



**Classifier of defects and breaches of
package integrity, leading to deterioration in
the quality of products, recommendations
for handling and storage**

November 2002



This guidance is designed for responsible (designated) employees of warehouses for intermediate storage of iron-bearing concentrate, pig iron, coils, plates, sheets, and tubular products (hereinafter - products).

When products are shipped to Clients through intermediate storage warehouses, the packaging or elements of the packaging of individual products might get damaged, exposing, in some cases, their contents (rolled steel products, pipe), or might have the presence of foreign matters, dirt, or fines in the iron concentrate or pig iron, which may lead to claims from Clients.

According to the following comments and examples (photos), upon receipt of products for storage, the responsible personnel of an intermediate storage warehouse shall:

- inspect the received products to detect any breaches indicated in this classifier, draw up an certificate based on the general form, indicating the details of the products:**
- notify the sales specialist/manager of the detected deviation, send the certificate and photos;**
- not allow the shipment of such products to the end Customers (Clients) in order to avoid quality claims.**

Once the shipment of such products with the detected deviations to the Customer is permitted, the responsible sales specialist / manager will notify the responsible employees of the intermediate storage warehouse.



Cold-rolled and galvanized coils



Absence (breakage) of up to 3 strapping bands encircling a coil through the eye.

According to the packaging scheme for cold-rolled coils, coils shall have six strapping bands, which are threaded through the eye and tie the coil packaging elements in a transverse direction (see Fig. 1)

When 2 or 3 of the 6 strapping bands are missing, coil packaging elements loosen, leading to easier moisture penetration in such places and, as a consequence, corrosion of rolled steel products.



Figure 1



Insufficient number of strapping bands



Deformation (bending) of outer and inner rings, also exposing the rolled product.

Outer and inner rings act as protection of end edges of coils, they also press down the packaging elements to prevent the moisture ingress.

When these packaging elements are deformed, among other things, exposing the rolled steel, the paper and plastic wrapping get damaged, and the rolled product becomes exposed to the moisture ingress and corrosion.



Displacement of the outer ring, exposing the rolled product



Damage to packaging elements (end disk, internal/external packing sheet), exposing the contents

Internal and external packing sheets protect the packaging elements (plastic and paper) from exposure to weather and some minor mechanical impacts.

When these packaging elements become damaged, this exposes the rolled product to moisture penetration and corrosion.





Damage to packaging elements (end disk, internal packing sheet) without exposing the contents

External and internal rings act as protection of end edges of coils, which, among other things, press down the packaging elements to prevent the moisture ingress.

When these packaging elements are deformed, this does not result in damage to paper and plastic wrapping, but it exposes the product to the penetration of moisture underneath packing elements, wrapping paper and plastic, onto the rolled product, and to corrosion of the metal.





Presence of traces on packaging elements (outer ring and end disk with clear boundaries of immersion in water), indicating the immersion of a coil in water above the end flange of the outer ring.

When their integrity is intact, used packaging elements and their arrangement protect the rolled product, but there is a risk of moisture penetration under packaging elements, if the packed coil is immersed in water to a level greater than 70mm.

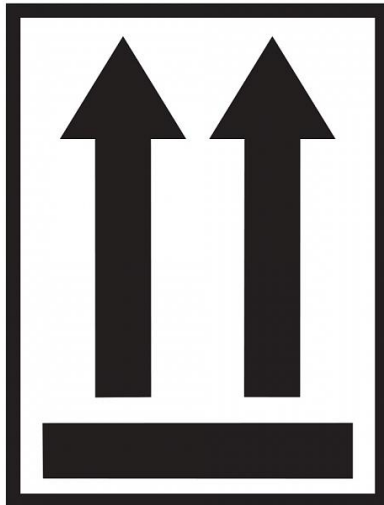


Storage of a coil in breach of the compulsory sign "Top here".

After packaging, each cold-rolled coil is marked with an additional label containing prescriptive recommendations on how to prevent the occurrence of defects.

The coil packaging scheme, combination and arrangement of all its elements ensure the safety of the product only if the requirements of the compulsory handling sign "top here" are adhered to.

In case of the displacement of the handling sign indicating the top of a coil, there is a risk of moisture penetration under packaging elements and corrosion.



Top here



Wrong positioning of a coil, displacement of the coil top

Stacking arrangement of cold-rolled and galvanized coils



Coils shall be unloaded from a vehicle one by one, combined unloading of two or more products in parallel is not permitted.

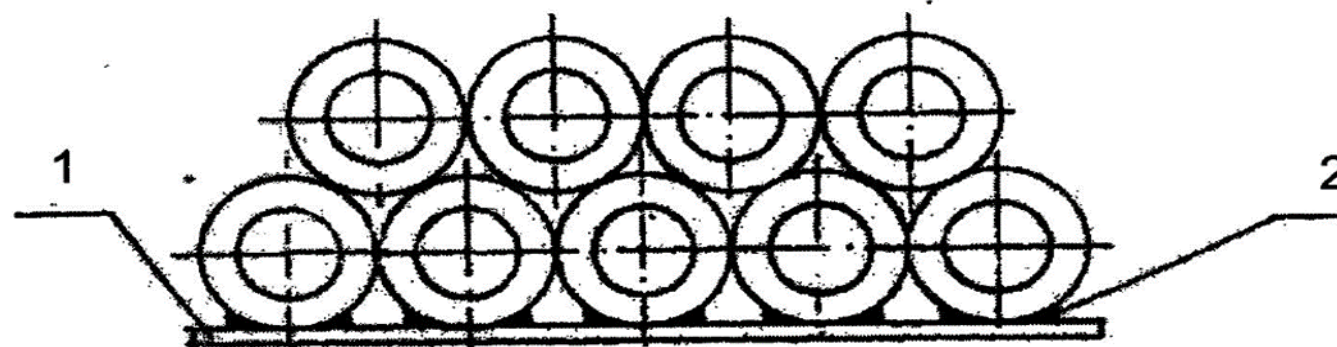
Devices used for unloading shall ensure the integrity of products and packaging elements (a soft sling or a C-hook complete with protective padding in places of contact with coils).

Coils be stacked in no more than two tiers on a flat concrete surface or other surface that prevents damage to products or packaging elements. Coils shall be stacked in such a way as to prevent their immersion in water in the event of precipitation.

Wooden dunnage (40-100mm) and spacers shall be placed under the bottom tier on any floor surface along the direction of a stack to prevent the rolled steel from coming into contact with puddles, which are formed by precipitation. Extreme coils of the bottom row of a stack shall be secured by anti-rollback stops (chocks).

To prevent coils in a stack from rolling down, it is permitted to secure coils in a stack with a steel band without damaging packaging elements.

The weight of the upper row coils in a stack shall not exceed the weight of the bottom tier coil by more than 20%. An increase in the number of tiers shall be coordinated with the responsible sales manager.



- 1 - wooden dunnage;
- 2 - chocks



Hot-rolled coils (mill edge, rolled edges)

Lack of strapping bands (more than 2 longitudinal or one transverse).

A strapping band may tear (break) during loading/unloading.

Lack of a strapping band (one longitudinal or at least 2 transverse) may result in: the loosening of coil wraps (a loose coil), tears (breakage) of the rest of strapping bands, and spontaneous unwinding of a coil.



Loose external wraps of a coil as a result of lacking strapping bands

Tear or break of edges of outer and/or inner wraps.

Edge tears or breaks of outer and/or inner wraps may occur during unloading/loading, handling or stacking of coils.

If the depth of the edge break exceeds half the width tolerance or causes the width to exceed the nominal dimension, shipping to a client is not permitted.

If the break depth does not exceed half the tolerance and does not cause the width of the rolled product to exceed the nominal dimension, such a coil is cleared for shipping after documenting this deficiency in a certificate and coordinating with the responsible sales manager.



Bending and scuffing of edges of outer and/or inner wraps.

Bending or scuffing of edges of outer and/or inner wraps may occur during loading/unloading, handling or stacking of coils.

Bending or scuffing of edges exceeding a 90-degree angle is not permitted.

If the depth of a defect, bending or scuffing of an edge exceeds half the width tolerance or causes the width to exceed the nominal dimension, it is not permitted to ship such a coil to a client.

If the depth of scuffing or bending of an edges does not exceed half the tolerance and does not cause the width of the rolled product to exceed the nominal dimension, such a coil is cleared for shipping after documenting this deficiency in a certificate and coordinating with the responsible sales manager.



Stacking scheme of hot-rolled steel in coils

Coils shall be unloaded from a vehicle one by one, combined unloading of two or more products in parallel is not permitted.

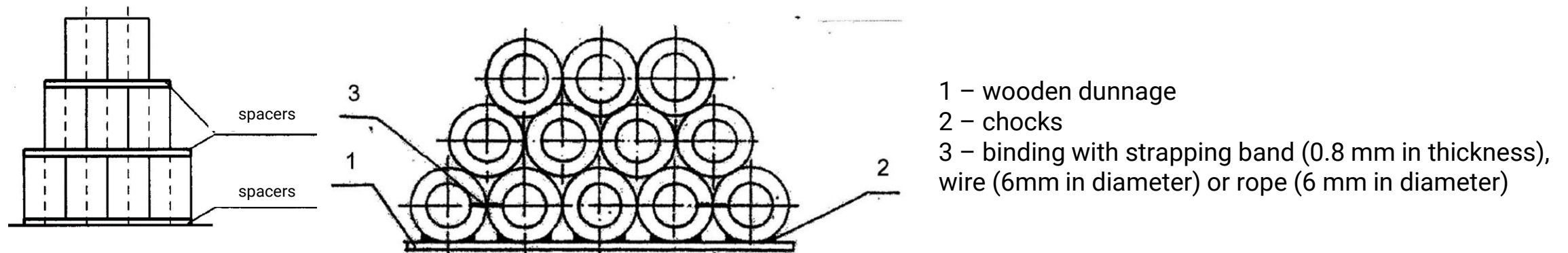
Devices used for unloading shall ensure the integrity of products and packaging elements (a soft sling or a C-hook complete with protective padding in places of contact with coils). Coils shall be stacked horizontally or vertically.

Coils be stacked in no more than three tiers on a flat concrete surface or other surface that prevents damage to products and packaging elements. Stacking is carried out in such a way that being in the water after the completion of stacking, if precipitation falls, will be excluded.

Wooden separators (40-100mm), spacers, which exclude contact of the rolled steel with puddles when atmospheric precipitation, must be laid under the bottom row along the stack direction on any floor surface. Extreme coils of the bottom row of the stack must be secured by rollback stoppers (chocks).

To avoid coils rolling down from the stack, it is also allowed to tie up coils in the stack with a steel band, without damaging the packaging elements.

The weight of the upper row coils in the stack should not exceed the weight of the bottom row coil by more than 20%. The increased number of rows should be coordinated with the responsible sales manager.



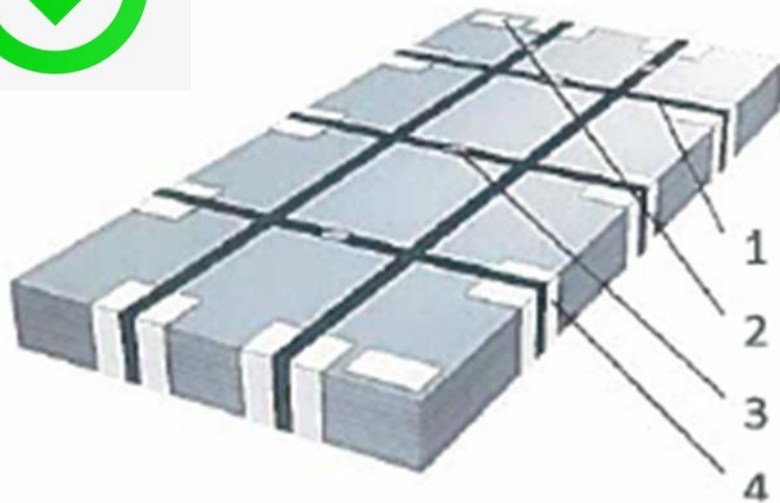


Cold-rolled and hot-rolled steel in sheets and plates

Lack of shipping straps (2 transverse minimum or one longitudinal).

During loading and unloading operations a tear (breakage of the shipping strap) may occur.

Lack of shipping straps (one longitudinal or at least 2 transverse straps) can result in: loosening of the packing elements (moisture ingress under the packing elements, formation of corrosion defect), tears (breaks) of other shipping straps, destruction of the bundle integrity, disruption of sheets.

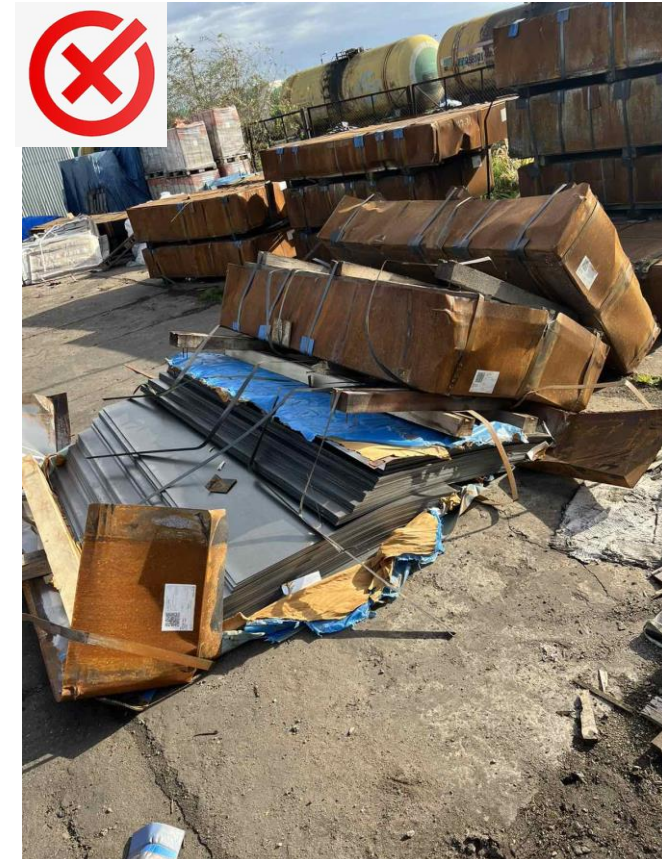


1 – steel strapping band (min 3 transverse and 2 longitudinal straps. For marine transportation, one additional strap is required); 2 – marked labels (2 waterproof self-adhesive labels); 3 – strap locks (pro rata the straps); 4 – steel pads (prop rata the double quantity of straps); 5 – protective steel sheet (2 pcs)



Deterioration of packaging of rolled sheets and plates

As a result of stacking bundles of rolled sheets and plates on an uneven surface without adherence of the levelness of bundles during their stacking, due to external influences the bundle pile can fall with complete or partial destruction of the packaging, including access to the package contents, transfer products to reject status



Stacking of cold-rolled and hot-rolled sheets and plates.



Sheets and plates should be unloaded from the vehicle piece by piece, simultaneous coupled unloading of two or more product units is prohibited.

Devices which ensure the integrity of the products and packaging elements shall be used for unloading (soft sling or traverse equipped with protective, cushioning pads in places of contact with bundles).

Bundles of rolled sheets shall be stacked in piles not more than 2 meters high, on an even concrete surface or other surface that prevents the products and packaging elements from damage. Stacking is carried out in such a way as to exclude the presence of water after stacking, if atmospheric precipitation falls.

The weight of the upper bundle in any row of the stock pile should not exceed the weight of the lower bundle in the bottom row by more than 20%. The increased height of the stock pile should be coordinated with the responsible sales manager.

When forming a stockpile of rolled sheets and plates, wooden separators (bars) shall be distributed among the bundles symmetrically with respect to each other throughout the height of the entire stock pile, and the distortion of the bundle plane shall be excluded



Pipes and Tubes

Lack of packaging element (paper, waterproof cloth).

Under the requirements of the order (specification), the shipment of pipe products may be carried out according to a packaging scheme, which includes packing the pipe bundle in waterproof material (polyethylene waterproof cloth or wrapping paper).

Absence of this packaging element within more than one month, or the ingress of atmospheric precipitation will result in the formation of corrosion.



Breaking the integrity of packaging.

When stacking pipe bundles, the packaging elements (polyethylene waterproof cloth or paper) may be damaged by lifting devices or materials on hand used to stack pipe bundles.

Due to the presence of points with damaged packaging elements, it is not excluded the ingress of contamination on the surface of pipes, moisture under the packaging and the formation of corrosion.

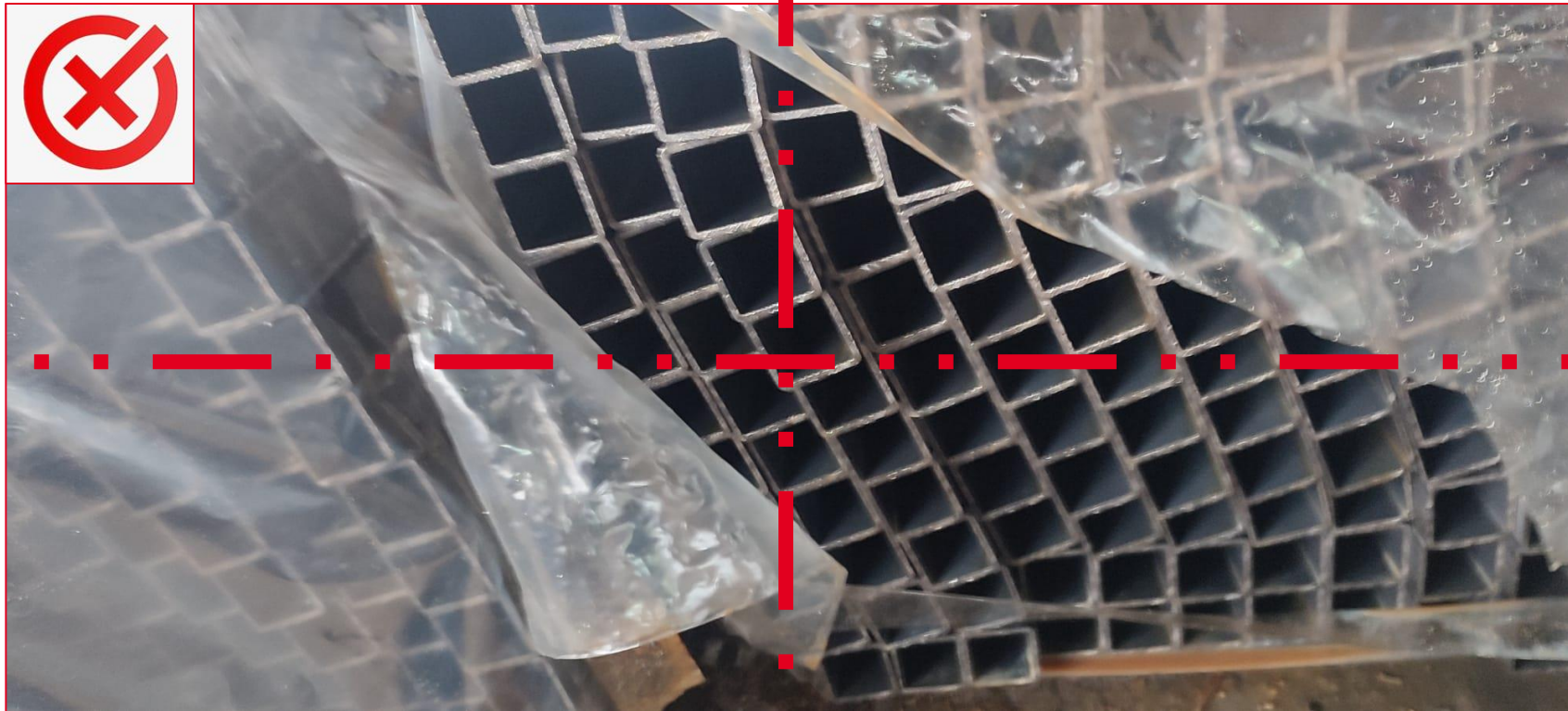


Displacement of pipes in the bundle.

Non-compliance with the schemes of pipe bundles fixing during transportation may result in the falling of the bundle, displacement of pipes in the bundle, and, as a consequence, breaking the integrity of the packaging.

Due to the damage of the packaging elements, it is not excluded the ingress of moisture under the packaging and corrosion formation, ingress of contamination on the pipe surface.

Pipes in the bundle shall be placed evenly, symmetrically and uniformly, without displacement.



Loose bundles of pipes

Non-compliance with the schemes of pipe bundles fixing during transportation may result in the falling of the bundle, displacement of pipes in the bundle, and, as a consequence, breaking the integrity of the packaging.

Due to the damage of the packaging elements, it is not excluded the ingress of moisture under the packaging and corrosion formation, ingress of contamination on the pipe surface

Pipes in the bundle should be placed evenly, with symmetry in the end part of the bundle, the uniformity of placing without displacement.





Pig Iron

Presence of foreign impurities in pig iron.

The pig iron pile should not contain any foreign free-running impurities, inclusions. Piles of cargoes must be separated from each other by special barriers which prevents cargo from mixing

The presence of foreign particles results in the rejection of the entire batch of pig iron.

Loading of pig iron with magnetic reloaders is prohibited. The area for pig iron storage must first be cleaned from previously stored material.

Loading shall be carried out with the help of grapple loaders, polyps, which exclude the loading of foreign particles. Before shipment, the rolling stock shall be inspected; if there are residues of previous cargo (iron ore concentrate, iron ore pellets, clay, sand, coal, etc.), the car shall be cleaned up.



High quantity of pig iron breakages (fines) in the pig iron pile.

Exceeding the limit values for the presence of fines (pig iron breakages) in the pig iron pile will result in rejection of the entire shipped batch of pig iron. The pig iron breakages include pieces less than 2 kg in weight, unless otherwise specified in the specification.

Loading of pig iron by means of magnetic reloaders is prohibited. The area for pig iron stacking shall first be cleaned of previously stored material.

Loading shall be carried out with the help of grab handlers, polyps, excluding the shipment of pig iron breakages. Before shipment the rolling stock is inspected, if there are residues of previous cargo (iron ore concentrate, iron ore pellets, clay, sand, coal, etc.), the car shall be cleaned.





IORM

(iron ore raw materials)



Overmoistened IORM and/or IORM with waste content.

The presence of foreign materials such as cloth (rags), boards, results in the waste content in the IORM ore, which in turn leads to an increase in unloading time due to involving additional loaders, incurring additional costs.

The presence of overmoistened IORM in the form of lumps (approximately 40x40cm in size) results in an increase in unloading time due to involving additional loaders, incurring additional costs for cleaning the cars from the remains of the previous cargo with making photos.

Piles of bulk cargo should be separated from each other by special barriers which prevent mixing of goods. Before shipment the rolling stock shall be inspected; in case of presence of the remains of the previous cargo (iron ore concentrate, iron ore pellets, clay, sand, coal, etc.) the car shall be cleaned.





Wire rod (wire)

Coils of wire rod with poor baling wire tying, or lack of baling wire.

Weak tension, breakage and/or lack of one or more straps of the wire rod coil, the straps have the possibility of free movement relative to the body of the coil.

Due to poor strap tightening, the coil wraps are displaced, entangled, and as a result the wire is torn.



Storage of wire coils outside the concreted areas.



In the case of stacking and storage of wire rod coils in conditions that lead to sticking to the coils of contaminants (soil and other), the formation of corrosion, the processing of this wire rod will be difficult, requiring additional costs.

Storage of wire rod coils outside the concreted areas should be carried out in conditions that exclude contamination of coils (see Annex 1), as well as excluding their presence in puddles of water from atmospheric precipitation.





Presence of contamination (fuel oil, oil contamination, presence of foreign materials).

If wire rod coils are stacked and stored in conditions that lead to sticking contaminants (oil, fuel oil and others) to the coils, the processing of the wire rod will be difficult, requiring additional costs.

Storage of wire rod outside of concreted areas should be in conditions that exclude contamination of the coils.





Recommendations on the storage of wire rod outside of space with concrete floors

In order to ensure the absence of contamination on the surface of the wire rod in the lower point of the coil, the wire rod should be stored on a concrete, asphalt surface.

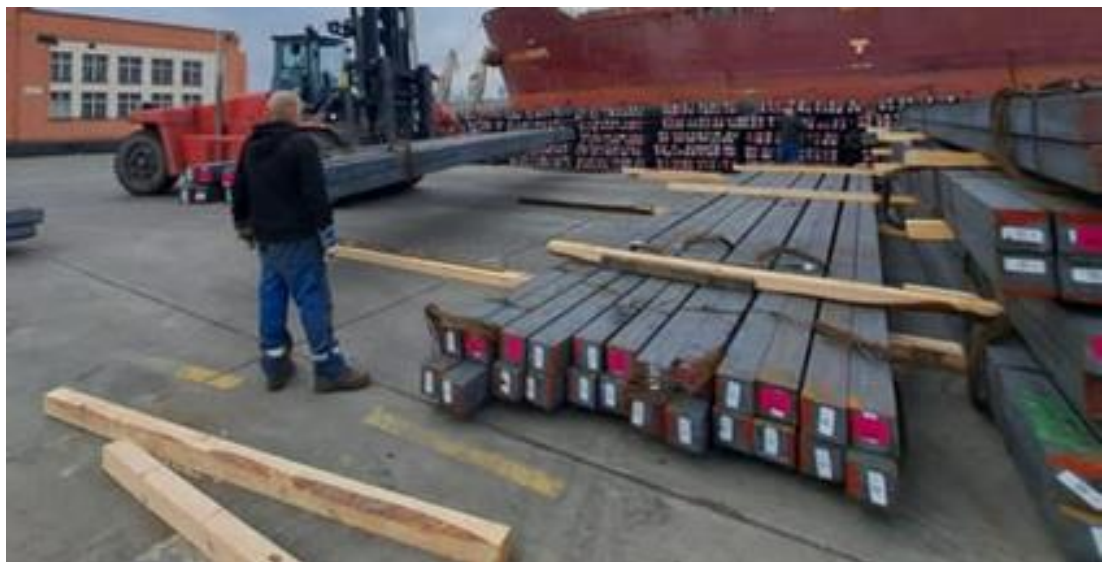
If such paving is missing, and wire rod is stored on the bare ground, crushed stone, slag or other surfaces, which will contaminate wire rod, it is necessary to use wooden dunnage. In the case of such type of floor surface, wooden dunnage (40-100 mm) and spacers shall be placed under the bottom tier along the direction of a stack to prevent rolled steel products from coming into contact with puddles formed by precipitation. Extreme coils of the bottom coil tier shall be secured by anti-rollback stops (chocks). **Any contamination of wire rod shall be removed before shipment.**

It is not permitted to store wire conditions in the conditions, where coils are exposed to puddles formed by precipitation, which will lead to corrosion.





Continuously cast billets, rolled sections (channels, angles)

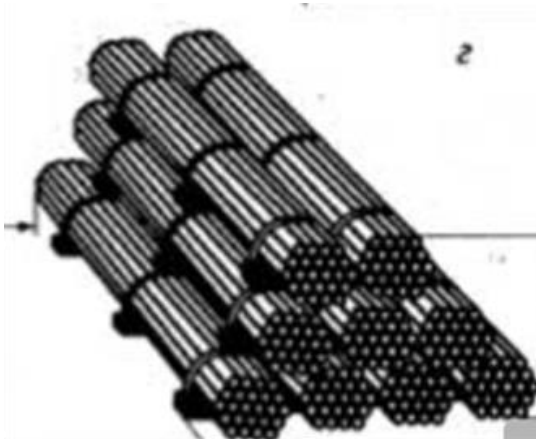


To preserve the quality properties of continuously cast billets (square and round), long products (channels, angles), these products shall be stored on a concrete, asphalt pavement surface during handling and storage.

Products shall be stacked using wooden dunnage, sized 40-100mm (80x80 is recommended), separating layers of products from the concrete, asphalt surface to the last row or layer of the stack.

The dunnage shall be laid evenly along the entire length of products, avoiding the placement of the dunnage at the strapping (winding) and clamps that ensure the integrity of the bundle.

The dunnage shall be so distributed that the stored products do not change the shape, straightness of continuously cast billets (square and round), long products (channel, angle), and ensure safety measures during their storage and subsequent shipment.



If there is no concrete, asphalt pavement surface, wooden dunnage shall be placed under the bottom tier when stacking continuously cast and rolled billets (square and round) or long products (channel, angle, beam, etc.) on the open ground, crushed stone, slag, or other surface that will not ensure the preservation of quality properties. With this type of floor surface, 40-100mm wooden dunnage (recommended size 80x80) and spacers shall be laid across the direction of the stack, preventing the contact of the rolled steel products with puddles formed by atmospheric precipitation.

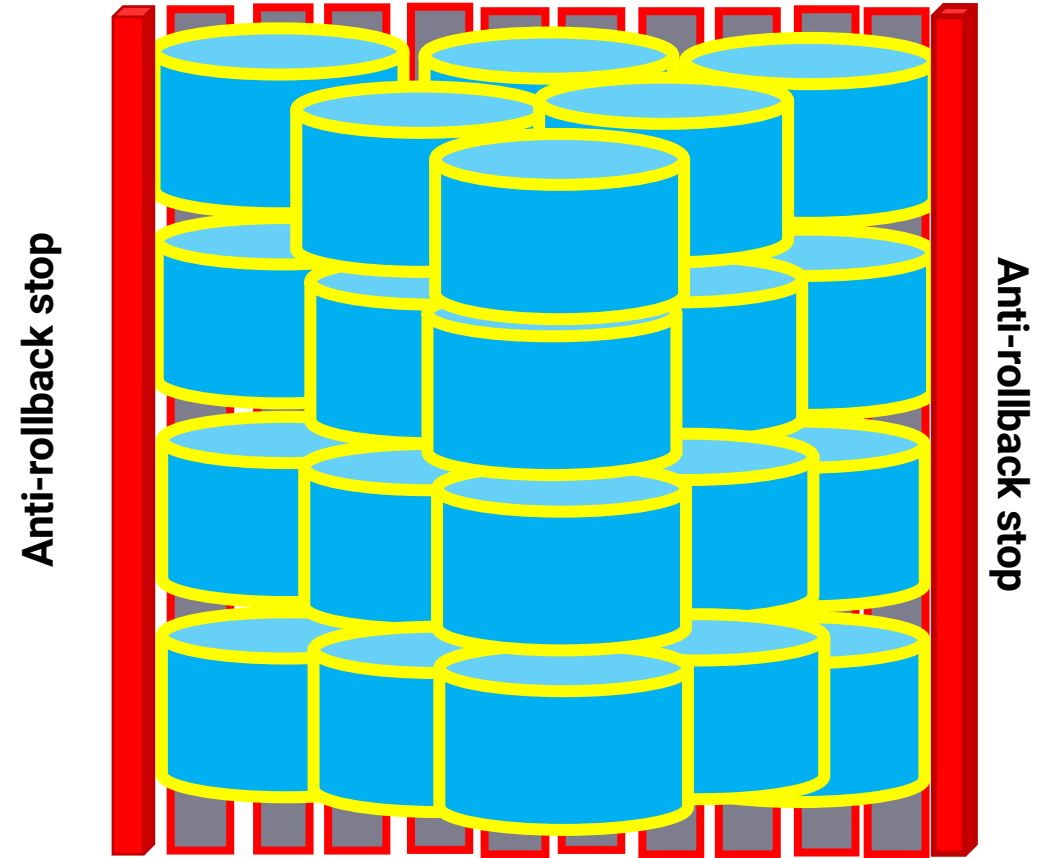
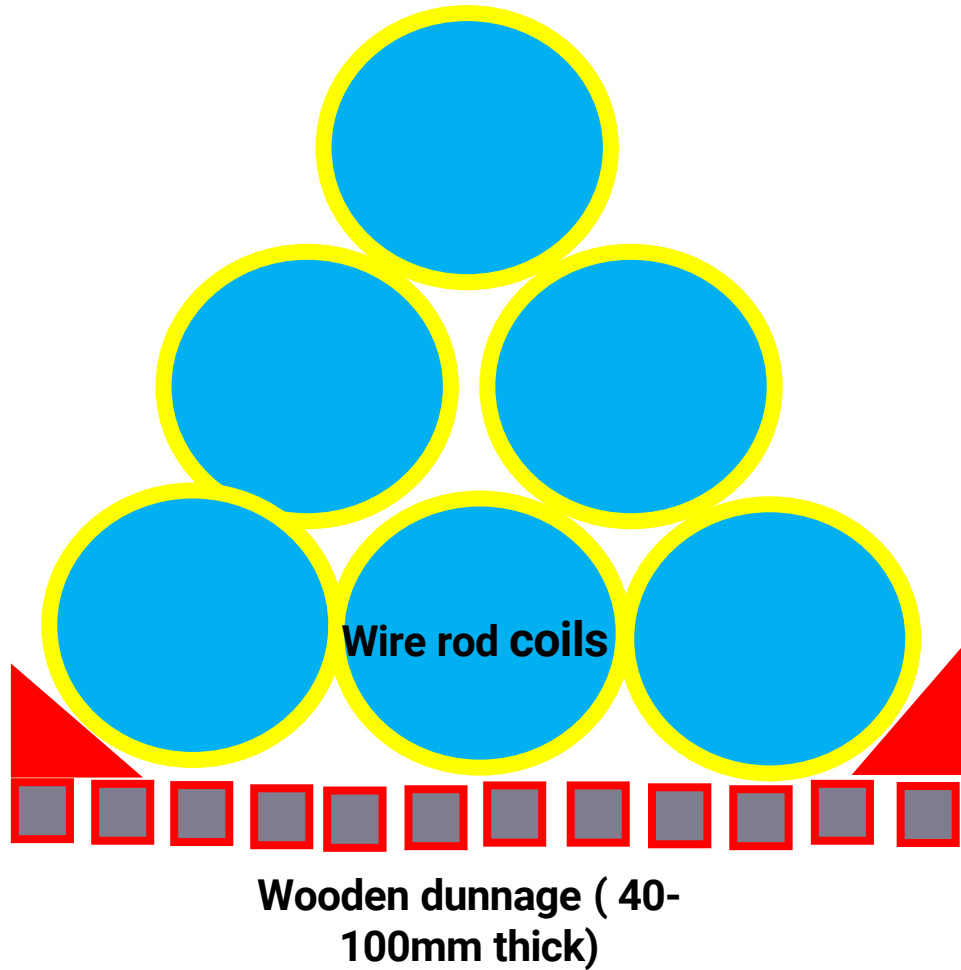
It is not permitted to store continuously cast and rolled billets (square and round) and long products (channels, angles, beams, etc.) in conditions where they are exposed to puddles formed by precipitation or water coming from soil.

Continuously cast and rolled billets (square and round) and long products (channels, angles, beams, etc.) shall be slung onto hooks only by means of slings. It is forbidden to apply slings to individual rods.

If no clamps are available, it is necessary to use nylon slings and sling the entire bundle.



Recommendations on the storage of wire rod outside of space with concrete floors





The procedure described below sets out the course of action and interaction between an intermediate storage warehouse and employees of the commercial function of METINVEST HOLDING, LLC, as well as with employees of independent inspection companies, including METINVEST SHIPPING, LLC, who inspect the unloading and loading of products received at or shipped from an intermediate storage warehouse.

All products delivered at an intermediate storage warehouse shall be examined at unloading and loading.

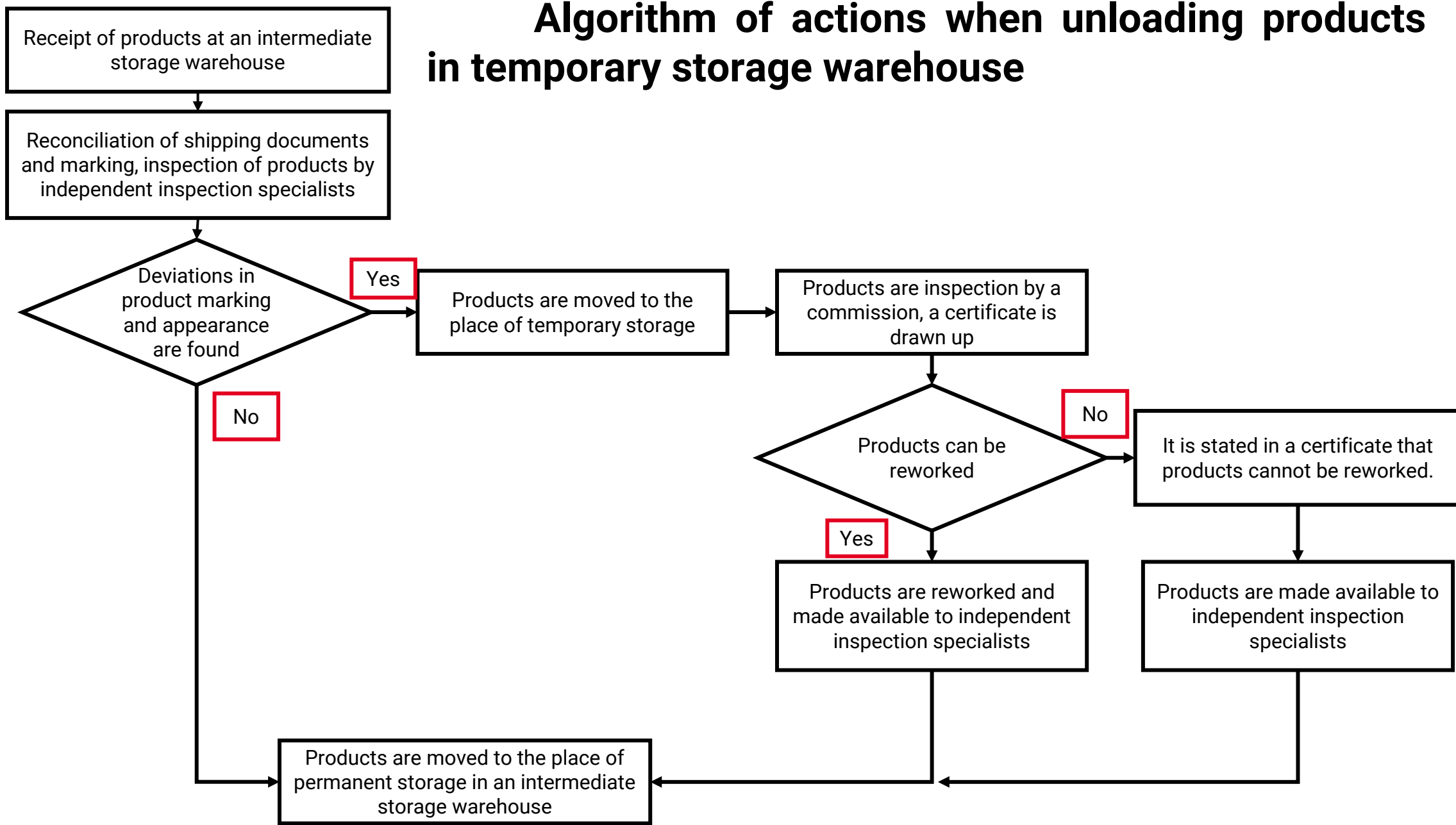
If any traces of damage, including damage to the packaging with the exposed contents, are detected, any such case shall be documented in a certificate and communicated to the responsible sales specialist (manager) of the commercial directorate.

The shipment of products with a quality deviation(s) requires permission from a sales specialist (manager) of the commercial directorate. Products can be reworked (grinding, packaging, sorting, sealing, etc.) for subsequent shipment. After the rework, products shall be made available to employees of independent inspection companies (METINVEST SHIPPING, LCC) who inspect the loading of products, which are shipped from an intermediate storage warehouse, to assess the completeness and sufficiency of the rework done.

Each shipment of products, which undergo rework, shall be documented in a certificate and communicated to the responsible sales specialist (manager) of the commercial directorate.

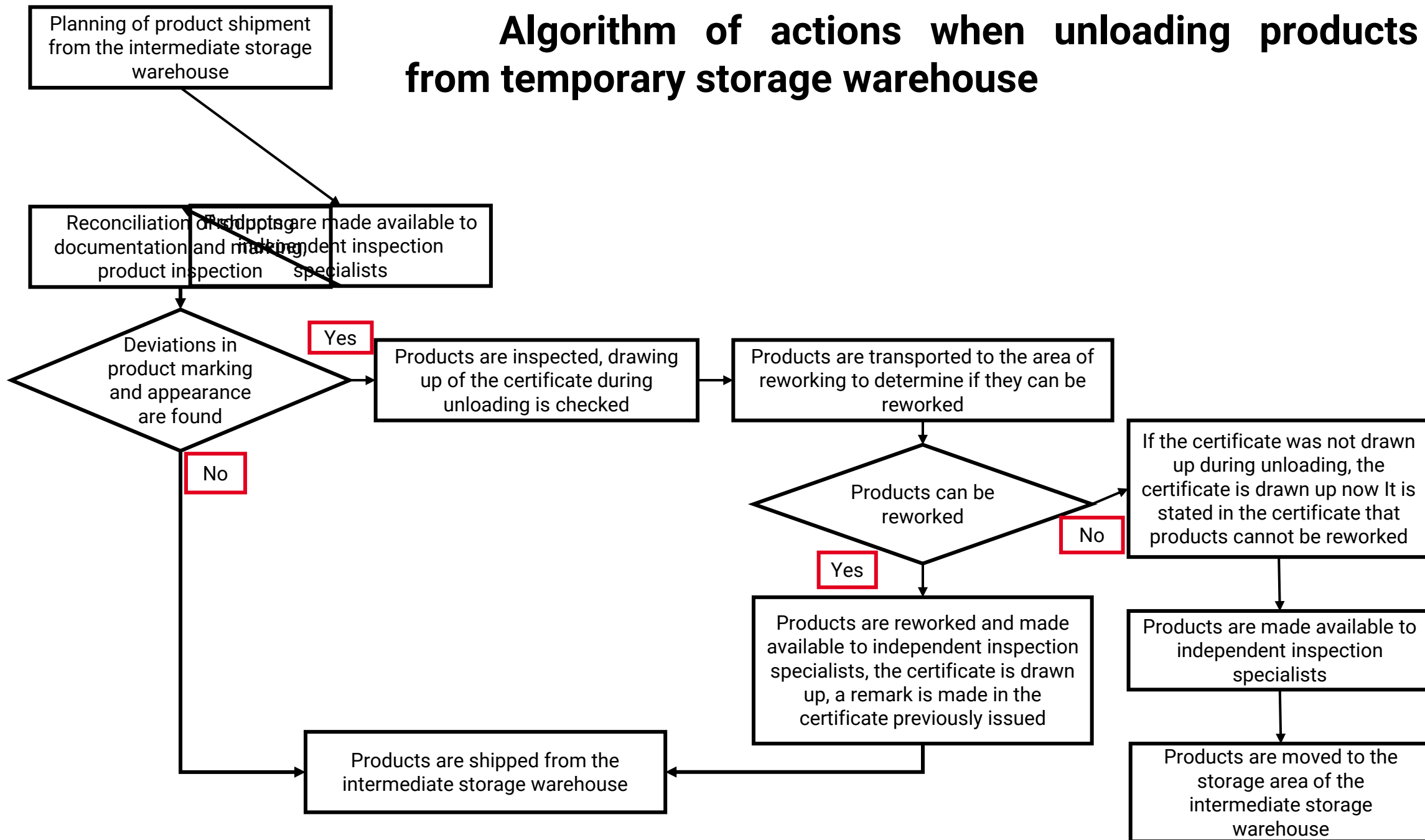


Algorithm of actions when unloading products in temporary storage warehouse





Algorithm of actions when unloading products from temporary storage warehouse





Recommended equipment for loading/ unloading of cold-rolled and galvanized steel in coils and wire rod.

1. Clamps with dampers

2. Textile slings

3. Steel canvas slings.



Requirements for hauling devices:

1. Hauling devices shall be in good working order and equipped with means that prevents products damage. It is allowed to use other designs of hauling devices, provided that damage to the transported cargo and packaging is avoided
2. All crane operations with hauling devices, their movement and stacking in warehouses, loading into railway open wagons should be made carefully, smoothly, and avoid hitting the floor, open wagons, bundles and coils located in the warehouse, and other objects.





Recommended equipment for loading/unloading of hot-rolled and cold-rolled steel in sheets and plates

1. Spreader bars with dampers

2. Textile slings

3. Magnets

4. Grabs

(only if shipping steel plates piece by piece;
their use **IS FORBIDDEN** when unloading/loading
rolled steel in coils and sheets and plates in bundles)



Requirements for hauling devices:

1. Hauling devices shall be in good working order and equipped with means that prevents products damage. It is allowed to use other designs of hauling devices, provided that damage to the transported cargo and packaging is avoided
2. All crane operations with hauling devices, their movement and stacking in warehouses, loading into railway open wagons should be made carefully, smoothly, and avoid hitting the floor, open wagons, bundles and coils located in the warehouse, and other objects.





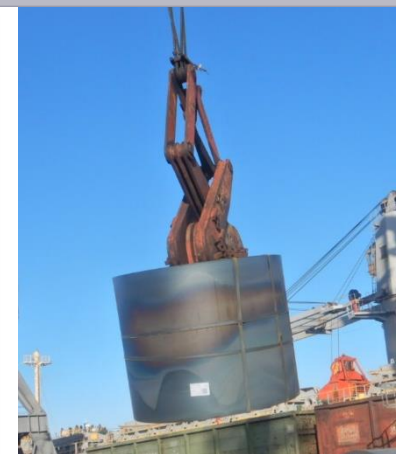
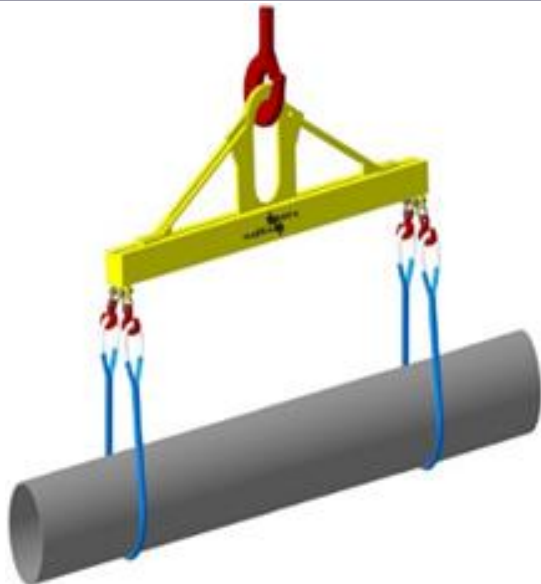
Recommended equipment for loading/unloading of hot-rolled steel in coils, welded steel pipes

1. Spreader beam with textile slings.

2. Textile slings

3. Clamps with dampers.

4. Lifting tongs with damper damping plates



Requirements for hauling devices:

1. Hauling devices shall be in good working order and equipped with means that prevents products damage. It is allowed to use other designs of hauling devices, provided that damage to the transported cargo and packaging is avoided
2. All crane operations with hauling devices, their movement and stacking in warehouses, loading into railway open wagons should be made carefully, smoothly, and avoid hitting the floor, open wagons, bundles and coils located in the warehouse, and other objects.

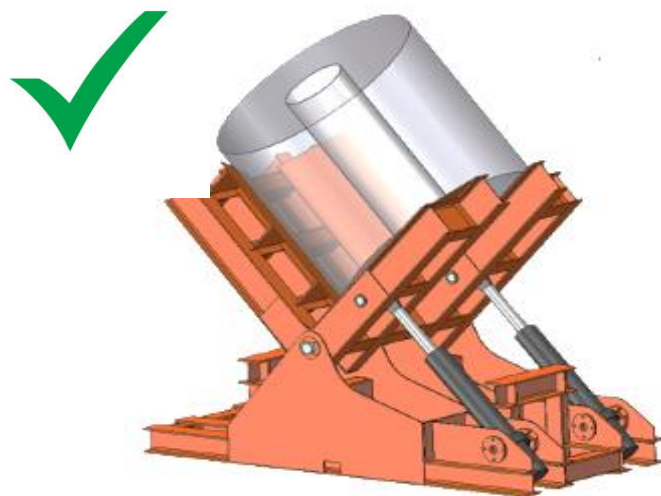




Recommended equipment for loading/ unloading of hot-rolled steel in coils.

When unloading hot-rolled coils, if the rolled steel is received in the vertical position and it is necessary to tilt it to the horizontal position, it is necessary to use mechanized (hydraulic, electric) tilting devices.

It is not recommended to use non-mechanized tilting devices of welded structures. These tilting devices do not exclude the formation of defects on rolled steel in coils during coil tilting. *The use of similar welded structures is allowed, provided that the integrity of the product is maintained, the formation of defects and breakage of shipping straps are avoided.*



Requirements for hauling devices:

1. Hauling devices shall be in good working order and equipped with means that prevents products damage. It is allowed to use other designs of hauling devices, provided that damage to the transported cargo and packaging is avoided
2. All crane operations with hauling devices, their movement and stacking in warehouses, loading into railway open wagons should be made carefully, smoothly, and avoid hitting the floor, open wagons, bundles and coils located in the warehouse, and other objects.



Recommended equipment for loading/ unloading of iron-containing raw materials (concentrate, pellets), pig iron.

1. Clamp hook.

**Shipment of pig iron with
clamp hook IS FORBIDDEN**

2. Polyps lifting tongs.



Requirements for hauling devices:

1. Hauling devices shall be in good working order and equipped with means that prevents products damage. It is allowed to use other designs of hauling devices, provided that damage to the transported cargo and packaging is avoided
2. All crane operations with hauling devices, their movement and stacking in warehouses, loading into railway open wagons should be made carefully, smoothly, and avoid hitting the floor, open wagons, bundles and coils located in the warehouse, and other objects.

