CBI
Ministry of Foreign Affairs

CBI Product Factsheet:

Heat Exchangers in Europe

Introduction

European imports of heat exchangers are growing steadily, and reached around €2.6 billion in 2014, of which exporters from developing countries supplied almost 9%. The main importers are Germany and France, and Italy and the United Kingdom may be interesting focus countries because of their strong market for developing country imports. The best opportunities for developing country exporters are in water and wastewater, heating, ventilation, and air conditioning (HVAC) and refrigeration applications. Manufacturers in developing countries are advised to focus as much as possible on custom-made production.

Product description

Heat exchangers are used to transfer heat between fluids (liquid or gas), which are usually separated by a solid wall to prevent mixing. They are designed with a maximum wall area to increase efficiency while minimising resistance to fluid flow through the exchanger.

There are various types of heat exchangers, of which shell and tube heat exchangers form the largest product category (about 30%), followed by plate-and-frame exchangers (20-30%). Examples of relatively simple types of heat exchangers are those used in refrigerators and cars.

The materials used to construct heat exchangers depend on the fluids or vapour handled, process conditions such as pressure and temperatures, and a balance between initial cost and expected life and maintenance requirements. The outer shell of a heat exchanger is usually made of durable, high strength metal, such as carbon steel or stainless steel. Materials used for the inner tubes are mostly copper, stainless steel, and copper/nickel alloys because of their durability, corrosion resistance and thermal conductivity.

Heat exchangers are extremely labour-intensive to produce, largely because of the many welding hours required. The wide variation in products, dimensions and manufacturing steps makes it difficult to improve production efficiencies. This is one of the main reasons production is increasingly shifting to relatively low-cost countries including developing countries. So far, only the more standard products have been produced in developing countries, but in the future custom-made or special heat exchangers are expected to be produced in these countries. Industry experts advise manufacturers in developing countries to focus as much as possible on custom-made production.

In this survey, heat exchangers refer to the product selection in Table 1, unless stated otherwise. Table 1 also presents Prodcom codes used in the production statistics for heat exchangers.

Table 1: Selected products based on CN and Prodcom nomenclature

CN code	Prodcom code	Description
841950-00/10/90	29231130	Heat-exchange units

Source: CN and Prodcom Nomenclature

Labelling and packaging

Usually, heat exchanger components are coated with rust preventive before they are packed and shipped. Since most heat exchangers (components) have a high value/volume ratio, they must be well packaged for shipment. Oilpaper is used to prevent dispersal of the protective oil, or if possible, hermetically, vacuum-sealed synthetic pouches are used. The outer package is a heavy box, and the box must be tightly packed to prevent movement of the product during shipment.

The size of the boxes depends on the weight and handling capacity. For sea transport, the boxes are stacked on wooden or iron pallets wrapped in plastic sheeting and secured with metal strips. Customers may also have their own additional packaging requirements and preferences. Individual box packaging or other modes may be requested. Batch numbers are required on individual boxes.

EU Packaging and packaging waste legislation restricts the use of certain heavy metals. There are also requirements for Wood packaging materials used for transport (WPM), such as packing cases, boxes, crates, drums, pallets, box pallets, and dunnage.

Tips:

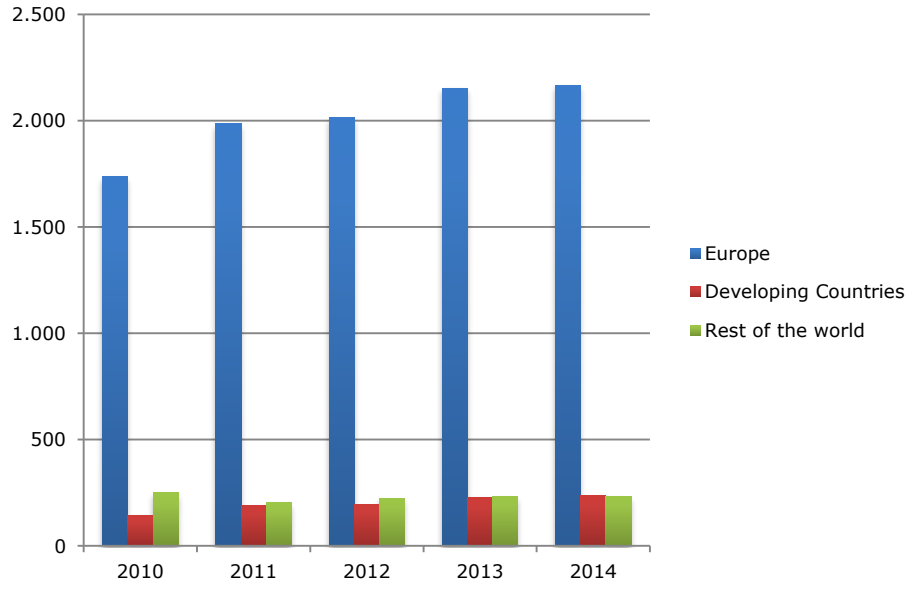
- Developing country exporters should focus on one or a few market segments. The most favourable opportunities are in water and wastewater, HVAC and refrigeration applications.
- As production is increasingly shifting to low-cost countries (LCCs), industry experts advise manufacturers in developing countries to focus as much as possible on custom-made production.
- Additional information on packaging is available on the ITC website.

Demand

Imports

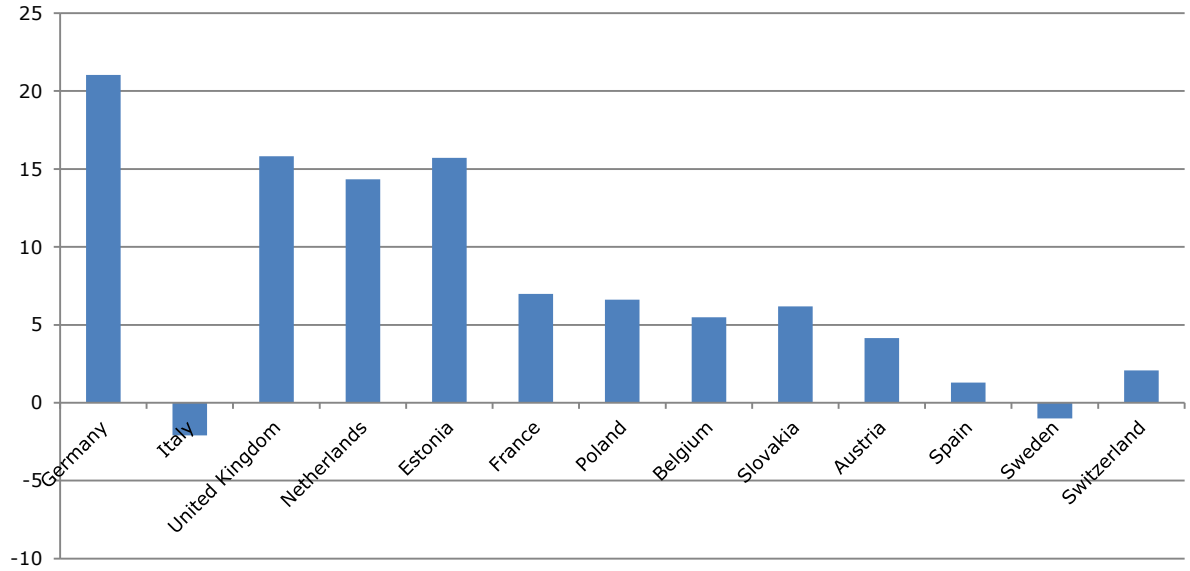
Heat exchangers have a rather high value/volume ratio (the value per volume measured in m^3 is relatively high) and vary enormously in weight. As volumes are very difficult to estimate, volume does not provide reliable information, and has not been included in this survey. Industrial demand has been calculated using Prodcom data for production, exports and imports (demand = production + imports - exports). These are the best data available.

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



Source: Trademap (2014)

Figure 2: Absolute growth in imports of heat exchangers from developing countries 2010-2014, € million (largest importers)



Source: Trademap (2014)

- European imports of heat exchangers reached €2.6 billion in 2014. Average annual growth in 2010-2014 was 5.5%, with most imports originating from intra-Europe sources (82% of all imports).
- Imports of heat exchangers are expected to show moderate growth in the next few years, in the range of 2 to 5%.
- The developing country share of European imports increased from 6.7 to 8.9% in the period 2010-2014. This share is forecast to increase slightly by 1 to 3% in the foreseeable future.
- The leading importer is Germany (25% of European imports), followed by France (10%) and Italy (7.4%). Germany leads in developing country imports, ahead of Italy and the United Kingdom.

Leading suppliers

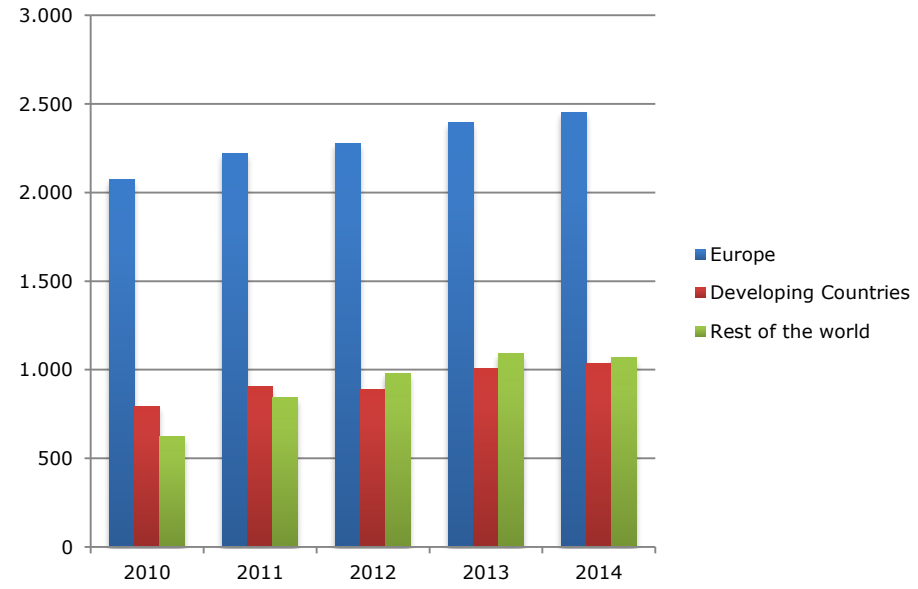
- Most of the leading suppliers of heat exchangers to Europe are developed countries. The top five suppliers are Germany, Italy, France, Sweden and China.
- With a value of €161 million (6.1% of European imports) in 2014, China is the only developing country on the list of leading suppliers. Industry experts suggest that imports from China are not competitive in the long term. China's advantage lies in mass production and huge volumes that are not so relevant for heat exchangers in the long term.
- Other developing countries exporting heat exchangers to Europe are Turkey (€30 million) and India (€18 million).
- USA is by far the largest supplier in the category 'rest of the world', followed by Japan.

Tip:

- Benchmark your company against your peers in countries in Europe, China, Turkey and India. Several factors can be taken into account, such as market segments served, perceived price and quality level, and countries served. A useful source to find exporters/producers of heat exchangers per country is the ITC Trademap.

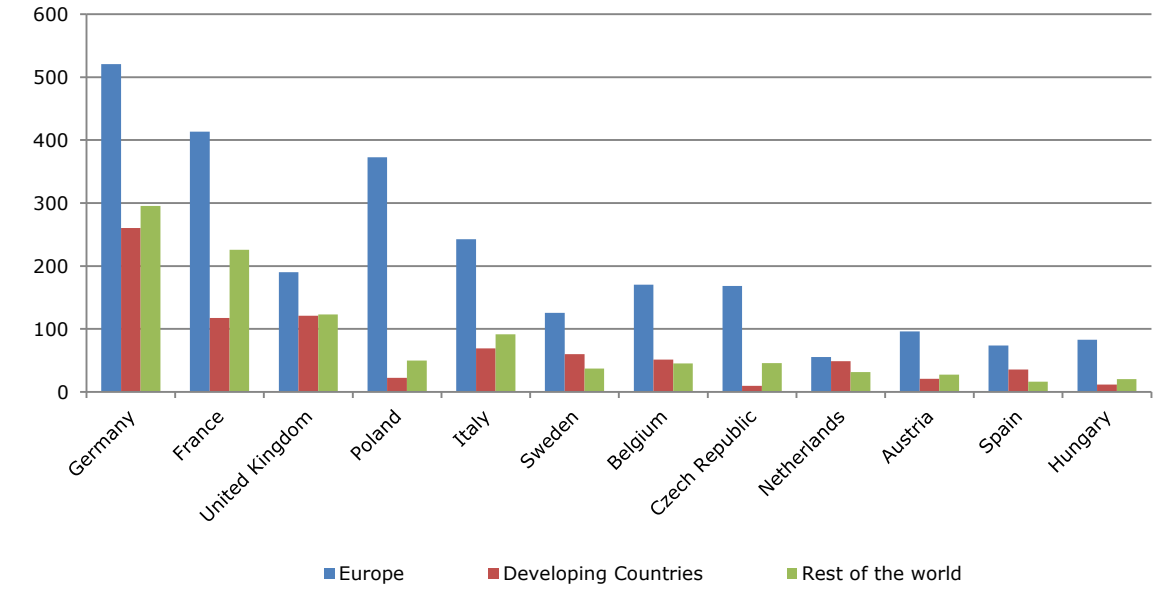
Exports

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



Source: Trademap

Figure 4: Main exporters of heat exchangers, € million, 2014



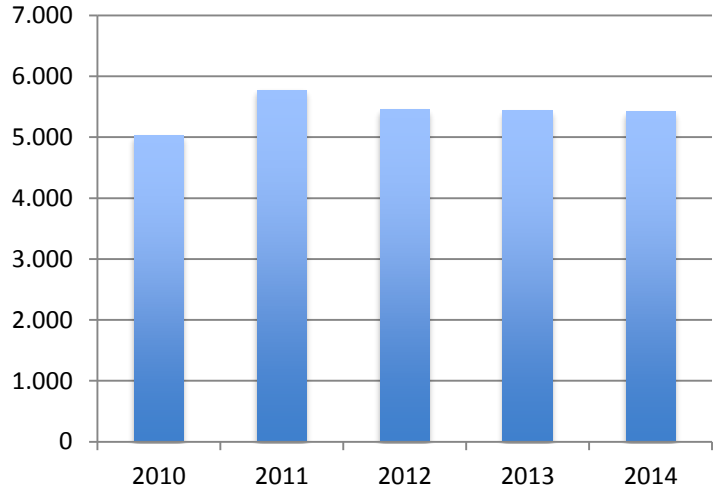
Source: Trademap

- European exports of heat exchangers have shown an upward trend in the last 4 years, and amounted to €4.6 billion in 2014. Average annual growth in 2010-2014 was 6.9% and was mainly caused by the weak reference year (2010) and the resulting strong growth in European demand in the period 2010-2014. European exports of heat exchangers are expected to show small growth in the next few years, in the range of 1 to 3%.
- The developing country share in European exports reached 23% in 2014. China will remain the main destination in this category. For the coming years, the developing country share in exports is forecast to be stable at about 23%.
- Most exports go to intra-Europe destinations (54% of all exports) including some re-exports of imports from developing countries.

- The leading exporter is Germany, accounting for 24% of total exports from Europe, ahead of Italy (19%) and France (8.5%).

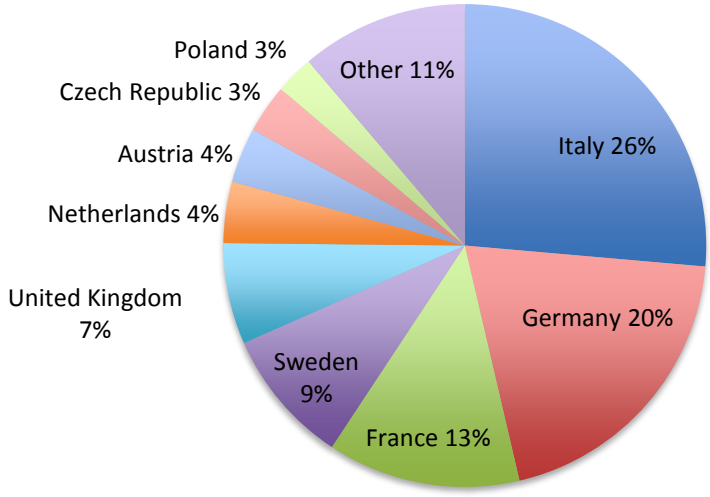
Production

Figure 5: European production of heat exchangers, 2010-2014, € million



Source: Eurostat Prodcom

Figure 6: Main European producers of heat exchangers, 2014



Source: Eurostat Prodcom

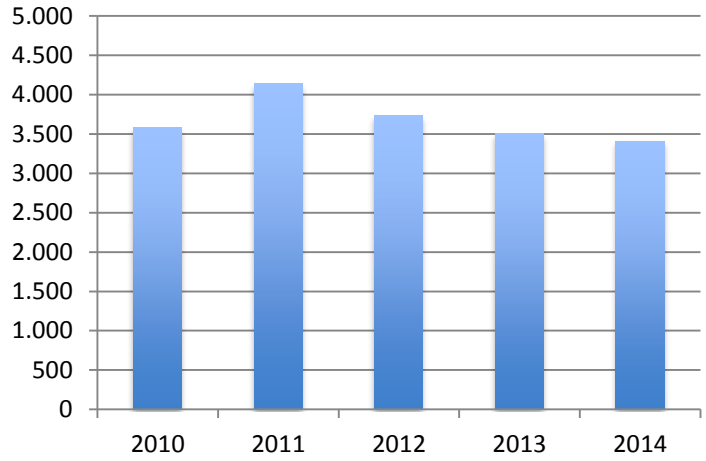
- European production totalled more than €5.4 billion in 2014, after an average annual increase of 1.9% in the period 2010-2014.
- With €1.4 billion, Italy accounted for slightly more than one quarter of total European production in 2014, followed by Germany with 20% (€1.1 billion).

Tip:

- In addition to Italy and Germany, there is considerable production output in France (see Figure 6). The presence of producers in these countries offers opportunities for subcontracting for developing country exporters. Links to databases of producers of heat exchangers are presented in Useful Sources below.

Apparent demand

Figure 7: Apparent demand for heat exchangers in Europe, 2010-2014, € million

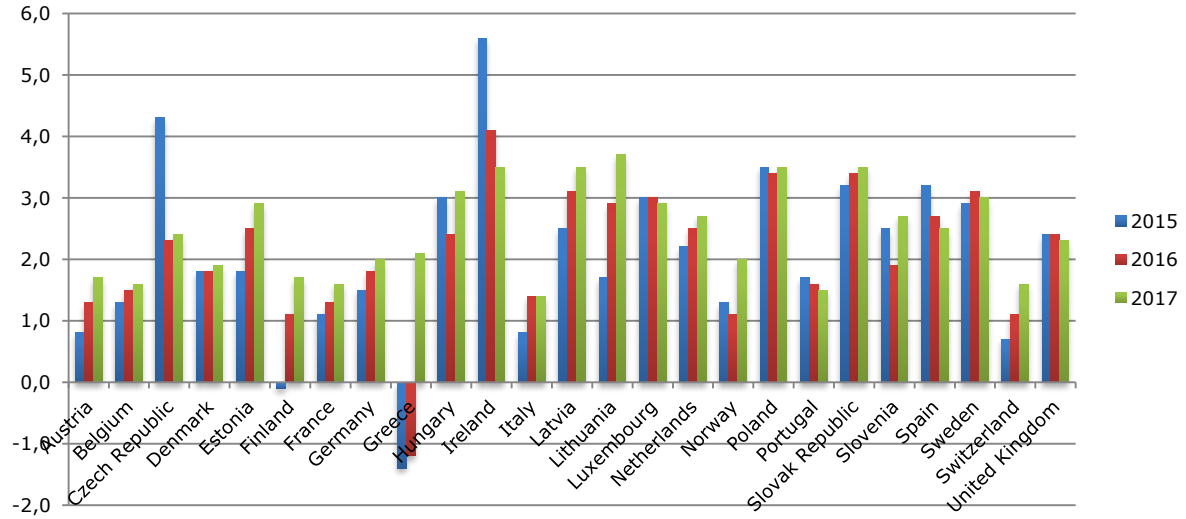


Source: Eurostat Prodcom

- Apparent demand in Europe totalled €3.4 million in 2014, after a slight average annual decline of 1.3% in the period 2010-2014. The top year since the financial crisis in 2009 was 2011 for the pipes and process equipment. This year marked a strong demand in all market segments.
- The dominant producers of heat exchangers are Germany, Italy and France and have the largest apparent demand for heat exchangers.

Macroeconomic indicators

Figure 8: Real GDP, percentage change on the previous year



Source: OECD Economic Outlook 96 database

- The major determinant of demand for heat exchangers is spending in the end-user industries, such as oil and gas, food processing industry, water and wastewater. Demand depends increasingly on the demand for replacement parts as well as for new equipment. In turn, this demand is stimulated by economic growth. In almost all European countries, GDP is expected to continue year-on-year growth in the years to come. This is a good basis for estimating demand for and growth in imports in the coming years.
- Profitability of heat exchanger imports is influenced by the euro/US dollar exchange rate, because many process equipment components sourced globally are paid for in US dollars. While the euro/US dollar exchange rate was not forecast to go beyond 0.80 until 2020, the exchange rate was between 0.88 and 0.93 in the period March-October 2015. This has a large effect on the price level of imports. If this situation continues for several years, it will have a negative impact on European imports paid in US dollars versus local European production.

Tip:

- If the euro remains stable at approximately US$ 0.90, developing country producers should increasingly focus on cost reduction to remain competitive in the European market.

For more information, see CBI Trade Statistics for pipes and process equipment.

Trends offering opportunities

Energy efficiency

Energy efficiency is the keyword for heat exchangers. Use of more efficient heat exchangers often results in cost savings in energy and other operations, as well as lower maintenance costs. Energy-efficient heat exchangers also contribute to achieving emission targets. The main trends related to energy efficiency are as follows:

- EU directives become more stringent
  - EU directives on energy efficiency and emissions have become more stringent. As a consequence, there is an increasing demand for compact heat exchangers and for closed cooling circuits at the cost of open systems. Changes can be expected with regard to refrigerants. Refrigerants used in heat exchangers, such as hydrocarbons, chlorofluorocarbons and fluorocarbons, are artificial and have negative impacts on the environment. These conventional refrigerants will be replaced in the long term by natural refrigerants, such as ammonia, CO_2, propylene and propane.

- Product and process innovation
  - In response to the stricter directives and to increasing demands from end-users, producers have continued to innovate their products. In shell and tube heat exchangers, improvements have been made in productivity in terms of enhanced efficiency, greater durability, less fouling and metal fibre-enabled integral cleaning. In standard plate and frame heat exchangers, there are trends towards newer and thinner plate patterns, enabled by sophisticated computer-aided design techniques. The search for energy efficiency and reduction of CO_2 and NOx emissions has led to innovative production techniques, resulting in improved efficiency and less waste.

Purchasing decision based on life cycle costs

The purchasing decision for process equipment, such as heat exchangers, is no longer made on initial expenses but increasingly on lifecycle costs, also known as Total Cost of Ownership. Nowadays, the purchasing decision for a heat exchanger is determined by energy efficiency and maintenance costs including downtime.

Micro channel heat exchangers

There is a trend to the development of micro channel heat exchangers, in which at least one of the fluids flows through micro channels with a diameter of < 1 mm. This technology provides advantages leading to cost savings, such as improved internal heat transfer due to the smaller diameter channels, significantly reduced weight (especially useful for mobile applications and also lower shipment costs) and volume (and consequently decreased use of refrigerant), and reduced pressure drop. Micro channel heat exchangers can be used in a wide range of applications, from the HVAC to the automotive industry.

Downturn in European oil industry

The European oil sector is expecting an extended downturn. In the short term, this may lead to oil companies putting off or postponing investments, such as the purchase or replacement of heat exchangers.

Tips:

- Invest in R&D to develop energy-efficient solutions, such as micro channel heat exchangers.
- Develop low-maintenance heat exchangers and focus export marketing on reducing maintenance costs for potential buyers.
- Focus on sectors that provide opportunities for developing country suppliers, such as water and wastewater, HVAC and refrigeration.
- There is increased demand for more sophisticated, tailor-made products with higher energy efficiency levels, and producers in Europe are continuing to focus on developing innovative heat exchangers. Customised, innovative products of high quality provide opportunities for developing countries because China specialises in mass production. Another option may be to subcontract production of components or complete heat exchangers for European producers.

For more information, see CBI Trends for pipes and process equipment.

Market requirements

Standards are becoming increasingly important for heat exchangers and should be known to everyone trying to export to the European Union. There are four classes of standards depending on application:

1- International standards

Several standards cover process heat transfer equipment, offshore exploration, production and pipelines and are mostly based on American Petroleum Institute standards. The main standards are:

- ISO 1129:1980 - Steel tubes for boilers, super heaters and heat exchangers -- Dimensions, tolerances and conventional masses per unit length
- ISO 12211:2012 - Petroleum, petrochemical and natural gas industries -- Spiral plate heat exchangers
- ISO 13706:2011- Petroleum, petrochemical and natural gas industries -- Air-cooled heat exchanger
- ISO 15547-1:2005 - Petroleum, petrochemical and natural gas industries -- Plate-type heat exchangers Part 1: Plate-and-frame heat exchangers
- ISO 15547-2:2005 - Petroleum, petrochemical and natural gas industries -- Plate-type heat exchangers Part 2: Brazed aluminium plate-fin heat exchangers
- ISO 16812:2007- Petroleum, petrochemical and natural gas industries -- Shell-and-tube heat exchangers

2 - EU Legislation and Standards

Heat exchangers fall under the Pressure Equipment Directive (97/23/EC). This directive applies to the design, manufacture and conformity assessment of pressure equipment and assemblies with maximum allowable pressure greater than 0.5 bar gauge (1.5 bar absolute). The current directive will be replaced by the new Directive 2014/68/EU on 20 July 2016.

3 - TEMA Standards

The Tubular Exchanger Manufacturers Association (TEMA) is a trade association of leading manufacturers of shell and tube heat exchangers, who have pioneered research and development for over 60 years. The TEMA Standards and software have achieved worldwide acceptance as the authority on shell and tube heat exchanger mechanical design.

4 - ALPEMA Standards

The Brazed Aluminium Plate-Fin Heat Exchanger Manufacturers' Association publishes standards that support the group's objective to promote safe use and quality of brazed aluminium heat exchangers. The Standards cover construction materials, design, manufacture, mechanical standards, installation, operation, contractual information and good practice.

Tariffs

For heat exchangers, a 0 to 1.7% duty is levied on EU imports from outside the EU. Several countries benefit from a preferential 0% tariff, such as Indonesia, Pakistan, Vietnam, the Philippines, Bosnia and Egypt. It is only possible to claim a preferential tariff treatment with a Certificate of Origin that can be validated by a local Chamber of Commerce.

Tips:

More details can be found on the following websites:

- ISO Catalogue - Click on ISO/TC 11 (Boilers and pressure vessels) for an overview of ISO standards.
- An overview is given of legislative requirements in the European buyer requirements for pipes and process equipment on the Market Intelligence Platform of CBI. For information on gaining access to the EU market, see also the European Union Export Helpdesk, ITC Market Access Map and ITC Standards Map.
- A useful source is the Heat Transfer Society, which was founded in 1964 by a small group of heat transfer engineers working in London. They represented the major UK contracting and manufacturing companies, and started technical forum.

Competition

As competition for heat exchangers does not differ significantly from the sector in general, see CBI Competition for pipes and process equipment and CBI Top 10 Tips for Doing Business with European Buyers for an overview.

Trade channels and market segments

An overview of European channels and segments for pipes and process equipment is presented on the CBI Market Intelligence Platform. Trade channels and market segments for heat exchangers do not differ significantly from those for the general sector.

Europe is home to most global leaders in the manufacture of heat exchangers. These world leaders include Alfa Laval in Sweden and GEA in Germany. In Europe, these companies face major competition from the Japanese company Hisaka and the USA companies SPX/APV, SWEP and Hamon.

Other heat exchanger producers in Europe are:

- Germany: Guentner, Wätas
- France: ETT
- Italy: Cosmin, Faco, Lu-Ve Group
- The Netherlands: Bronswerk Heat Transfer, Embaffle, Kelvion
- Spain: García Cámara

Market segments

A wide range of process industries use heat exchangers, the most important of which is the chemical industry, accounting for 20 to 25% of the total demand. Other major end-user industries are HVAC (heating, ventilation and air conditioning) and refrigeration, both accounting for 15 to 20% of the demand. The segments water and wastewater, and gas and oil account for between 5 and 15% of the market. Other industries accounting for between 1 and 5% of demand are power generation, pharmaceuticals, food and beverages, and pulp and paper.

Some market segments have very high requirements with regard to the materials used, such as power generation and the chemical industry. The pharmaceutical, and food and beverage industries have very high requirements with regard to hygiene. In heat exchanger applications for these industries, risks such as air pockets, dead ends and stagnation zones, have to be prevented. Furthermore, the materials used must not be reactive, additive or adsorptive in any way. The best opportunities for developing country exporters are water and wastewater, HVAC and refrigeration applications.

Tip:

- Developing country exporters need to focus on one or a few market segments. The best opportunities are in water and wastewater, HVAC and refrigeration applications.

Market prices

Margins for heat exchangers range from 12 to 22% because the risks are relatively high due to the relatively high value of one heat exchanger and the high value/volume ratio. There are differences. Margins are smaller for standard heat exchangers than for special heat exchangers.

Production of heat exchangers is extremely labour-intensive, and very difficult to automate. To some extent, this will support a shift of production to developing countries due to cheaper labour.

Price has gained in importance over the last decade, especially for standard shell and tube exchangers. This is the result of increased competition among European suppliers, partly resulting from strong sales efforts by Italian manufacturers in Western Europe, especially in Germany and the UK. There is growing competition from suppliers in low-cost countries, such as China, Turkey, Croatia, Indonesia and India. Several European producers have relocated part of their production to low-wage locations in Central and Eastern Europe. In the next 5 to10 years, price pressure on standard heat exchangers is expected to remain firm.

Tips:

To establish an export price, you need to consider many 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, which 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.
- 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 or 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.

Useful sources

- Finding prospects: ABC Business Directories, Direct Industry, Europages, Heat Exchangers Directory, Kompass, Subsea Oil and Gas Directory.
- International associations: Eurovent.
- International magazines and news: Global Spec, International Journal of Pressure Vessels and Piping, OGJ, Ogpe, Stainless Steel World.
- Trade fairs: WTT Expo (main European heat exchangers fair), ACHEMA, Hannover Messe, Pumps and Valves,.
- Trade fair databases: AUMA, Eventseye.
- Other: Kwintessential.

For more information, see CBI Finding Buyers in the Pipes and Process Equipment sector.

CBI Market Intelligence

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This survey was compiled for CBI by Globally Cool – Creative Solutions for Sustainable Business in collaboration with CBI sector expert Josef Jilek.

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