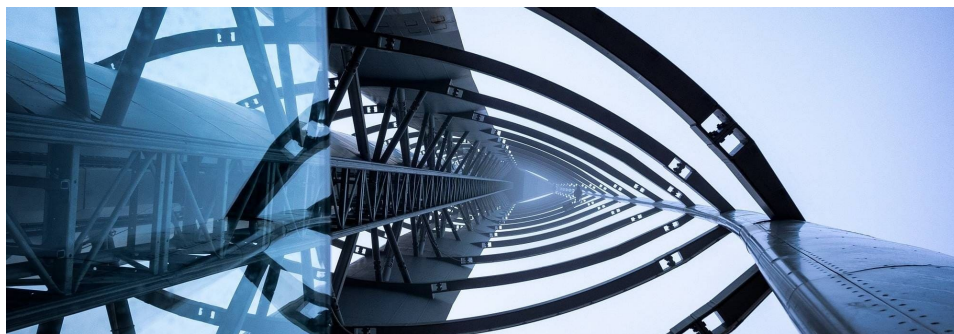


## How to check the quality of metal

Choosing food in a supermarket is a routine and habitual thing. While the quality of some products can be judged with the eye, we have to read the labels and trust what is written there when buying other products. What about steel products? Metinvest offers recommendations about what a retail buyer should pay attention to when choosing steel products.



On one hand, everything is strictly regulated in the steel industry. The quality of steel products is set out in several key documents: a standard guide for technical specifications, a standard guide for steel grades and a standard guide for geometry.

Additional specifications, not defined in the above standards, can be outlined separately by the buyer.

### Visual inspection of products

The buyer can inspect products at the metal service centre where finished goods are delivered. For some products, their appearance is one of the quality parameters, while for other products, it has no influence on the quality.

Each industry segment brings its own set of requirements for the appearance of steel products and these are described in the relevant standards. For example, for bridge, wind tower and shipbuilding companies, the quality of the steel plate surface is important. To manufacture structures for these segments, steel plates are subject to shot blasting and painting, which means the surface of the rolled steel should be free from any defects during these operations.

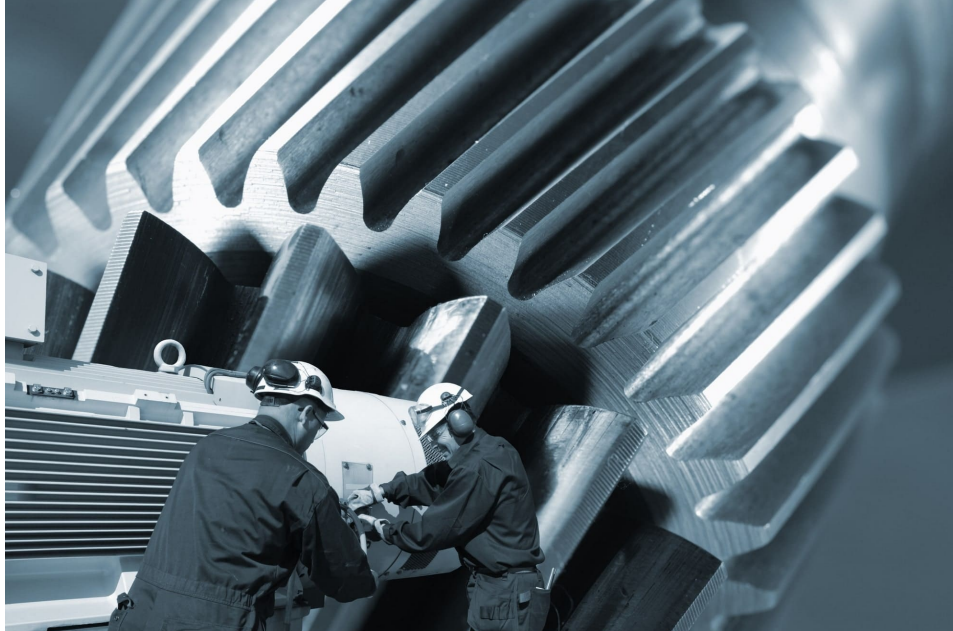
Whenever steel plates are used for equipment lining to protect from wear, their appearance is not critical. The same applies to rebar, which builders use for reinforced concrete blocks. Minor rust is actually good for rebar, as it provides for better cohesion with the concrete.

Galvanised steel has a number of quality parameters that are evaluated only visually, including spangle pattern, passivation stains and others. In the storage yard, galvanised sheets are usually kept coiled and therefore only inner and outer wrappings are visible. Shiny zinc crystals resembling frost patterns on the windows should be clearly visible on the surface of rolled products. However, if galvanised steel is purchased for colour coating, zinc "patterns" will only be a hindrance as they are visible from under the coating layer, so this shiny effect should be minimised during the production process.

Therefore, visual inspection will not be of equal value in all cases. Normally, steel sheets or plates are stacked, long steel products are bundled, and it may not be possible to detect defects even during a careful inspection.

For example, waviness and flatness are not determined by the eye, but rather by carefully inspecting the plates in a specially prepared area. The plate is put on a prepared metal or even concrete surface to be measured with a specially calibrated tool.

In order to check other properties of steel products (chemical composition, mechanical properties, etc), the buyer can check the data in the quality certificate against the marking applied to the product. If the buyer wants to make sure these properties conform to the specified values, the buyer can test the products at their own premises or in an independent, specialised laboratory using standardised methods and calibrated equipment.



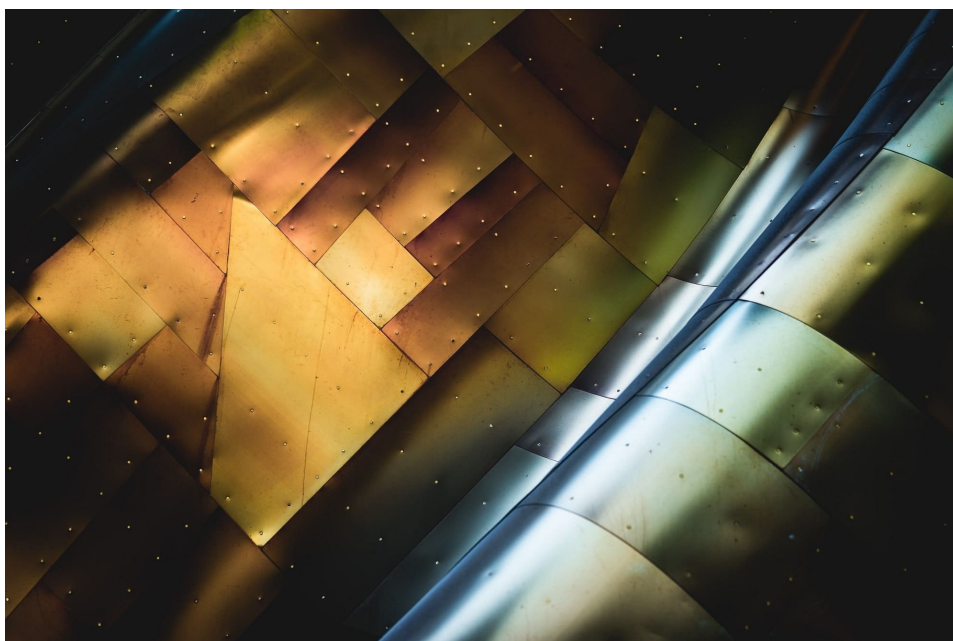
### **Product testing**

Manufacturers perform numerous tests in certified and approved labs. All lab equipment is regularly calibrated. For example, quality control departments at Metinvest facilities perform an independent inspection of product compliance with the established requirements and guarantee this compliance to the customer.

The set of properties and test methods are clearly described in the standards. For each group of products, and even within the same group, the set of tests can be completely different.

One of non-destructive tests is ultrasonic flaw detection, where ultrasound is used to detect possible defects in the product body.

Manufacturers also take samples for destructive mechanical testing. The specially prepared samples of a product are exposed to external forces, as a result of which the samples are destroyed or deformed or lose their initial properties in a different way. For example, a metal sample is extended to measure yield strength, tensile strength and elongation. These are some of the most important parameters determining steel strength and ductility. Impact testing takes just a few seconds, while tensile tests on a steel plate specimen in an H<sub>2</sub>S environment can last up to two months. The testing time is included in the production time. The standards specify the number of samples to be taken for such tests, their size, treatment methods and other parameters. If the samples are proved to comply with the quality standards, the whole batch is considered to be compliant too. The testing method developed in accordance with the requirements of a certain standard is the same both for Ukraine and other countries. Therefore, a customer in any part of the world can perform a test using their own equipment to determine the quality of metal.



### **Test and trust**

Most buyers trust quality certificates, especially if they have a years-long partnership with the steel producer. The desire to test the quality of steel products arises when something goes wrong during the processing.

If a steel supplier has to be selected from several unknown manufacturers, it's worth ordering a trial lot first and checking the quality using one's own equipment. Once the appropriate supplier has been selected, its quality certificates can be trusted. It is even better to find a reliable partner who can save the customer from constant testing. After all, when tests do not have to be performed every time steel products are delivered for processing, it saves time and makes the production process easier. This is one of the obvious advantages of choosing a long-term partnership.

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