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## GENERAL SPECIFICATION

				DocuSigned by: <i>Timo Göbbels</i>		DocuSigned by: <i>Ralf Krug</i>		DocuSigned by: <i>Ralf Schuster</i>	
00			02.12.2024	Timo Göbbels	02.12.2024	Ralf Krug	02.12.2024	Ralf Schuster	
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## 1 Scope

This Project Engineering Specification (PES), agreed within thyssenkrupp nucera - (TKNCA), shall be adhered to both by the supplier, if he is responsible for rendering the packing services, (hereinafter referred to as “supplier”) and by any packing company commissioned separately by the CONTRACTOR to render packing services on the supplier’s premises, on the said company’s own premises or at any other location (hereinafter referred to as the “packing contractor”), the applicable HPE packaging guidelines<sup>1)</sup> to be considered as minimum standard. In all other respects the customer’s General Conditions of Purchase shall apply. Any special conditions agreed to in the written order or in any enclosures of the same shall have precedence over the present packing instructions.

1) HPE = The Registered Federal Association for Wooden Packages, Pallets and Export Packaging, Bonn

## 2 Project specific clarification / definition

In this Document, the following capitalized terms shall have the following meaning, unless the context indicates otherwise:

- CONTRACTOR shall mean thyssenkrupp nucera, Freie-Vogel-Straße 385a, 44269 Dortmund, Germany
- SUPPLIER shall mean the persons, companies or corporations named as such in the PURCHASE ORDER and their successors and permitted assigns, being liable for any obligations arising out of the PURCHASE ORDER
- PURCHASE ORDER shall mean the purchase order document for the PLANT issued by the CONTRACTOR to the SUPPLIER, including its attachments, as specified in the Additional Terms and Condition of Purchase
- SUPPLIES shall mean the equipment, materials, machineries, items and/or (as applicable) anything to be delivered by the SUPPLIER as set forth in the PURCHASE ORDER

## 3 Preservation and corrosion protection


### 3.1 Corrosion protection on the object in question

- In the event of equipment such as vessels, columns, large-scale machinery, pipes etc. being shipped without packing, the supplier shall protect said items against corrosion in conformity with the technical specifications of the CONTRACTOR and with the planned mode of shipping. The CONTRACTOR shall be consulted in the event of queries.
- Corrosion protection measures to be performed on the object itself (e.g. painting of process equipment and vessels or Nitrogen Blanketing) shall be performed by the supplier in compliance with the CONTRACTOR's technical specifications, even if the object is to be packed by a packing company commissioned by the CONTRACTOR. The CONTRACTOR's technical department shall be consulted in the event of queries.

### 3.2 Preservation provided by the packing material

If no standards are available, the supplier / packing contractor shall observe the following:

- Materials, whose composition and design characteristics make them particularly susceptible to corrosion, shall be sealed in plastic foil which must be at least 0.2 mm thick. When selecting the type of foil to be used (polyethylene or aluminum compound sheeting), the foil's permeability to water vapors and the duration of the transport and storage periods involved shall be taken into consideration.
- Sufficient quantities of a desiccant material shall be added to the packed units to ensure that the relative air humidity inside the sealed foil packing is maintained at less than 50 % during the entire transport and storage period, details of these periods being specified in the shipping specifications (calculation in accordance with DIN 55474).
- Laminated paper shall not be used if the packed unit contains metals which could be affected by the use of such.
- The use of hygroscopic filling and padding materials (e.g. wood wool, hay, straw, paper) for filling cavities

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or for padding purposes is not permitted.

#### 4 Identification of individual components

All individual components contained in one packing unit shall be marked separately.

The supplier shall be notified of the marking of the individual components, such notification being sent with the order and enquiry enclosures or with the CONTRACTOR's shipping instructions.

All markings shall be listed in the appropriate packing lists to enable the materials to be identified upon delivery.

#### 5 Types of packing

##### 5.1 General

The design, construction and durability (defined in the purchase order) of the packing, whilst remaining within reasonable economic limits, shall allow for loads (static or dynamic) occurring during transport, handling and storage and shall also comply with the requirements of the transport operator, the country of destination and the CONTRACTOR's own specifications.

The packing shall withstand the following loads:

- load on the lid: min 1 t / m<sup>2</sup>
- shunting impact: 4 g

If wood (even if dunnage or used elsewhere) is chosen as packing material the current laws and regulations which apply also for the import into 'the order mentioned country' must be taken into account. Among others, all packing must be in accordance with ISPM15 (the regulation of wood packaging material in international trade). All wooden package material and dunnage has to show the following marking (sample) and a certificate to evidence the conformity with this regulation:



The construction of the packing described shall allow handling by crane or fork-lift truck and shall ensure that the packing can be properly secured during transport. Lifting and sling points shall be attached by the supplier / packing contractor.


Any special lifting devices required for equipment / packed units awaiting shipping (e.g. due to an abnormal center of gravity) shall be provided by the supplier, even if the items have been packed by a packing company commissioned by the CONTRACTOR. The CONTRACTOR shall be furnished with proof that the official certificate covering cargo handling gear / test certificate has been issued before transportation can begin.

Lifting Beams, cranes, temporary supports, patterns, models, and all equipment that must be removed on site must be painted with RAL1003.

##### 5.2 Packing cases

In accordance with DIN 4074-1 and -2, only grade II / III timber (fir / spruce) may be used for the packing cases. The boards for the outer surfaces shall be between 24 mm and 30 mm thick depending on the type, size and weight of the items of equipment to be packed. The boards shall be nailed closely together. The design of the cases shall facilitate stacking, i.e. there must be sufficient internal structuring with squared timbers and diagonal braces.

The cases shall be provided with skids and sub-skids (slinging reinforcement elements). The number of skids required and their width depend on the overall weight, length and breadth of the packed unit. The sling points (bottom/side and side / lid) of cases with a gross weight in excess of 5 t shall be provided with angle irons (min. 3 mm thick) to prevent the cables from cutting into the cases. The front-end timber of all cases weighing more than 1000 kg shall be firmly bolted to the skids ([Figure 6](#)).

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The cases shall be braced and reinforced to withstand any load (static or dynamic) likely to occur during transportation by rail, road or ship (rail: 4 g, road: 1.2 g, ship: 1.1 g). Measures shall be taken to prevent the item from shifting within the packed unit (screwing together, bolting to the bottom of the case etc.). The cases shall be lined with waterproofing materials (e.g. jute board or bituminized paper).

The case lid shall be designed to prevent water penetration and shall therefore be lined on the inside with polythene or aluminum compound foil. A layer of hardboard, plywood or plastic shall also be nailed to the lid to prevent the formation of "water pockets".

The finished cases shall not be stored outdoors without additional protection and shall be covered with tarpaulins if they cannot be stored indoors.

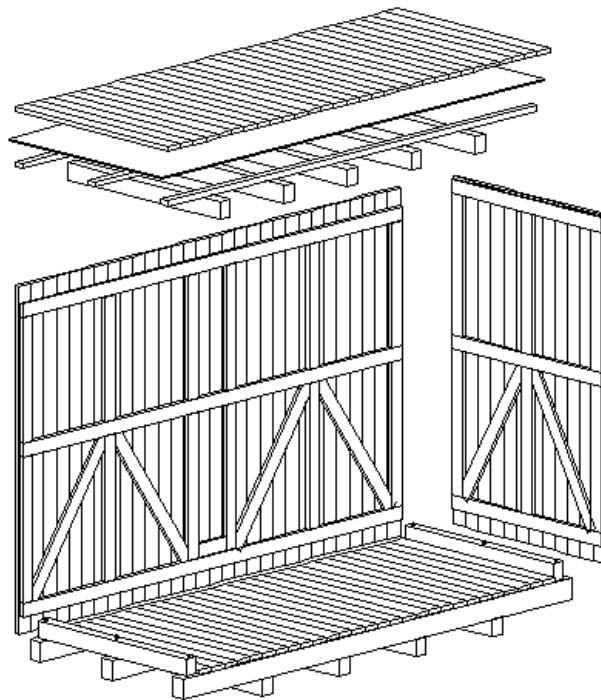


Figure 1. Case for packing preserved items with vertical supports

without vertical supports

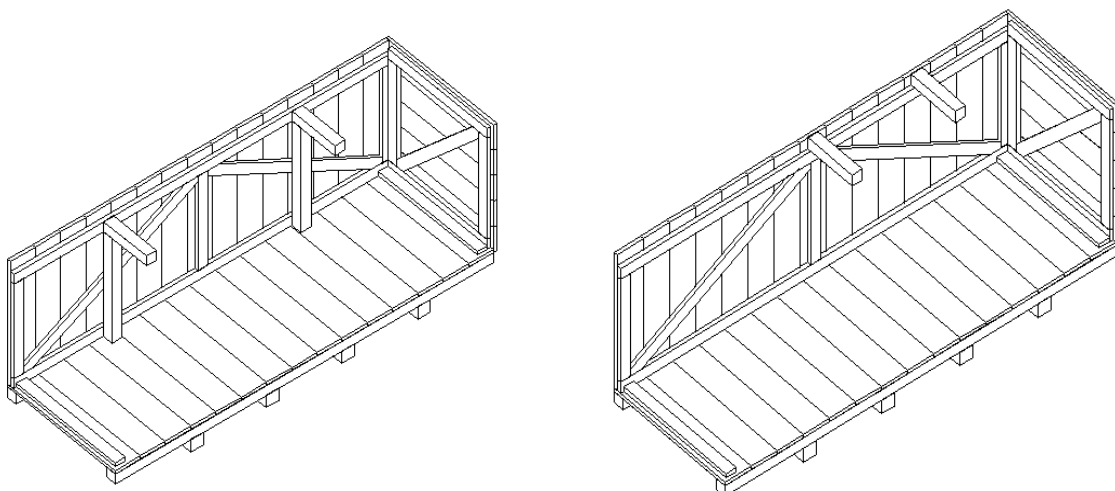



Figure 2. Packing case with vertical boards, lid strigers and vertical supports

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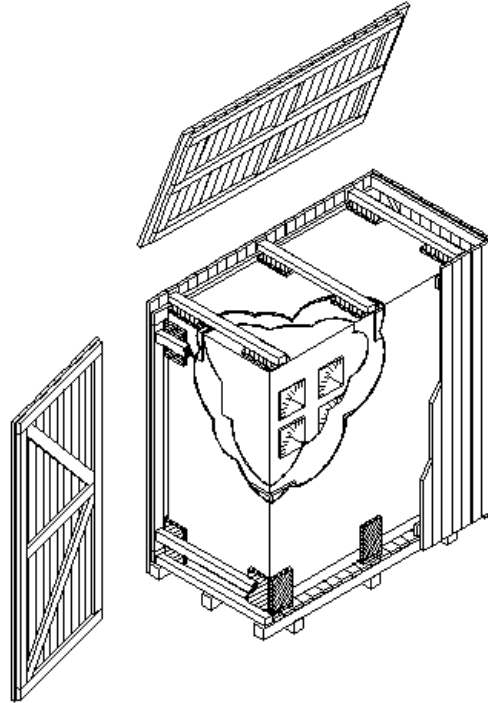


Figure 3. Case for packing preserved items, floating packing

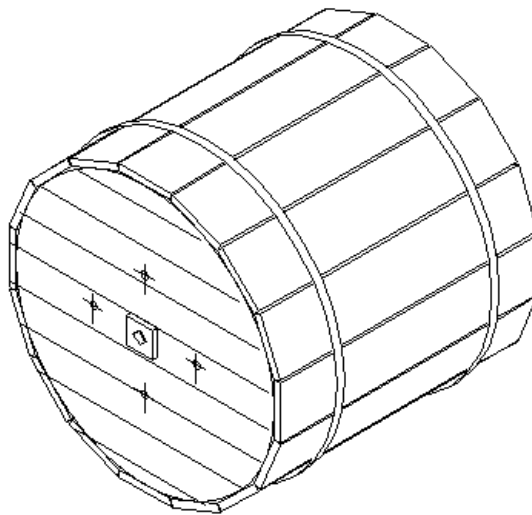



Figure 4. Cable drum

### 5.3 Crates

In principle, the design criteria applied to cases also apply to crates, with the exception of the design of the outer surfaces. These surfaces shall provide a sufficient area for large-surface marking. If necessary, some side surfaces shall be boarded completely to provide the space required for such marking. The ratio of the boarded surfaces to the open surfaces shall generally lie between 1:1 and 2:1.

The boards shall not be less than 10 cm wide. All four sides shall be reinforced with diagonal braces. The front ends of the crates shall be boarded completely if there is a risk of individual items being pushed out.

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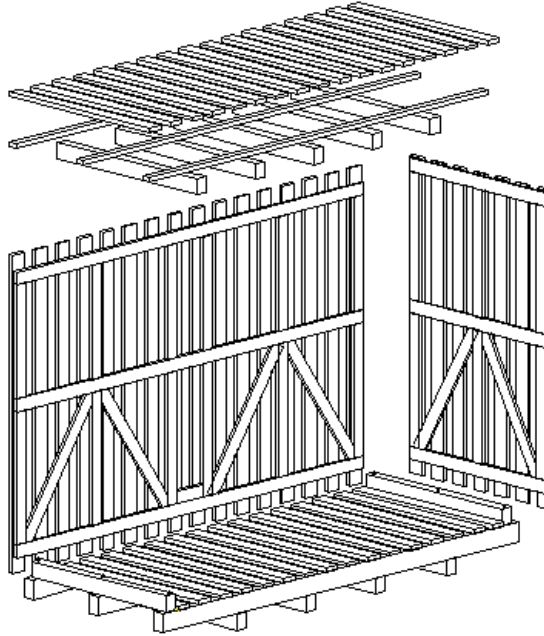


Figure 5. Crate, open front ends

**5.4 Arrangement of skids / subskids for cases and crates**

A minimum of 3 skids shall be provided for cases and crates measuring between 100 cm and 240 cm wide. The actual number of skids, their location and their spacing depend on the location of the center of gravity and on whether the item of equipment can be attached to the bottom of the case. The skids shall be dimensioned in proportion to the weight and shape of the item to be packed.

The subskids shall be positioned such that the packages can be handled by both cranes and fork-lift trucks. The subskids shall be at least 10 cm high.

Any transverse subskids (60 mm to 80 mm thick) shall be bolted or securely nailed to the longitudinal or intermediate skids.

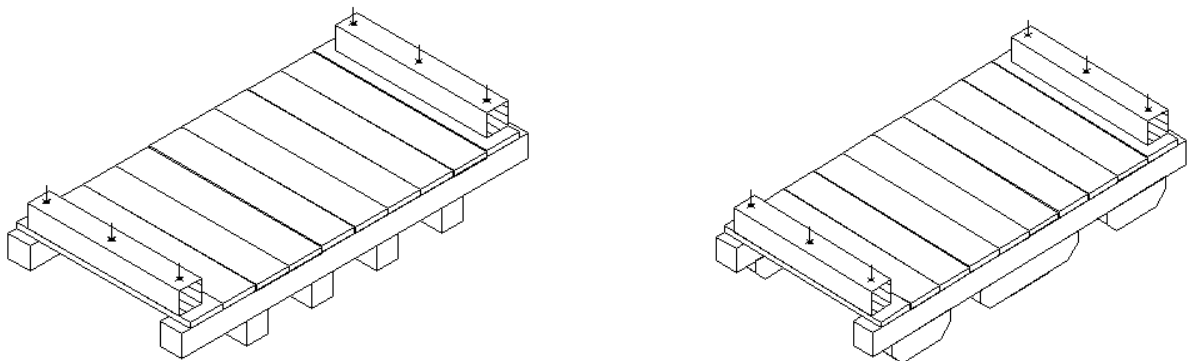



Figure 6. Construction of the bottom

**5.5 Bundles**

Any items of equipment which do not need to be packed in cases or crates, but whose size prevents them from being shipped as separate packages, shall be packed to form cubic packages using channels irons steel, adequate to material to avoid any contamination, secured by threaded rods and screw shackles. Lock nuts shall be used to prevent the screws from coming loose. The closures shall be so tightly fastened that the packed items cannot slide out even when loaded in a slanted position.

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Each package shall have at least 3 clips which shall be positioned no more than 2.5 m apart. The distance between the last clip and the end of the bundle shall not exceed 1 m.

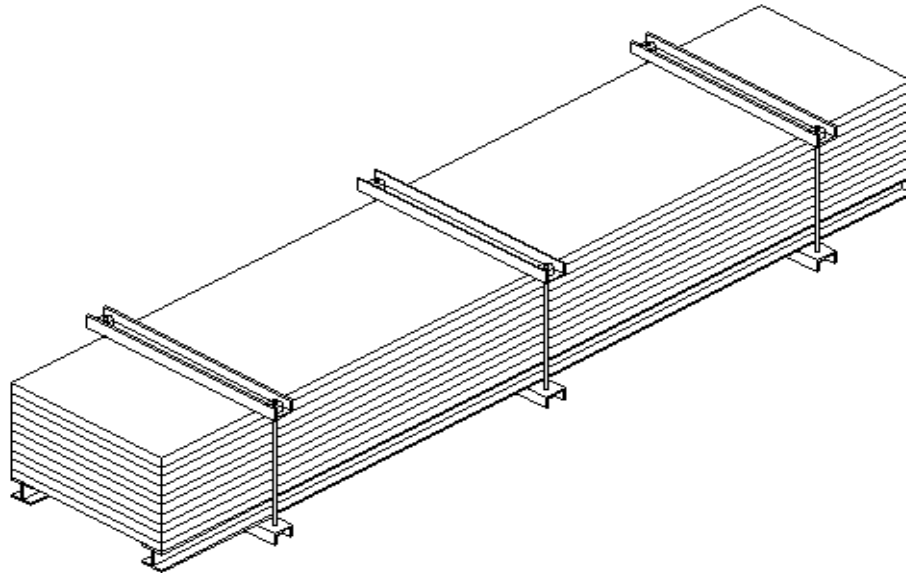


Figure 7. Smooth plates

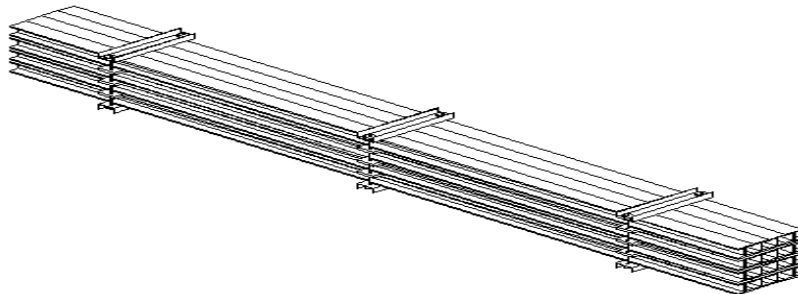


Figure 8. Steel components

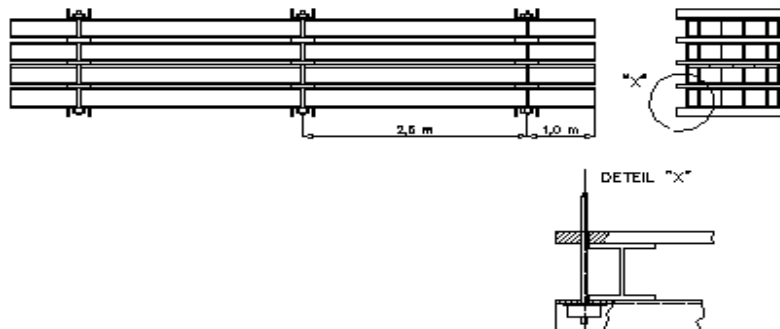



Figure 9. Bundles

### 5.6 Cradles

The equipment is secured by iron straps with elastic underlays. The straps shall be screwed to the cradles and must not be able to slip. The screws shall be prevented from coming loose.



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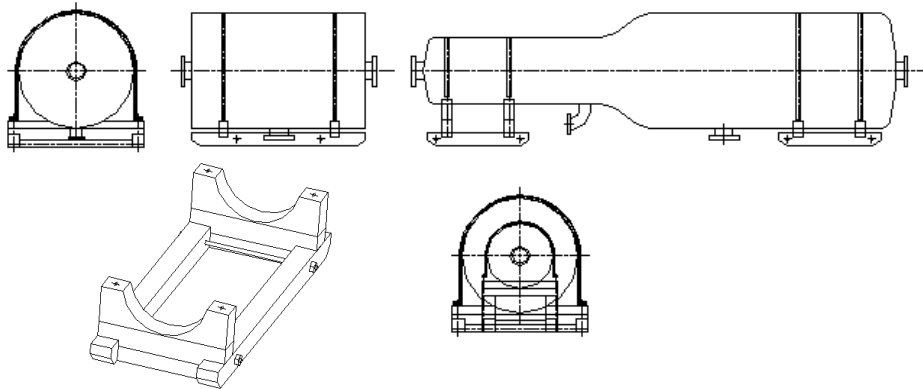


Figure 10. Wooden cradle (for items weighing up to 30 t)

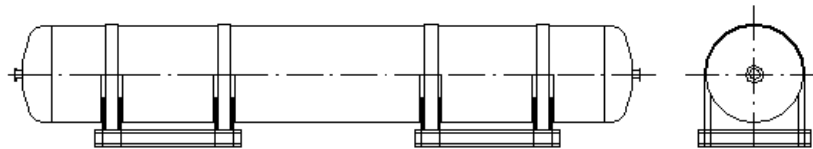


Figure 11. Steel cradle (for items in excess of 30 t)

### 5.7 Transport frames

Large two-dimensional items are to be transported on frames. The design of these frames shall allow for handling using normal lifting gear (crane and fork-lift truck) without the need for specially constructed girders. Sheets shall be additionally secured with clips.

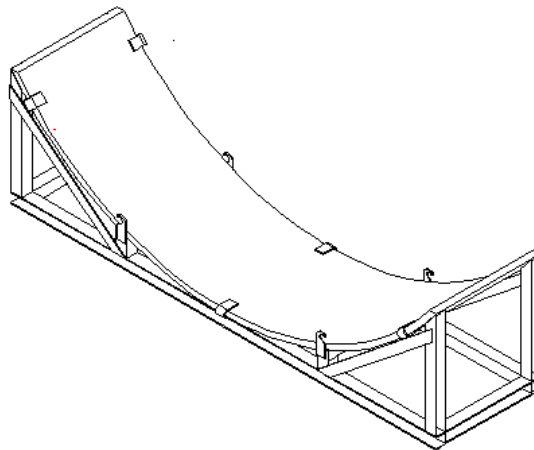


Figure 12. Transport frame for shaped sheets

### 5.8 Squared timber structures


Squared timber structures are used for packing items of equipment which are not susceptible to corrosion or mechanical damage. They are also used for heavy goods which would not be adequately protected by a cradle and for which the cost of cases or crates would be too high. This type of packing shall be constructed analogous to section [5.5](#).

### 5.9 Packing for pipes

#### 5.9.1 Carbon steel and stainless steel pipes

Up to 40 mm in diameter = in cases

40 mm to 100 mm in diameter = in crates with the front ends completely closed

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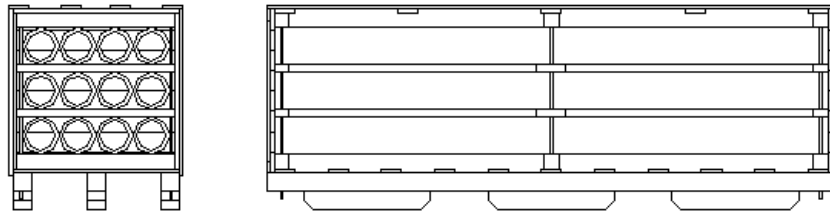


Figure 13. Packing of pipes in crates  
 100 mm to 300 mm in diameter = in bundles

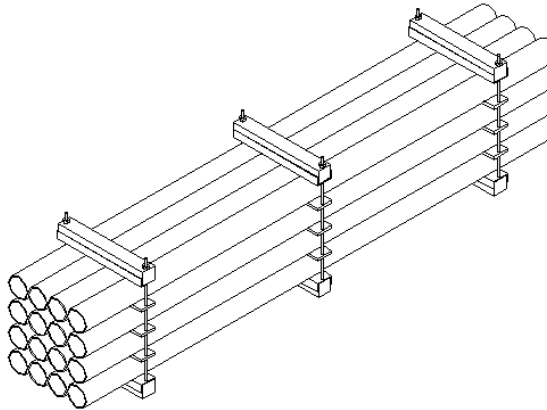
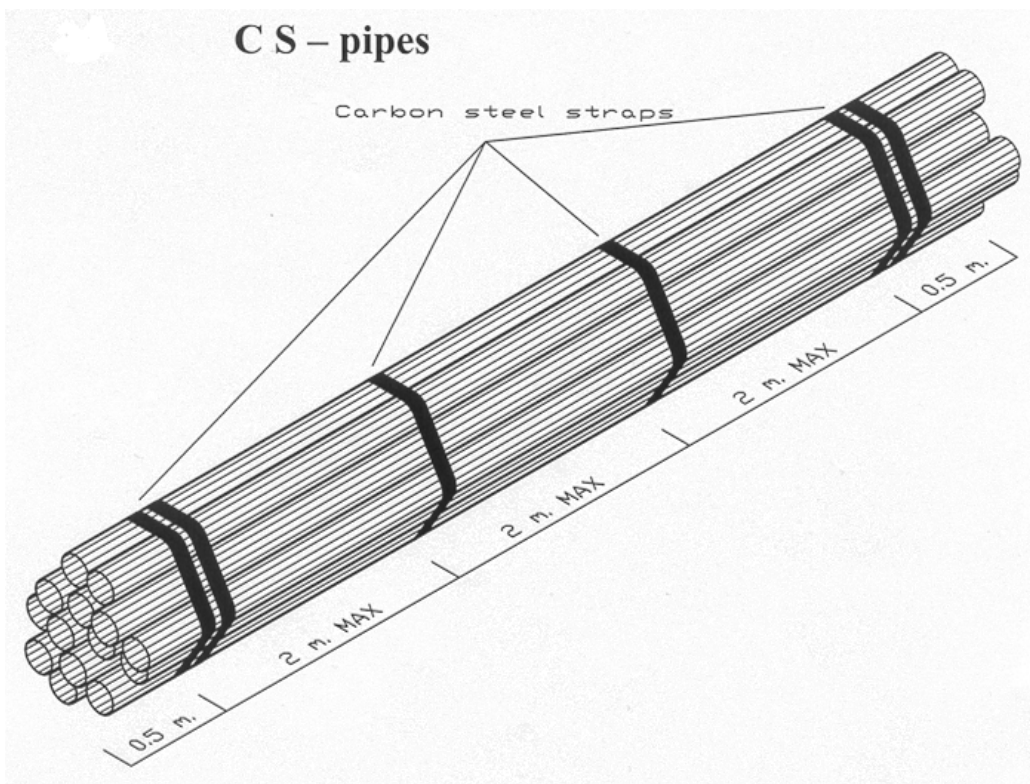

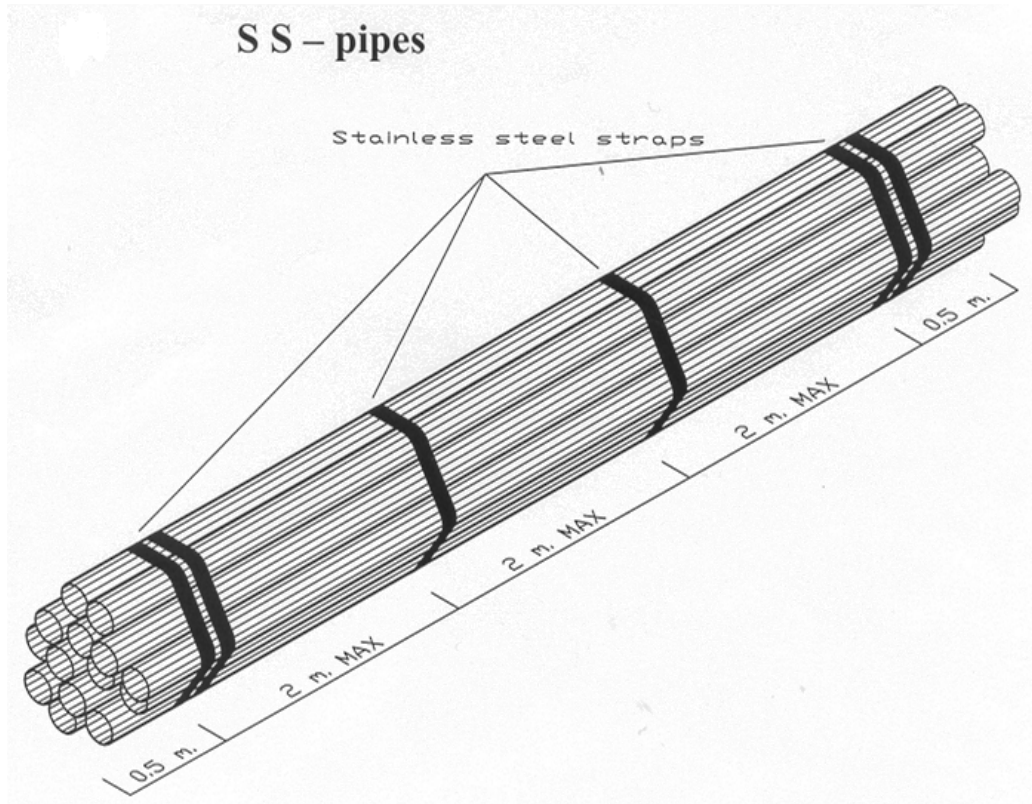


Figure 14. Bundling of pipes

more than 300 mm up to 325 in diameter = consult the CONTRACTOR  
 CS- and SS-Pipes Pipes with a diameter up to 325 mm must be packed according the following sketch:



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Pipes with a diameter exceeding 325 mm will be sent loose, but attention all openings must be properly sealed = consult the CONTRACTOR

The pipes shall be preserved in accordance with the CONTRACTOR's technical specifications prior to packing. Carbon steel and stainless steel pipes shall always be packed separately.

**5.9.2 Bituminized pipes**

- Up to 40 mm diameter = packed in cases with separator sheets
- between 40 mm and 100 mm diameter = packed in crates with closed ends and separator sheets
- 100 mm diameter and above = bundled with separator sheets
- 300 mm diameter and above = consult the CONTRACTOR

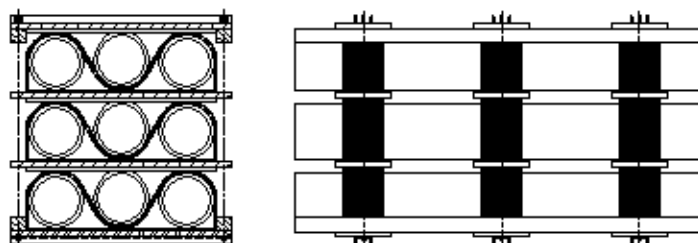



Figure 15. Bundles of bituminized pipes

**5.9.3 Plastic pipes**

Depending on vulnerability and acc. to technical specification = packed in cases or crates

**5.10 Flexible Connections**

Flexible connections subject to possible damage during shipment shall be disconnected and loose ends adequately supported or protected to prevent damage. The connections have to be packed in cases or crates.

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### 5.11 Shaft Couplings

Flexible couplings shall be removed (except for hubs) and adequately supported and protected to prevent damage. Rigid couplings shall be shipped as required to provide full protection and safety in transit and storage. The flexible couplings have to be packed in cases or crates.

### 5.12 Containers

The container in itself is not more than a transportation aid and has limited suitability as a type of packing. Prior to being placed in containers, the items of equipment shall be suitably packed for loading and unloading and for any additional storage periods required. The preservation of equipment is governed unconditionally by the regulations stated in section 3. As regards container loading, the IMO/ILO / UN ECE guidelines<sup>2)</sup> for the packing of cargo transport units (CTUs) shall be strictly observed.

The containers used, especially shipper's owned containers, shall conform with current IICL regulations (Institute of International Container Lessors) and shall have a valid CSC plaque / permit<sup>3)</sup> for the scheduled period of use.

Containers may only be used for packing if written permission has been obtained from the CONTRACTOR.

## 6 Dangerous goods

The packing of dangerous goods is governed by the law covering the transportation of dangerous goods and the current regulations and ordinances enacted by the respective carriers.

The following standards are particularly relevant:

- IATA<sup>4)</sup> Dangerous Goods Regulations (DGR), English version is binding,
- International Maritime Dangerous Goods Code (IMDG Code),
- Dangerous Goods Ordinance Road and Railways (Germany) (GGVSE),
- European agreement concerning the international transport of dangerous goods by road (ADR),
- "RID" Regulations for the international transport of dangerous goods by rail in line with the standard provisions specific to the contract for the international transport of goods by rail (CIM),
- Dangerous goods regulations for inland waterways (Germany) (GGVBinSch).

Country-specific regulations shall also apply.

To ensure that the correct procedures for the shipment and transport of dangerous goods are followed during road and rail transportation to the shipping port/airport and during further transport by ship/aero plane, the supplier shall ensure that the appropriate goods classification is included with the packing lists, i.e.:


- UN number (UN = United Nations),
- Class, code number,
- Technical designation and proper shipping name (not the trade name),
- Page from the English/German IMDG code,
- EmS no. (pamphlet no. for procedures in the event of an accident)<sup>5)</sup>,
- Reference to "marine pollutant",
- Characteristics of the dangerous goods, and the flash point for all goods of class 3 and for certain goods of classes 6.1, 8 and 9,
- Identification number of the package.

2) ) IMO = Inter-Governmental Maritime Organization  
ILO = International Labour Organization  
UN-ECE = United Nations Economic Commission for Europe

3) ) CSC = International Convention for Safe Containers

4) ) IATA = International Air Transport Association

5) ) EmS = Emergency Schedule, Emergency Procedures for Ships Carrying Dangerous Goods

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This information shall be presented in writing together with the safety data sheet. EC Directive 91/155/EEC as amendment by Directives 93/112/EEC and 2001/58/EC sets out the requirements for the information which should be included in a safety data sheet.

Depending on the type of transport, the packing shall comply with the UN standard and be approved for dangerous goods.

A “declaration of assuming responsibility” required for the transport of the dangerous goods shall be compiled and signed by the CONTRACTOR.

The supplier / packing contractor’s attention is drawn to the fact that he has sole responsibility for ensuring that the above instructions are duly carried out and that he shall be held liable for any consequences resulting from their non-fulfilment.

## 7 Marking

The packages shall be marked using a stencil and waterproof, light-fast, high-contrast dyes. The size of the letters depends on the overall dimensions of the package, but shall not, as a rule, be smaller than 40 mm.

Metal and plastic plates must not be used for cases and crates unless permission has been granted by the CONTRACTOR. If the items of equipment have not been packed or have been packed on cradles, the marking shall be applied directly to the items themselves.

The packed units shall be marked on the two side walls and the gross weight of the unit shall be stated on the lid.

Bundles shall be marked on their longitudinal sides. Metal plates attached to waterproof plywood or wooden plates may be used for this purpose. Each plate shall be attached separately.

Packages that are impossible to mark, must be equipped with at least two metallic labels (plates).

Marking is directly related to the order in hand and is stated in the shipping instructions.

The packed units shall always be marked with the chain symbol (sling here) and with the win arrows (this side up).


Packages requiring special handling shall also be marked with the appropriate international symbols:



- |   |                    |    |                                 |
|---|--------------------|----|---------------------------------|
| 1 | this side up       | 2  | handle with care                |
| 3 | keep dry           | 4  | keep cool                       |
| 5 | no hooks           | 6  | center of gravity               |
| 7 | sling here         | 8  | do not put sack trolley here    |
| 9 | clips in direction | 10 | do not put fork-lift truck here |
- of arrows

All the above symbols and instructions shall be marked in red.

The center of gravity symbol shall be marked on all four sides of all packages measuring in excess of 1m and / or weighing in excess of 5000 kg.

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## 8 Abnormal dimensions

To facilitate the planning and execution of large capacity or heavy goods transport, the supplier shall send the CONTRACTOR 5 copies of true-to-scale dimensional outlines (scale 1:25 - three-sided view) as soon as possible, at the very latest 4 months prior to shipping. This applies to all items which are larger or heavier than:

Gross weight of individual item : 20 tons and / or  
Dimensions: 1190 x 225 x 230 cm (length x width x height)


The dimensional outlines shall be binding and provide the following information:

- a) external dimensions of the packed unit in the position in which it is to be transported
- b) longitudinal and side view
- c) gross and net weight in kg
- d) centers of gravity in longitudinal and transverse directions
- e) sling points (and special criteria to be considered)
- f) type of packing planned or required (clearly plotted)

Any regulations which form part of the contract-specific shipping instructions and which differ from the present packing instructions shall have precedence over the said packing instructions.

## 9 Liability

- 9.1 The supplier / packing contractor is obliged to perform the packing services with the due care of a professional packing company. The supplier / packing contractor shall only use new packing materials.
- 9.2 The packing contractor shall take out an insurance policy in the form of a liability insurance. The insurance cover shall amount to at least € 250,000 for each loss-entailing occurrence with a maximum of € 500,000 per annum. Proof of the existence of the insurance cover shall be provided at the CONTRACTOR's request.
- 9.3 The supplier / packing contractor is responsible for performing the services specified in the order and is liable for any damage occurring to the items of equipment in connection with his services.
- 9.4 In the event of total loss of the packed items, the supplier / packing contractor's liability shall cover the replacement value; in the event of damage it shall cover all necessary repair costs including dismantling and reassembling as well as the costs of spare parts plus any packing, freight, storage, travel, transport or handling costs accrued.
- 9.5 If the packing is performed at the supplier's works, the packing contractor shall bear the risk for the items from the moment he takes them into his possession.
- 9.6 The packing contractor's liability shall be limited to € 125,000 per claim.
- 9.7 The CONTRACTOR shall take out transport insurance. The transport insurance shall come into effect from the moment the items to be packed leave the supplier's area of responsibility, and shall cover the usual risks which might occur in transit or during a period of intermediate storage.
- 9.8 If the packing performed by the supplier / packing contractor is faulty or deficient, the CONTRACTOR can arrange for repair work to be performed up to a maximum of € 2,500 at the supplier's / packing contractor's expense and without his prior consent. Any repair work in excess of this amount shall be agreed by the supplier / packing contractor prior to commencing the said repair work.
- 9.9 With the exception of the defects stated in section 9.8, the CONTRACTOR shall notify the supplier / packing contractor immediately of any damage and, as far as this is within the CONTRACTOR's power, shall grant him the opportunity to eliminate the damage.
- 9.10 Guarantee period
  - 9.10.1 The length of the supplier / packing contractor's guarantee period shall correspond with the period specified in the shipping instructions and/or order enclosures for transport and storage unless agreed

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				REV. <b>00</b>

otherwise.

9.10.2 The supplier's guarantee period results from the regulations agreed to in the order and / or other conditions which are an integral part of the contract.

## 10 Packing inspection

- 10.1 The CONTRACTOR shall reserve the right to examine the packing. A notice of readiness for inspection shall be sent to the CONTRACTOR's address stated in the shipping instructions.
- 10.2 The lids of the cases shall be left open to enable the inner packing to be examined (the CONTRACTOR shall be consulted).
- 10.3 A set of packing lists shall be made available at the time of inspection and all packages shall be marked with all relevant information.
- 10.4 The inspection as outlined above does not in any way reduce the supplier / packing contractor's guarantee and liability with regard to the design and performance of the packing.

## Reference standards

EC Directive 91/155/EEC	This directive as amended by Directives 93/112/EEC and 2001/58/EC, sets out the requirements for the information which should be included in a safety data sheet
DIN 4074-1 : 2012-06	Strength grading of coniferous wood; coniferous sawn timber
DIN 4074-2 : 1958-12	Building Timber for Wood Building Components; Quality Conditions for Building Logs (Softwood)
DIN 55474 : 2015-03	Auxiliary means of packaging - Desiccants in bag - Application, calculation of the required number of desiccant units