

Container Types: Overview for Technical Procurement and the Supply Chain

Container types refer to the standardised designs of transport and cargo containers used in international freight transport by sea, rail and road. For buyers and supply chain managers in the DACH manufacturing industry, choosing the right container type is a direct cost driver, as it affects freight rates, stowage requirements, handling effort and damage risks. This glossary article explains the most important container types, their technical characteristics and the procurement-relevant decision criteria in a practical manner.

Key facts

- Standard ISO containers are based on the 20-foot container as the basic unit; capacity is usually stated in TEU.
- Dry Van containers are the most common container type and are typically available in 20-foot and 40-foot versions.
- For oversized goods such as machinery or plant components, Open Top, Flat Rack or High Cube containers are used.
- Refrigerated goods and chemical products require Reefer, Tank or ISO containers with their own certifications.
- The container type typically measurably affects freight costs, insurance surcharges, loading planning and delivery reliability.
- For sea freight shipments, dangerous goods, cleaning and inspection requirements should frequently be contractually defined in the service level agreement (SLA).

Definition: Container types

Container types comprise the ISO 668 standardised design and usage types of freight containers, supplemented by special formats for specific goods. They differ in dimensions, payload capacity, opening type, equipment and certification. The standard container serves as the reference unit: a 20-foot container equals one TEU, a 40-foot container two TEU.

Standardised basic types

ISO standard 668 defines external dimensions, tolerances and corner load limits; in practice, the main distinction is between 20-foot, 40-foot and 40-foot High Cube. A 20-foot container typically offers around 33 cubic metres of loading volume with a payload of roughly 28 tonnes, a 40-foot container around 67 cubic metres. Relevant for buyers is the usable quantity per container, as it determines the optimal number of units per shipment and thus the freight cost per unit.

- 20-foot (TEU): standard for heavy, dense cargo
- 40-foot: standard for lightweight, bulky cargo
- 40-foot High Cube: around 76 cubic metres for goods sensitive to headroom

Distinction from swap bodies

Containers in the strict sense are seaworthy and standardised, whereas swap bodies are primarily designed for road and rail transport in Europe and have different coupling systems. For intercontinental procurement routes for supplied parts, ISO containers are almost always relevant; for European in-plant deliveries, swap bodies or wire mesh boxes are frequently used. Procurement logistics should coordinate both systems to avoid transloading times.

The most important container types at a glance

In addition to the enclosed standard container, numerous special designs exist, each tailored to specific cargo characteristics. The selection follows the guiding principle of protecting goods whose transport would be expensive, while making optimal use of the stowage volume. For buyers of technical goods, the types can be divided into four groups: standard, opening, refrigerated and special containers.

Standard and opening types

The Dry Van container, also called the standard container, is fully enclosed and the most commonly used design for packaged industrial goods. The Open Top container has a removable cover and allows oversized parts to be craned in from above. The Flat Rack, often designed as a collapsible flat rack, carries heavy or extra-wide machine components on its loading platform.

- Dry Van: universal, weather-protected, best price structure
- Open Top: top loading, tarpaulin fabric as weather protection
- Flat Rack: foldable end and side walls, high payload

Refrigerated, tank and special containers

Reefer containers cool actively down to approximately minus 25 degrees Celsius and are intended for food, chemicals or temperature-critical electronics. Tank containers, in practice usually 20-foot frames with an embedded pressure tank, transport liquids and gases. The ISO container for dry bulk goods, the Ventilated Container and the Side Door Container complement the range for bulk cargo, ventilation-requiring goods or side loading.

- Reefer: temperature control and data loggers as a mandatory requirement
- Tank: demand dangerous goods certification and cleaning certificates
- Bulk/ISO: loading via top doors or nozzles

Internal containers and pallet optimisation

Frequently requested in practice is the so-called Pallet Wide Container with increased interior width, optimised for euro pallets, holding two pallets side by side across the width. It significantly reduces stowage losses compared with the standard container and improves utilisation per shipment. When procuring, it should be checked whether the shipping line can even provide such container types at the port of departure.

Methods and approach: selecting the container type in the procurement process

Container selection is not merely a logistical detail, but part of the procurement strategy and closely linked to transport costs, delivery reliability and product costing. A structured approach reviews goods characteristics, volume data, costs and certifications in a fixed sequence. This allows the container

specification to be definitively defined as early as the purchase requisition stage.

Analysis of goods, volume and route data

The starting point is the bill of materials and volume planning: dimensions, weight, stackability, dangerous goods class and temperature requirements determine the permissible container types. Building on this, packing proposals are created that match the usable internal dimensions against the typical stowage loss quota of usually 10 to 20 per cent. For fluctuating demand, a well-maintained sales forecast from the plant provides reliable volume bands from which container numbers and booking intervals can be derived.

Economic comparison and coordination with suppliers

A comparison of container types on a total landed cost basis includes freight, port charges, insurance, handling and damage probability. In practice, it turns out that a more expensive Reefer container can be cheaper for high-value goods than a standard container with high blocked stock management effort, due to lower damage and scrap rates. The agreement of multiple use, container standards and return rules belongs in the framework agreement and in service level agreements with the freight forwarders.

- Cost-per-container approach per item group
- Packing proposal and stowage planning before every shipment
- Fix container type and cleaning requirements in the SLA

Integration into ordering and delivery processes

The defined container type should be recorded in the supplier's product range and reviewed in the material approval for new parts. Delivery notifications, loading plans and shipping boxes should be coordinated so that goods do not need to be restacked with repackaging in goods receiving. Once the process is stabilised, container utilisation can be queried digitally and approved in advance via a supplier portal.

Key KPIs: managing container types measurably

Anyone deploying container types strategically measures their impact through clearly defined KPIs. These link logistics performance with procurement objectives such as cost, delivery reliability and inventory impact. A single KPI on its own is misleading; only the combination reveals the true quality of the container strategy.

Utilisation and costs per container

Container utilisation, i.e. the ratio of actually loaded cargo to theoretical capacity, is frequently above 85 per cent in well-organised supply chains. In addition, the landed cost rate per container or per kilogram/pallet is tracked, including port surcharges and cleaning costs. If utilisation falls, landed costs per unit rise and thus the purchase price increases without any change in net goods value.

Delivery reliability, damage and inventory impact

The On-Time Delivery (OTD) of container transports and the damage or complaint rate per container type show whether the chosen design suits the goods. A high level of blocked stock management effort in goods receiving is an early indicator of unsuitable container selection or inadequate packaging. In addition, the service level of suppliers indicates whether the agreed quantities arrive within the agreed container cycle.

- OTD of container deliveries typically > 98%
- Damage rate per container type, usually measured in ppm
- Landed cost per TEU as a monthly KPI

Risks and controls: typical sources of error and countermeasures

Errors in container selection rarely lead to failures, but frequently to additional costs, delays and complaints. Typical causes are incorrect volume assumptions, missing dangerous goods or cleaning certificates and unclear responsibilities between seller, freight forwarder and port. Risks can be effectively limited through contractual and procedural controls.

Technical and legal risks

Exceeding dimensions or weights, inadequate load securing and missing stowage certificates are the most common technical risks; they can trigger liability issues and should be legally reviewed on a case-by-case basis. For Reefer and Tank containers, temperature logs, cleaning certificates and dangerous goods declarations are mandatory, otherwise loading may be refused. Buyers should have these documents contractually warranted and agree a right-to-audit clause for on-site inspections.

Supplier and process risks

Suppliers who do not fill containers as notified or change the container design jeopardise the launch process of new products and material approval. A binding container standard profile in the supplier manual, supplemented by regular audits against the supplier quality objective, reduces this risk. For strategic parts, a most-favoured-customer clause is recommended for prices only, but not for container or packaging specifications, as technical reasons should take precedence here.

Current developments: containers in a changing procurement logistics landscape

The container market increasingly follows the shifts in global procurement strategies. Nearshoring and regionalisation shorten routes and increase the share of rail and road containers, while classic sea freight relies more heavily on standardised high-volume containers. At the same time, requirements for traceability, sustainability and digital transparency are rising.

Regionalisation and new container concepts

For European supply routes, rail containers, swap bodies and reusable returnable containers have gained importance in recent years because they offer shorter cycle times and generate less packaging waste. In practice, these formats also influence the optimal order quantity, as smaller, more frequent shipments can reduce ordering costs. Combined with volume discounts in procurement, this creates a trade-off that should be resolved in a cost-to-serve analysis.

Digitalisation and sustainability

Container utilisation, delivery notifications and customs documents are increasingly exchanged via supplier portals and interfaces such as OCI, which reduces the error rate in goods receiving. Digital twin approaches for packing proposals and container loading planning tools help identify stowage losses before loading. Sustainability requirements from customers also mean that CO emissions per container type are incorporated into product costing and policy compliance in procurement; the assessment of this data should always be reviewed and documented on a case-by-case basis.

Typical metrics

Container utilisation: > 85%

Ratio of used to available loading space per container

On-Time Delivery (OTD) container transports: > 98%

Punctuality of container arrival at the agreed loading date

Landed cost per TEU: tracked monthly, benchmark-dependent

Total costs incl. freight, terminal, customs, cleaning divided by TEU

Damage rate per container type: measured in ppm

Complaints per million transported units by container type

Practical example

A mid-sized mechanical engineering company previously procured stamping and forming units from Asia in 40-foot Dry Van containers. Due to rising damage rates and long restacking times in goods receiving, the container strategy was revised.

- Classification of items into standard, Open Top and Reefer requirements based on dimensions, value and temperature requirements
- Agreement of a binding container standard including packing proposal with the supplier, documented via the supplier portal
- Introduction of cost-per-TEU monitoring and an OTD KPI for sea freight
- Implementation of a right-to-audit clause for sample checks of container loading at the loading site

Conclusion

Choosing the right container type is not a peripheral logistical issue for buyers, but directly affects freight costs, delivery reliability, inventory values and product costing. Anyone selecting container types systematically combines technical requirements such as dimensions and payload with economic KPIs such as landed costs and utilisation. Consistent anchoring in contracts, SLAs and supplier portals is important so that specifications are also reflected in day-to-day supplier operations. In addition, regular KPIs such as OTD, damage rate and cost per TEU help identify weaknesses early. Overall, this creates a robust interface between procurement strategy and the physical supply chain.

Frequently asked questions

What container types are there?

The most important container types are Dry Van (standard container), Open Top, Flat Rack, High Cube, Reefer, Tank Container, ISO/Bulk Container, Ventilated Container, Side Door and Pallet Wide. They differ in opening type, payload capacity, temperature capability and loading volume. For industrial procurement, standard, Open Top and Reefer containers are particularly relevant.

What is a 40-foot HC container?

A 40-foot High Cube container is a 40-foot standard container with increased interior height, typically around 2.9 metres instead of 2.4 metres. It frequently offers around 76 cubic metres of loading volume instead of 67 cubic metres. It is suitable for bulky but lightweight goods and is commonly used in practice for machine components, electronics or furniture.

What do TEU and FEU mean in container shipping?

TEU stands for Twenty-foot Equivalent Unit and corresponds to one 20-foot container; FEU stands for Forty-foot Equivalent Unit and corresponds to one 40-foot container. These units are the standard sizes for freight rates, ship and terminal capacities. They matter to buyers because landed costs are typically calculated and compared per TEU or FEU.

When is an Open Top container used?

An Open Top container is used when goods are too tall for the standard container body or must be craned in from above, such as machine frames or mould tools. The tarpaulin cover provides weather protection but requires more effort in loading and load securing. In practice, Open Top containers are typically more expensive and less available than Dry Van containers.

What is a Reefer container?

A Reefer container is an active refrigerated container with its own cooling unit and a temperature range commonly between approximately minus 25 and plus 25 degrees Celsius. It is used for temperature-critical goods such as food, pharmaceuticals, chemicals or sensitive electronics. Relevant for procurement here are temperature logs, cleaning certificates and power supply on board or at the terminal.

Why is the container type important for procurement?

The container type determines freight costs, stowage losses, damage risk, handling time and ultimately the landed cost per unit. Wrong containers frequently lead to higher costs, more complaints and longer blocked stock management in goods receiving. Buyers should therefore define the container type early on in purchase requisitions, contract negotiations and supplier communication.