addition to offering the ability to eliminate seal leakage in hazardous environments. The European imports of seals are increasing since 2010, totalling €4.6 billion in 2014, with a stable but relatively small Developing Country share of about 8%. For the coming years, the Developing Country share is forecast to be stable or show a modest growth. As Europe's leading importers of seals from Developing Countries, Germany and the United Kingdom are especially interesting target markets. At the same time, these two countries have a relatively large production output, offering the opportunity of subcontracting.

## Product description

A seal is a device that supports the joining of systems or mechanisms together by preventing leakage, containing pressure, or excluding contamination. For seals, the effectiveness is dependent on adhesion (for gaskets this depends on compression). Seals are used in many industries (e.g. oil and gas, chemical processing, automotive).

The important nature of seal technology was clearly illustrated at the time of the Space Shuttle Challenger disaster which occurred in 1986, when the NASA Space Shuttle orbiter Challenger broke apart, leading to the deaths of its seven crew members. The spacecraft disintegrated over the Atlantic Ocean, after an O-ring seal in its right solid rocket booster (SRB) failed at lift off. The O-ring failure caused a breach in the joint it sealed, allowing pressurized burning gas from within the solid rocket motor to reach the outside and impinge upon the adjacent SRB aft field joint attachment hardware and external fuel tank. Of course a space rocket may be considered as an extreme example of where the specification of the seal has to be more than exact. However, a seal that does not perform in service in any application will lead to a malfunction of some sort in any application.

When 'seals' are referred to in this survey, this concerns the selection of products in Table 1, unless stated otherwise. Table 1 also shows the list of Prodcom codes used for the production statistics of seals.

**Table 1: Selected products, based on CN and Prodcom nomenclature**

CN code	Prodcom code	Description
84841000		gaskets and similar joints of metal sheeting combined with other material or of two or more layers of metal
84841010		gaskets and similar joints of metal sheeting combined with other material or of two or more layers of metal, for civil aircraft
84841090		gaskets and similar joints of metal sheeting combined with other material or of two or more layers of metal (excl. those for civil aircraft)
84849000		sets or assortments of gaskets and similar joints, dissimilar in composition, put up in pouches, envelopes or similar packings
84849010		sets or assortments of gaskets and similar joints, dissimilar in composition, put up in pouches, envelopes or similar packings, for civil aircraft
84849090		sets or assortments of gaskets and similar joints, dissimilar in composition, put up in pouches, envelopes or similar packings (excl. those for civil aircraft of subheading 8484.90.10 )
40169300	28292300 Gaskets and	gaskets, washers and other seals, of vulcanised rubber (excl. hard rubber and those of cellular rubber)
40169310	similar joints of metal sheeting combined with	gaskets, washers and other seals, of vulcanised rubber (excl. hard rubber), for technical uses, for use in civil aircraft (excl. those of cellular rubber)
40169390	other material or of two or more layers of metal	gaskets, washers and other seals, of vulcanised rubber (excl. hard rubber and those of cellular rubber and those for technical uses, for use in civil aircraft, subheading 4016.93.10)

Source: CN and Prodcom Nomenclature

## Product specification

Specifications of seals as required by European buyers are depending on a range of factors:

- The type of seal application. Pumps are one of the most common applications for seals.
- Operating conditions (shaft speed, pressure, eccentricity); do they fall within design limits.
- Lip, case and selection of the material (compound) is based on the pressure, the medium and the temperature.

- **Pressure:** The key to selection criteria is system pressure. At low pressure conditions, harder compounds may be slow to respond and can lead to leakage. Conversely, soft compounds may be subject to heavier extrusion and the resultant premature seal failure. As a general rule, the higher the pressure, the harder the required material.
- **Medium:** Ambient medium would be the second key selection factor. Compounds are produced and designed specifically to optimize performance to assist in the resistance to hydrolysis and media effect, as well as to combat extremely humid conditions.
- **Temperature:** Operating temperatures are the third aspect to be considered for compound selection. Special compounds have been developed which are particularly suited to cope at extreme temperatures, both low and high.
- Examples of materials used for the seals are the elastomers Nitrile (NBR), Hydrogenated Nitrile (HNBR), TFE/P (FEP), and Polyurethane (AU, EU, PU).
- Bore and shaft configuration.

## Quality

Quality requirements in the European market are high, and it is therefore very important to have an advanced quality control system in place. Most major seal producers will have laboratory equipment which is capable of:

- Compression set testing (ISO 815 method A)
- Accelerated heat and ageing tests (ISO 188)
- Hardness control following Shore A or IRHD (International Rubber Hardness Degrees)
- Surface control
- Specific measurement to special tolerances
- Tear strength testing
- Tensile strength testing
- Ozone testing
- Lifetime testing
- Chemical resistance tests
- Infrared spectroscopy
- TGA (Thermo-Gravimetric) Analysis
- FDA (Food and Drug Administration) migration test
- TOC (Total Organic Carbon) analysis
- FEA (finite element analysis) calculations
- Differential Scanning Calorimetry
- Failure analysis
- Surface defects
- Immersion testing
- Hyper elastic material characterisation
- Hydro testing
- Explosive Decompression Testing

### Tip:

- The availability of in-house laboratory equipment can be an important criterion for potential customers. Therefore, producers should invest in such facilities or make sure they have a good access to third party laboratories.

## Export packaging

In general, multi-packaging is used for smaller parts whereas single packaging is applied to large parts. Packaging consists of an interior package and an outer package. The interior package is often a plastic tube/envelope, while the outer package is usually made up of carton lined with plastic sheeting and should contain brand name and type number. The package for ocean transportation is a wooden, or plastic pallet, wrapped with plastic sheeting and packed with metal strips. The sizes of the boxes depend on the weight per box and handling possibilities.

Moreover, it may well be the case that the customer has his own (additional) packaging requirements and preferences. Batch numbers on individual boxes may also be a requirement.

## Storage

Rubber products in storage can be adversely affected by a number of factors which include temperature, humidity, ozone, sunlight, oils, solvents, corrosive liquids and fumes. They should also not be stored near any source of heat and should be protected from rodent and insects interference.

Storage temperature should range between +15° C and +25°C. With higher temperatures the material may start to vulcanize prematurely (scorch). Too low temperatures will make the material stiff and will reduce the adhesion.

When storing these products, compliance with the norms DIN 7716 and ISO 2230 should be assured (these standards are used by several customers worldwide). Seal manufacturers should develop an optimal packaging, which is often in detail specified by the customer.

Note that there is also a general guideline for recommended shelf life of seals, following the Aerospace Recommended Practice ARP 5316 issued by the SAE (Society of Aerospace Engineers):

- 5 years: Polyurethane, SBR, Natural Rubber, Polybutadine, Polyisoprene
- 15 years: Nitrile, neoprene, HNBR, Polyacrylate, Butyl
- Unlimited: Ethylene Propylene, Fluorocarbon, Perfluorinated Elastomer, Silicone, Tetrafluoroethylene Propylene, Fluorosilicone

**Tip:**

- See also [ISO 2230:2002](#); this International Standard gives guidelines for the inspection, recording procedures, packaging and storage of products, assemblies and components made from vulcanized or thermoplastic rubber prior to being put into circulation.

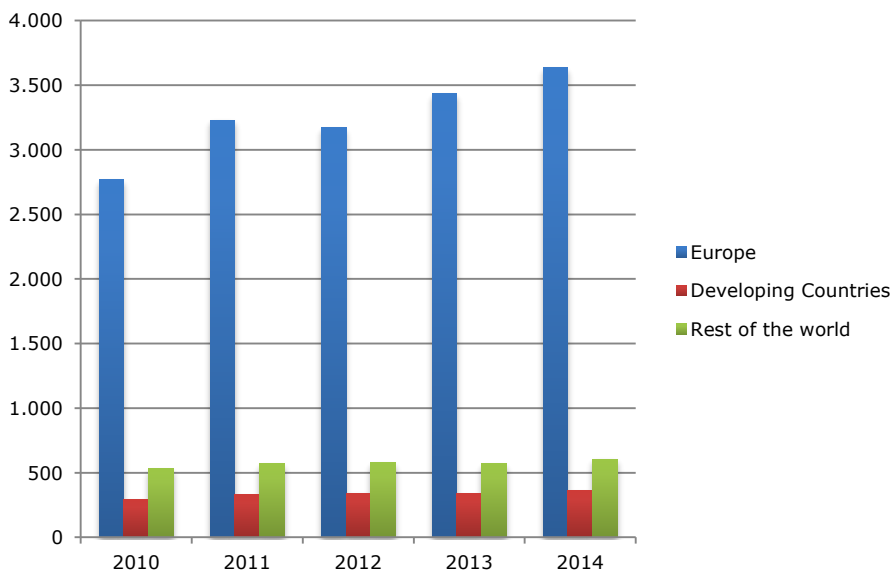
## What is the demand for seals in Europe?

Note: data used includes not only seals but also gaskets (refer to Table 1 for the selection of CN codes).

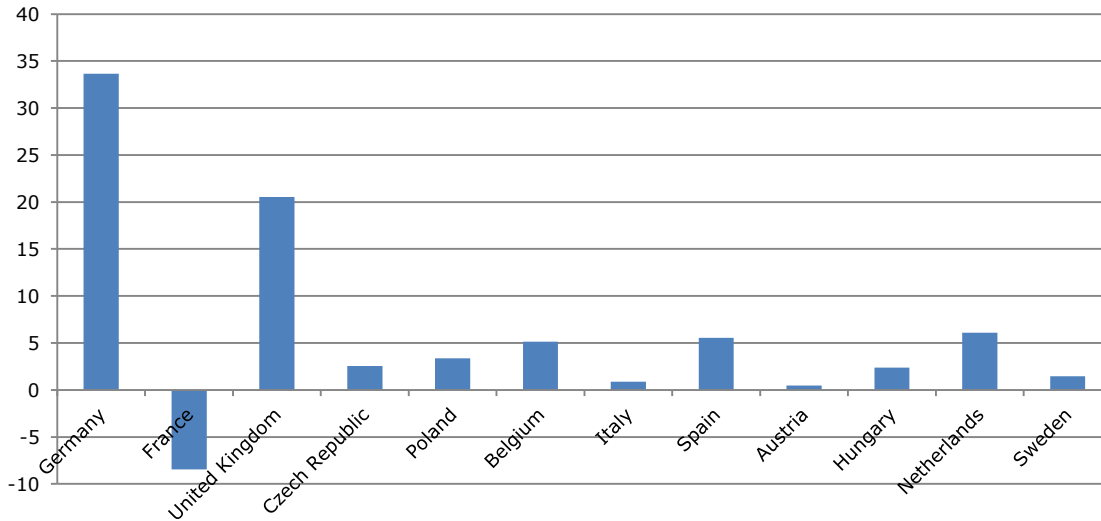
### Imports

**Figure 1: Imports of seals to Europe, by main origin, € million, 2010-2014**

**Europe**



**Figure 2: Absolute Developing Country import growth 2010-2014, € million (countries in range of largest importers), of seals**



Source: Trademap

- European imports of seals peaked in 2014, totalling €4.6 billion. Average annual growth in 2010-2014 was 6.4%.
- The Developing Country share in European imports has been stable in the period under review, moving in a range between 8.4% (2012) and 7.9% (2014). Most imports originate from intra-European sources (almost 80% of all imports). For the coming years, the Developing Country share is forecast to be stable or show a modest growth.
- The leading importer is Germany (28% of European imports), followed by France (10%), the United Kingdom (8%), Czech Republic and Poland (each with 7%), Belgium, Italy and Spain (each with 5%). In terms of Developing Country imports, Germany is leading (34% of European imports from Developing Countries), ahead of the United Kingdom (14%), France (9%), Belgium (6%), Poland, Spain and the Netherlands (each with 5%).
- The import of seals is expected to show a small growth in the next few years, in the range of 0-2%.

### Leading suppliers

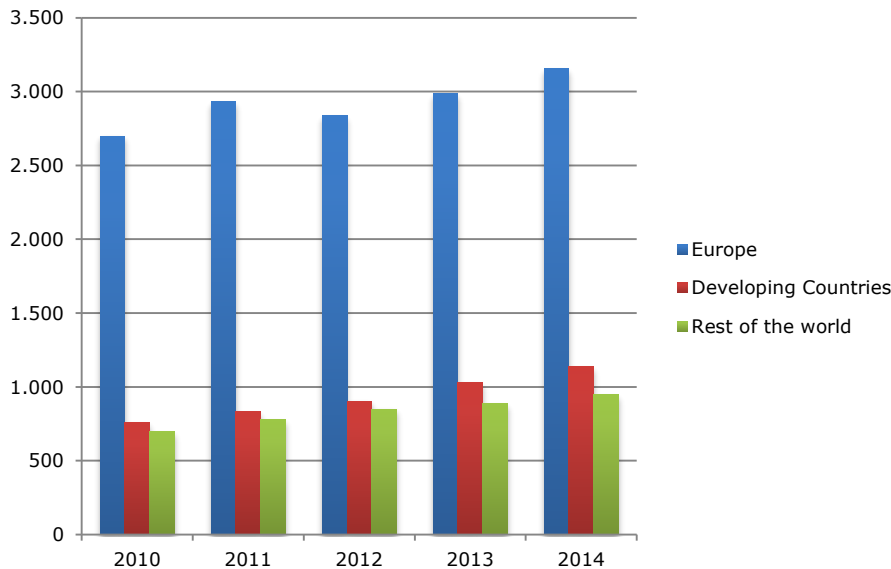
- The leading suppliers of seals to Europe are mainly Developed Countries. Germany, Italy, France, Poland, the United Kingdom, Spain and Belgium are in the top 10 leading suppliers. Only one Developing Country, China, appears in the list of top suppliers, in the 8<sup>th</sup> position. China exports to Europe amounted to €156 million in 2014, equal to 3% of total European imports.
- Other Developing Countries which export (smaller amounts of) seals to Europe are Turkey, India, Mexico, Vietnam and Thailand.
- USA is by far the largest supplier in the category 'rest of the world', followed by Japan and Taiwan.

### Tip:

- Benchmark your company against your peers from European countries, China and USA. Several factors can be taken into account, such as market segments served, perceived price and quality level, countries served, etc. A useful source to find exporters/producers of seals per country is the [ITC Trademap](#).

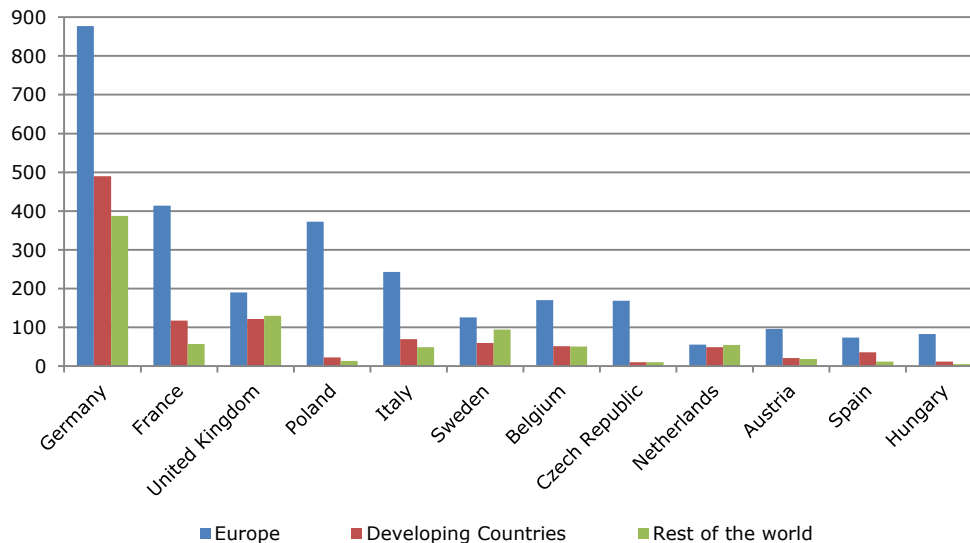
## Exports

**Figure 3: Exports of seals from Europe, by main destination, € million, 2010-2014**



Source: Trademap

**Figure 4: Main exporters of seals, € million, 2014**

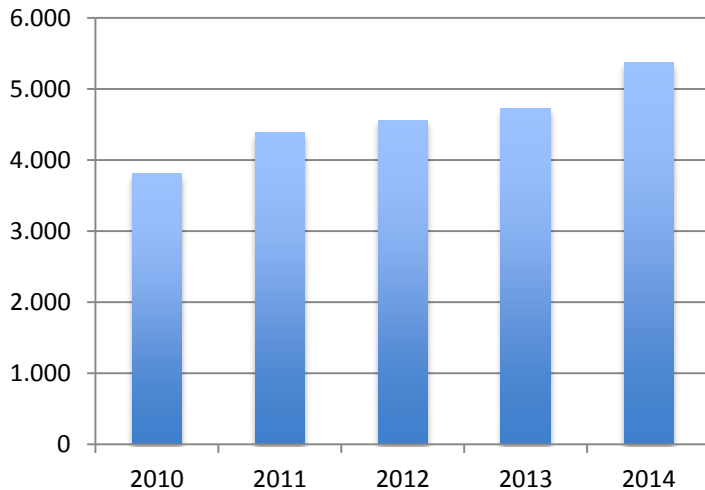


Source: Trademap

- European exports of seals exhibited an upward trend in 2010-2014, reaching €5.2 billion in 2014. Average annual growth for this period was 6%.
- The Developing Country share in European exports increased year on year, reaching 22% in 2014. Still, most exports go to intra-European destinations (60% of all exports). However, note that this figure also includes some transit trade of imports originally from Developing Countries. For the coming years, the Developing Country share is forecast to remain relatively stable between 20-25%, with China remaining the leading market.
- The leading exporter is Germany, accounting for 33% of total exports from Europe. France is in 2<sup>nd</sup> position (11%), followed by the United Kingdom and Poland (each with 8%), and Italy (7%).
- German exports to Developing Countries are massive; they represent 43% of European exports to Developing Countries. The United Kingdom is in 2<sup>nd</sup> position (11%), followed by France (10%).
- The European export of seals is expected to show a small growth in the next few years, in the range of 0-2%.

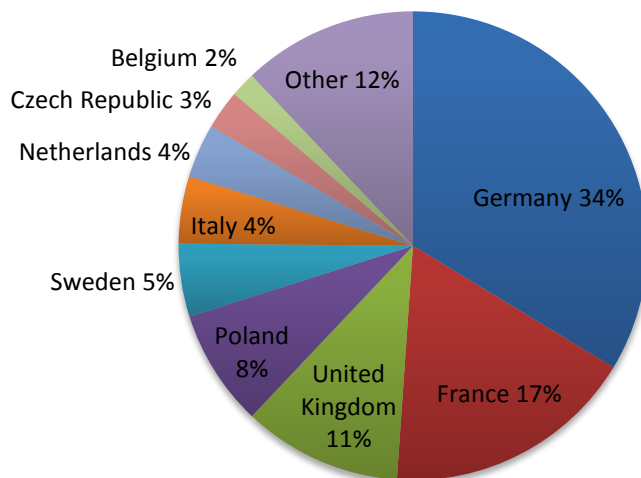
## Production and apparent demand

**Figure 5: European production of seals, 2010-2014, € million**



Source: Eurostat Prodcop

**Figure 6: Main European producers of seals, 2014**



Source: Eurostat Prodcop

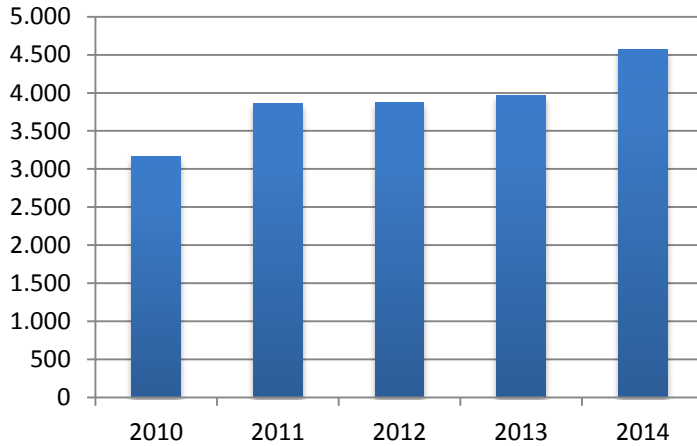
- European production totalled €10 billion in 2014, after an average annual increase of 8.7% in the period 2010-2014. This growth was largely the result of a weak reference year (2010) and the relatively strong growth in demand in Europe in 2014, caused by a general growth in many main market segments across Europe in the same year.
- Germany accounted for slightly more than 34% of total European production in 2014, France for 17%.
- Note that each country in Europe has its own specific market profile and that each market segment has its' own requirements.

### Tip:

- Figure 6 reveals that in addition to Germany and France, there is also considerable production output in the United Kingdom.<sup>1</sup> The presence of producers in these countries offers subcontracting opportunities for Developing Country exporters.

<sup>1</sup> Production in Poland is basically the result of Foreign Direct Investments of Western European producers; hence Poland does not offer good opportunities.

**Figure 7: Apparent demand for seals in Europe, 2010-2014, € million**

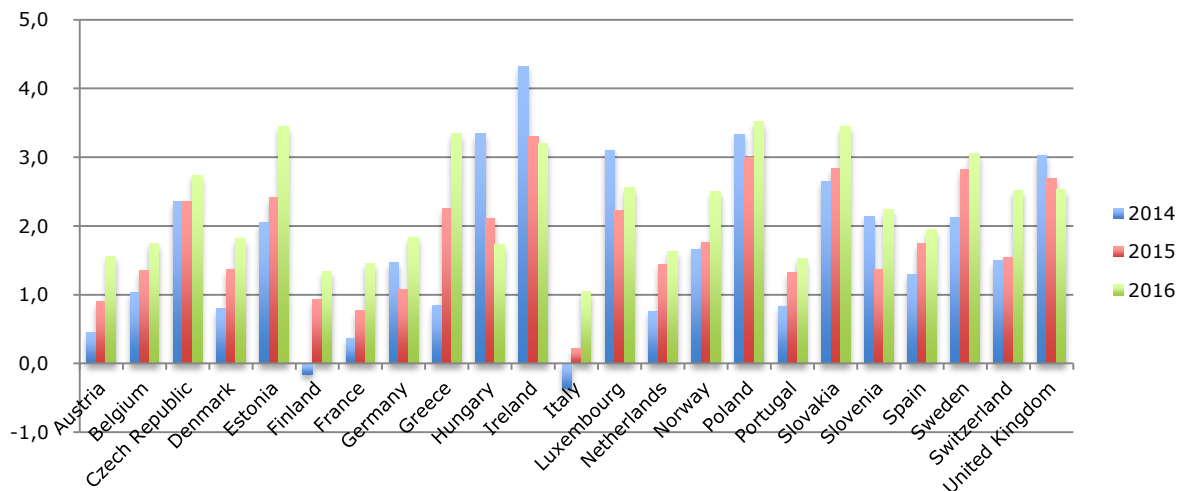


Source: Eurostat Prodcom

- European apparent demand totalled €4.6 billion in 2014, after an average annual increase of 9.6% in the period 2010-2014.

### Macro-economic indicators

**Figure 8: Real GDP, % change from previous year**



Source: OECD Economic Outlook 96 database

- The major determinant of seal demand is spending activity in the end-user industries. Seal demand depends both (and increasingly) on the demand for replacement parts as well as demand for new equipment. In turn, this demand is stimulated by economic growth. In each country, GDP is expected to show continued growth year-on-year in the years to come. This is a good basis for demand and import growth in the coming years.
- In general, seal demand is relatively stable because the large range of market segments offers a relatively balanced market over the years. This stability in demand can be seen in the period 2011-2013 (Figure 7).
- The profitability of seals imports is influenced by the €:US\$ exchange rate, as many engineered parts sourced globally are paid in US\$. While the €:US\$ exchange rate was not forecast to go beyond 0.80 until 2020, this did happen in 2015, with an exchange rate of 0.88-0.93 in the period March-October 2015. This has a large effect on the price level of imports. Especially if this situation will stay for years, it will have a negative impact on the level playing field of European imports paid in US\$, versus local European production.



**Tip:**

- Looking at the current low value of the Euro; if the Euro stays on the level of approximately 0.90US\$, Developing Country producers should increasingly focus on cost reduction to remain competitive in the European market.

## What trends offer opportunities on the European market for seals?

Seal technology today maintains a strong focus on industry or application specific solutions. There are increasing developments with new elastomers which have improved properties and which provide better service life and wear resistance (offering reliability) in specific aggressive conditions. The new seals of tomorrow will most probably have unique thermal management features, durable overall seal product life, and offer the ability to eliminate seal leakage in hazardous environments.

At the same time, the used seal designs should offer lower inventory needs to customers, which translates in lower working capital needs for the customer. This aspect is important, as cost reduction remains an important factor in industrial sales channels.

The sites of the leading seals manufacturers sometimes offer an interesting overview of characteristics and trends for several important market segments.

**Tips:**

- Look at for example [Garlock](#) for trends and developments per market segment.
- Look at an example of a new seal development of [Flowserve](#); the [ISC2 series](#).

## What requirements should seals comply with to be allowed on the European market?

You can find a general overview of the [EU \(legal\) buyer requirements for motion control](#) on the Market Intelligence Platform of CBI. The requirements for seals don't differ significantly from those for the general sector. Also refer to the [EU Export Helpdesk](#), the [ITC Market Access Map](#) and the [ITC Standards Map](#) for more information related to gaining access to the European market.

For seals a 0-3.7% duty is levied on European imports from third countries. The TARIC database shows more details for Chapter [401693](#) and [8484](#). Several countries benefit from a preferential 0% tariff, for example Indonesia, Pakistan, Vietnam, the Philippines, Bosnia and Egypt. Note that it is only possible to claim a preferential tariff treatment with a Certificate of Origin.

The customer's main requirements will be related to the seal itself; design, material, dimensions, and finishing must meet the customer's specifications. In fact, these issues are key in the sample phase. If the customer accepts the samples and all other conditions are agreed upon, the contract can be signed. After that, the main challenges of the suppliers are to deliver the products according to the agreed specifications, delivery times, and volumes.

There are several standards applying to seals. Examples are ISO or API standards, e.g. ISO21049 or API682 refers to mechanical seals used in petrochemical, chemical, and pipeline operations worldwide.

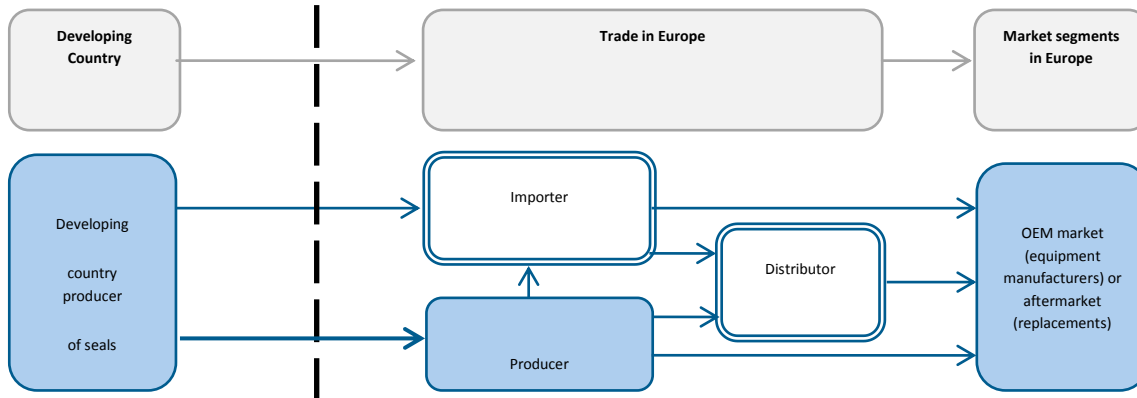
**Tip:**

- More details can be found at the ISO website: [ISO Catalogue](#) – Go to "ISO/TC 45/SC 4" for an overview of ISO standards applying to rubber- or plastics-coated fabrics (seals is also in the list), or enter 'seals' in the search menu.

## What do the trade channels and interesting market segments look like in Europe for seals?

Developing Country producers of seals have two main options for entering the European market: importers and manufacturers. Sources of prospects are included in the section "Useful sources". For additional information on finding buyers, refer to the [CBI document on Finding Buyers in the Motion Control Industry](#). Another important resource is the [CBI document on Doing Business in the Motion Control Industry](#).

**Figure 9: Trade structure for seals in Europe**



Europe is home to several interesting players. As each company is unique, with its own customers, market segments, and products, the profile of the potential partner is very important. You are very likely, however, to find a match.

The following are some examples of seal manufacturers and importers in Europe:

- Manufacturers: [Eriks](#), [FST](#), [Suebel](#), [Garlock](#), [SKF](#), [Hallite](#), [Trelleborg](#), [Parker](#) and [JohnCrane](#). Note that some can be also characterized as distributors (like Eriks), and there are producers who focus on seals (Garlock) and producers who have a larger range of products (e.g. SKF).
- A few examples of seals distributors are [EDCOSeal](#), [Europe-Seals](#) and [Kimman](#), while most distributors in Europe are broad-line distributors of a wide range of motion control products (e.g. [Brammer](#), [AFC](#), [Hayley Group](#), [FIAP](#) and [Fortek Automazioni](#) (Italy), and [Biesheuvel Groep](#) (the Netherlands)).

## What are the market prices for seals?

To establish an export price, you need to consider many of the factors involved in pricing for the domestic market:

- Aim to charge the price the market will bear and keep in mind the quality-price ratio of your products. It should be in line with competitor prices;
- Pricing is a mix of knowing your domestic costs and calculating costs you will incur in delivering and supporting your activities in a foreign market;
- Use contracts with variable material costs. It is important to set the reference index for the fluctuations in agreement with the buyer. Use, for example, the steel index of the [London Metal Exchange](#);
- Bear in mind that it is not easy to increase prices once you have agreed to deliver at a certain price. The negotiated price should never be below your cost price (except for the first order; in this context you may accept a loss if larger quantities and thus lower costs are expected for the following orders). No European buyer will accept an unreasonable/unexpected price increase after the first order;
- The negotiated price depends on the delivery conditions, the means of payment, credit terms and currency risks, quantities, and the means of transport;
- Exchange rates fluctuate. Cover this risk by including the currency risk in the contract. This practice has been accepted in international business transactions for a few years.

Another very important issue is the responsibilities and rights relating to the tooling. The following tooling issues should all be covered in the contract: financing manufacture and possible repairs, guaranteed life time, ownership, and storage.

### Tips:

- Use contracts with variable material costs.
- Include the currency risk in the contract.
- Include the responsibility and rights related to the tooling in the contract.

## Useful sources

- Associations: [European Sealing Association](#), [European Seals and Gaskets Association](#), and in some countries there is a national association, e.g. [VTH-Fachgruppe Dichtungstechnik](#) (Germany)
- Finding prospects: [ABC Business Directories](#), [Europages](#), [Kompass](#), as well as via the associations (
- Magazines and news portals: [Pumps & Systems](#)

- Trade fairs: [Hannover Messe](#) – the world’s leading trade fair for industrial technology, annual with a bi-annual motion control fair, April, Hannover
- Trade fair databases: [AUMA](#), [Eventseye](#)
- Trade statistics: [Eurostat](#), [ITC International Trade Statistics](#)
- Other: [EU Export Helpdesk](#), [Kwintessential](#)



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