



**Metal Scrap
& Ferro
Alloys
SURVEY**



It's Shipping & Survey



Our Company CISS GROUP
(Commodities International
Survey Services) –
this is a team of professionals
with experience of doing
business in major international
survey companies more than
15 years.

ABOUT COMPANY

We have teamed up our forces, experience and knowledge in order to offer only the best practice and business solutions in the field of independent inspections for active metallurgical plants and traders (metals, ferro alloys, scrap) and others players all over the world.

Operational excellence and high standards of **CISS GROUP** allow our partners feel protected twenty-four-hour a day.





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The value of metallurgical products is best determined by means of visual inspection, quantity inspection, sampling, sample preparation and laboratory analysis & testing. All our services are conducted according to the relevant ISO, ASTM, DIN standards and are performed by well-educated experienced inspectors and laboratory staff.

- Inspection and quality control
- Quantity determination
- Sampling (if required)
- Tally control
- Moisture and rust control
- Size measurements
- Re-weighing and weight asserting for confirmation
- Supervision of loading and discharge operations
- Salinity tests (silver test)

As part of our testing services, we are able to provide physical (including non-destructive methods) and chemical testing of samples against required contractual, international or regional standards.

CISS GROUP's quality certificates based on results from independent and accredited laboratories.



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METAL SCRAP

It is very important for the recycling industry to know the composition of the scrap for further application. Therefore, a proper visual inspection, quantity determination, sampling and analysis of the material must be conducted.

The services can be carried out during and after loading or during discharging operations and on stockpiled materials.

- Quality inspection
- Quantity inspection
- Radioactivity testing
- Inspection hazardous / dangerous materials (absence of uncut gas bottles/balloons, missiles and others military materials)
- Supervision of loading / transshipment / discharge
- Visual classification of scrap metal to ensure conformity with contractual specifications (oversized, absence of wire ropes, foreign materials like sand, stones, construction materials etc.)
- Grading determination (sizing and impurities)
- Photo reporting
- Weight conformation by vessel's draught survey or weight bridge asserting
- Forwarder's certificate of receipt conformation
- Certification



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**BASE
METALS**

All international base metals including copper, lead and zinc, ferrous ores such as iron ore and other mostly transported by bulk shipments on the vessels.

Iron Ore, bauxites, raw mining commodities

The transportation of iron ore, bauxites (and others bulk raw commodities) has a lot of commercial risks to all parties involved. The quality and quantity of the cargo must be accurately determined to know the grade of iron ore being transported.

CISS GROUP provides inspection and supervision services including weight control supervision, sampling, chemical and physical quality analysis.

List of main chemical analyses for iron ore pellets: Fe, FeO, SiO₂, Al₂O₃, CaO, MgO, P, S, MnO, TiO₂, K₂O+Na₂O, B₂ (CaO/SiO₂), B₄ (CaO+MgO)/(SiO₂+Al₂O₃), H₂O

Additional physical tests: float-sink test, size distribution, cold compression strength, abrasion index.



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**FERRO
ALLOYS**

**Inspection, weighing,
sampling and analysis
for ferroalloys (like
ferrochrome, ferronickel)
include determination of
minor metals presents**

- Nickel
- Titanium
- Chromium
- Magnesium
- Manganese
- Antimony
- Cobalt
- Bismuth
- Indium
- Cadmium
- Tungsten
- Selenium
- Vanadium
- Silicon
- Molybdenum
- Rhenium



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Process control and quality control in the metal industry - whether it concerns primary metals or special products - are driven by rapid and accurate chemical analysis, by structural characterization of metals and alloys as well as particle size distribution, particle shape, surface area, and density.

As layers of pure metals or alloys are used to enhance certain features of a product, it is important to precisely and accurately determine their contamination and overall composition.

Quality control of metals requires non-destructive, elemental analysis as well as detailed characterization of physical properties of each component.



**FERRO
ALLOYS**



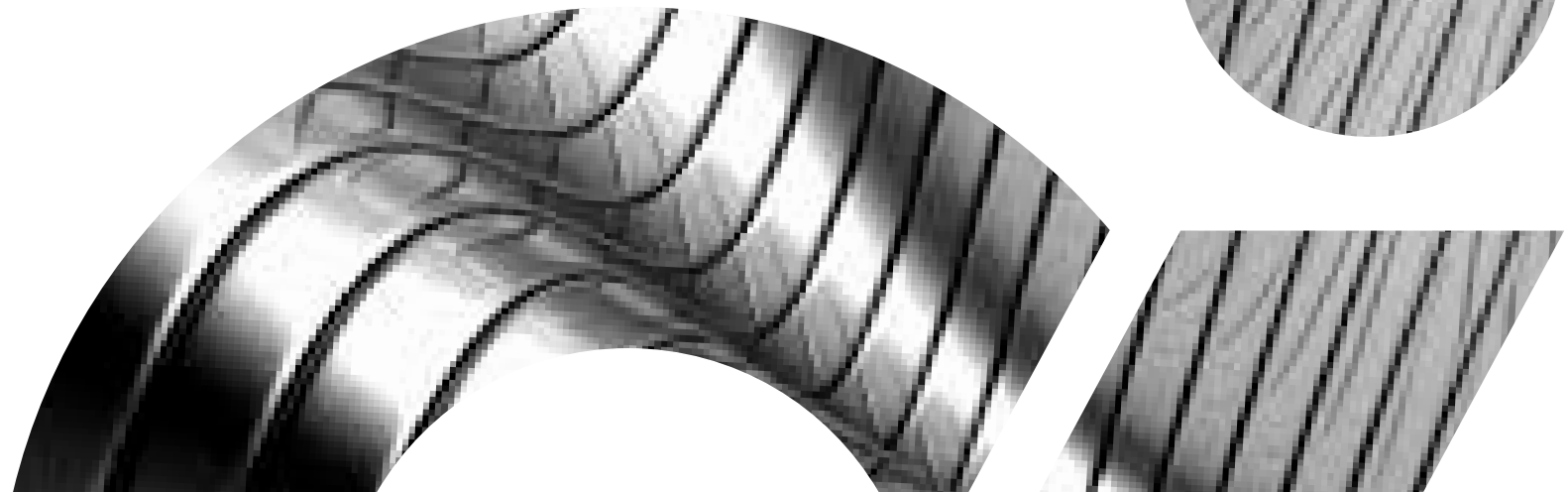
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Ferrous and non-ferrous metals production is monitored by CISS GROUP's inspectors continuously during the manufacturing process and at the final product storage places.

It must be ensured that material streams are consistent in elemental, structural and particle size composition as well as physical characteristics.

The non-ferrous metals industry includes the production of different metals for a very wide range of applications. Important non-ferrous metals are aluminum, copper, lead, nickel, tin, titanium and zinc, and their alloys.

Use of these materials is widespread in industries from automotive manufacturing to construction, in the manufacture of advanced specification, high-technology goods for high temperature, corrosion resistance, as well as for high strength to weight ratio (e.g. titanium and its alloys).



**FERRO
ALLOYS**



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**FerroChrome (FeCr)
is the amalgam of chromium
as well as iron comprising
between 50% and
70% chromium.**

Hard Ferro Chrome is made by electric arc melting of chromite, an iron magnesium chromium oxide as well as the most significant chromium mineral. Over 80% of its production is applicable in the production of stainless steel that is well-defined as a steel alloy with a least of 10% chrome by content. It is employed in specialist applications such as engineering steels.

It is also produced in less carbon content so as to deal with smaller quantities for more particular applications. Solid Ferro Chrome has a slag that is chemically stable and can be used for road construction as well as civil engineering.

CISS GROUP's main chemical composition analyses: Cr, Si, P, S, C and sizing.





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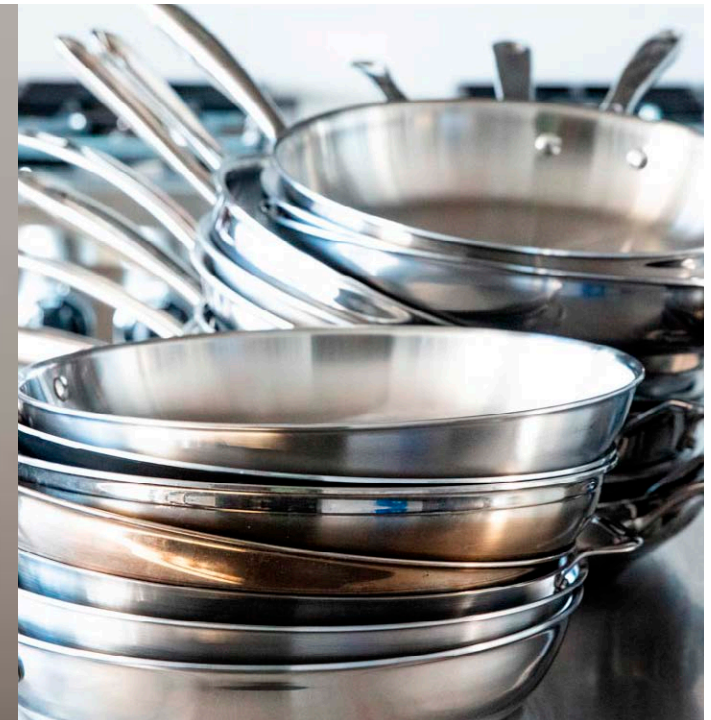
**FerroNickel (FeNi)
is mostly used as main raw
material of stainless steel.**

Stainless steel belonging to nickel is not only heat-resistant, corrosion-resistant, acid-resistant and abrasion-resistant, but it also boasts of excellent processability.

As a material that is harmless to the human body, it is used in making tableware and kitchen utensils for most households, in various purposes such as medical equipment, aircrafts and coins.

Main chemical analyses: elemental analysis: Nickel (Ni), Cobalt (Co); Silicon (Si); Copper (Cu); Chromium (Cr); Phosphorus (P); Sulphur (S); Carbon (C); Iron (Fe)

Sampling of ferroalloys provided by inspectors of **CISS GROUP** in accordance with manual method as per **ISO 4551**, i.e. cargo taking from big bags and from stockpile at random using hand – held sampling tool.





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- Pre-shipment inspection
- Inspection of cargo during its storage / warehouse operations
- Audit of inventories, due diligence and audit of warehouses and terminals
- Sampling & Analysis: chemical (C, Si, Mn, S, P, Ni, Cr, Cu etc.) & physical (yield strength, tensile strength, elongation, bending, zinc coating, coating adhesion test etc.)

- Draft survey of the vessel
- Holds inspection of the vessel
- Salinity test in holds (silver test)
- Loading & discharge supervision
- Tally services
- Visual checking (packing, marking, cargo identification & condition, random checking of dimensions)
- Supervision of weighing operations





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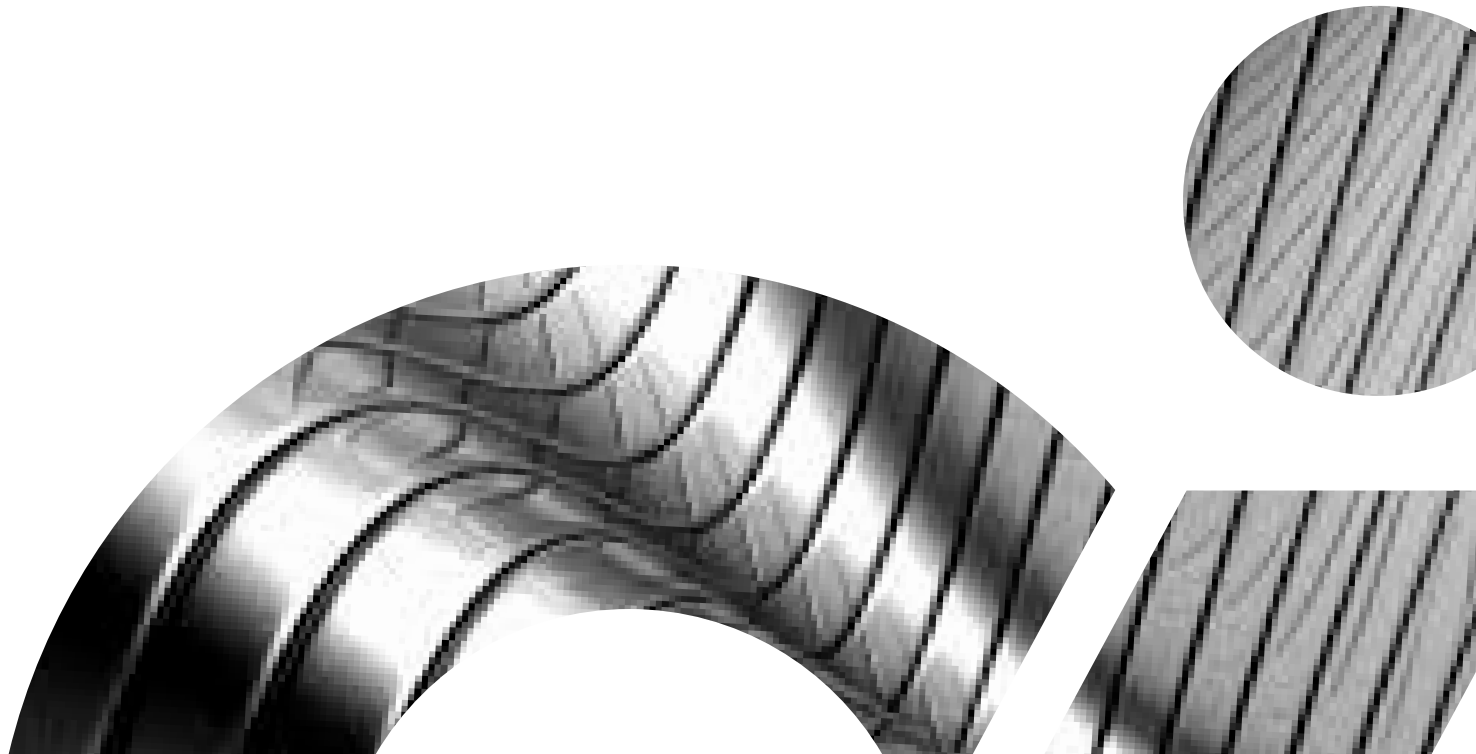
Additional Services

- Stock Monitoring Agreement
- Radioactivity control surveys
- Damage & loss prevention surveys
- Colour marking & labelling verifications
- Forwarder's certificate of receipt confirmation

List of steel products CISS GROUP's inspectors familiar with:

- Steel scrap
- Pig iron
- Billets
- Slabs
- Steel plates, flats & sheets
- Hot & cold rolled steel coils
- Steel wire
- Wire rods & rebar
- Merchant bars
- Steel tubes & pipes
- I-beams and H-beams
- Channels
- Railway wheels and rails

**STEEL
PRODUCTS**





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STEEL BILLETS INSPECTION

Steel billets are the product of a melting shop which later go through a rolling mill production line to produce steel bars for further pipes production.

Main stages of inspection:

- Preshipment
- Cargo condition (surface and rust condition)
- Tally count
- Marking checking out
- Weight control assesment
- Loading supervision
- Size determination



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STEEL PIPE INSPECTION

Visual Inspection by CISS is one of the most effective inspection method used to check overall product quality.

During the visual inspection, our **CISS GROUP's** inspectors will check out overall product finished condition on the factory warehouse.

Inspectors will check surface for imperfections such as mechanical marks, lamination, tears or any other visual imperfections and also check weld defects such as porosity, undercuts, uneven weld bead, and excess or under fill of weld material, quality of welded seam.

Acceptance of these imperfections is as per applicable ASTM standard.



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**STEEL
PIPE
INSPECTION**

Pipe Dimension Inspection

Dimension inspection of the pipe is carried out based on the Dimension Standard, the final dimension of the pipe must confirm the following standard or it should be as specified in the purchaser's specification: diameter, length, wall thickness, straightness, ovality & weight

Pipe Packing Inspection

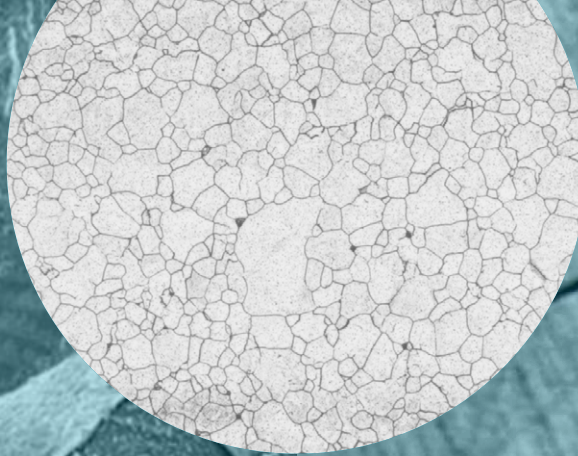
To prevent the damage during transportation, pipe ends are covered with a cap. Spider supports at the end of the pipe are also installed in large diameter pipe to protect the circularity of pipe.

Some pipes are placed in the hexagon shape and bundled by plastic strips.

In some cases these bundles laid down in the wooden boxes.



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STEEL PIPE INSPECTION

Metallurgical Tests

Metallurgical Tests confirm that the chemical requirements of pipe are as per the material standard.

Macro analysis for welding will check the proper fusion of weld material with pipe material.

There is some special pipe inspection tests also carried out on the material when it is going to be used in aggressive environments. These tests will ensure that pipe material is able to withstand in such aggressive environments also.

Some of the tests are:

- Grain size (AS & SS)
- IGC - Intergranular Corrosion Test (SS)
- Ferrite (SS)
- HIC- Hydrogen-induced Cracking
- SSC - Sulfide Stress Corrosion Crackin



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STEEL PIPE INSPECTION

The mechanical Destructive and non-destructive tests are types of pipe inspection which confirms the mechanical requirements of pipe are as per the material standard.

The tensile test is done to check the yield and ultimate tensile of the pipe. If required by the purchaser or by standard high or low-temperature tensile tests are also performed.

Bend test / Guided bend test is used to check the integrity of weld joint.

Flattening test examines the ability of plastic deformation in a pipe.

Impact test / Sharp V-Notch Test, check the ability of a material to withstand under low-temperature conditions

Creep test is done to check the long term effect of temperature under constant load.

Ultrasonic test and hydro pressure test provided to determine whether non-visible cracks existed or not.



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SEAMLESS STAINLESS STEEL PIPES

Stainless steel is one of the most popular and versatile materials. Seamless stainless steel pipe is used in applications where high temperature strength and superior corrosion resistance are critical. Further, stainless steel is easy to clean and doesn't tarnish.

Stainless steel is an iron alloy that contains a minimum of 10.5% chromium. Alloying elements such as nickel, molybdenum, titanium, carbon, nitrogen, and copper can boost the strength, formability, and other properties of stainless steel. Different alloys offer different levels of corrosion resistance.

Stainless steel alloys offer greater cryogenic toughness, a higher work hardening rate, increased strength and hardness, greater ductility, and a more attractive appearance compared to carbon steel.

Benefits of stainless steel pipe

Stainless steel pipe is resistant to rust and other corrosive attack. It is heat-resistant for high-performance and high-temperature use.

Industries served by inspectors from CISS: oil and gas, liquefied natural gas, ship building, pharmaceuticals, nuclear power generation, pulp and paper industry, refinery and petrochemicals, mills, etc.



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OIL DRILLING PIPES

It is a family of seamless rolled products consisting of drill pipe, casing and tubing that are used in drilling, equipping and operating oil and gas wells/fields onshore and offshore.

It is hollow, thin-walled, steel or aluminum alloy piping that is used on drilling rigs. It is hollow to allow drilling fluid to be pumped down the hole through the bit and back up the annulus. It comes in a variety of sizes, strengths, and wall thicknesses, but is typically 27 to 32 feet in length (Range 2). Longer lengths, up to 45 feet, exist (Range 3).

In the world wide oil industry today, an overwhelming majority of all tubular goods are manufactured to specifications developed and approved by the American Petroleum Institute. These specifications cover the mechanical properties of the steel, the details

of manufacture and physical dimensions of the pipe. The inspection by CISS include internal and external diameters control, wall thickness and upset dimensions for each nominal size, weight and grade, as well as tool joint type, O.D. and I.D., length and quality of thread.

API Specification 5 and 7 cover pipe and the drill string.

High Strength Drill Pipe – because of deeper drilling and higher stress levels, grades of drill pipe stronger than Grade E-75 have been developed.



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AEROSPACE TITANIUM PIPES

Structural airframe applications include wing structures, landing gear components, critical fasteners, springs, and hydraulic tubing. Titanium is selected in this application due to its basic characteristics; specifically its strength to weight ratio.

The use of Titanium in airframes has continued to grow since the 1960's where it had its beginnings in military programs and ultimately moved into commercial aircraft. Titanium alloys effectively compete with Aluminum, Nickel and ferrous alloys in both commercial and military airframes.

Applications run the gamut of airframe structural members; from massive highly stressed, forged wing structures, and landing gear components, to small critical fasteners, springs and hydraulic tubing.

As new Titanium products, alloys and manufacturing methods are employed by the aircraft industry, the use of titanium will expand in this application.

The selection of titanium in this application is a result of the specific properties associated with the metal including: **strength to weight ratio, reliability, corrosion resistance, mechanical properties, thermal expansion, location on the galvanic series.**

Inspectors from CISS GROUP can provide any kind of inspection services and lab tests for titanium products.



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STEEL PLATES INSPECTION

Transportation of steel plates usually provides by vessel due to huge sizes, discharging operations provided to port terminal area, from terminal via railway platforms to plant. During this operations it is very important to identify all plates as per ID through checking Packing list.

- Preshipment inspection at plant
- Loading/discharge supervision
- Tally count
- Measurements
- Identification as per Packing list
- Holds inspection
- Weight control
- Rust control as per American Rust Standards Guide
- Size dimensions measurements
- Loading supervision and fastening (cargo securing) inspection



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STEEL COILS INSPECTION

Transportation of steel coils usually provides by vessel or by containers, the main purpose of inspection – to fix all damages occurred during transportation and control of fastening operations.

- Preshipment at plant
- Loading/discharge supervision
- Tally count
- Measurements
- Identification as per Packing list
- Holds inspection
- Weight control
- Rust control as per American Rust Standards Guide
- Size dimensions
- Damaged rolls inspection
- Container sealing
- Load fastening inspection



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ALUMINUM FOIL INSPECTION

Thin foils are fragile and are sometimes laminated to other materials such as plastics or paper to make them more useful. Often referred to with the misnomer tin foil, is aluminium prepared in thin metal leaves with a thickness less than 0.2 mm (7.9 mils); thinner gauges down to 6 micrometres (0.24 mils) are also commonly used.

Aluminum foil and its popularity will continue to expand in the packaging industry. Medical, military and retail food industries will continue to contribute to the expansion of the packaging industry. Which in return continues to maintain and uphold the quality and durability of aluminum foil worldwide.



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Aluminum Foil Inspection and Quality Control Tests by CISS:

**ALUMINUM
FOIL
INSPECTION**

Wettability Test

The wettability test is performed when you need to determine the dryness of the aluminum foil. During this test various ethyl alcohol / water solutions are poured onto the aluminum foil surface. If no droplets form on the piece of aluminum foil, the wettability will be classified as zero.

Pinhole Determination in Aluminum Foil

The thickness that manufacturers should create aluminum foil range from about 0.002 inches or more to ensure the aluminum foil is virtually free of pinholes. If aluminum foil ranges less than 0.002 inches then pinholes may appear.

Thickness of Aluminum Foil

Thickness of aluminum foil tests are used to determine the thickness of metallic foils, thin sheets, and films. The test is performed by measuring the mass of the foil. A blanking press will cut aluminum foil into medium sized circles which will be used to determine the mass.

Water Vapor Transmission of Materials

The water vapor transmission of materials test covers the determination of water vapor transmission of materials. These materials would include products such as aluminum foil, paper, plastic film, fiberboard, wood, and plastic. Two of the basic test methods used during inspection are the Desiccant Method and The Water Method.





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STRUCTURAL STEEL PRODUCT

Steel channel, rebars, beams

It is a structural steel product that features a C-shaped cross section, with a vertical back called a web and two horizontal extensions called flanges at the top and bottom. It is light compared to products like I-beams, and weaker, though it offers more support than angle iron or flat bars, without much of an increase in weight.

It is often used as a structural component in buildings, as rafters, studs or cross-bracing, and it can also be used to create trailer frames, vehicle frames and other structures. It is both versatile and affordable.



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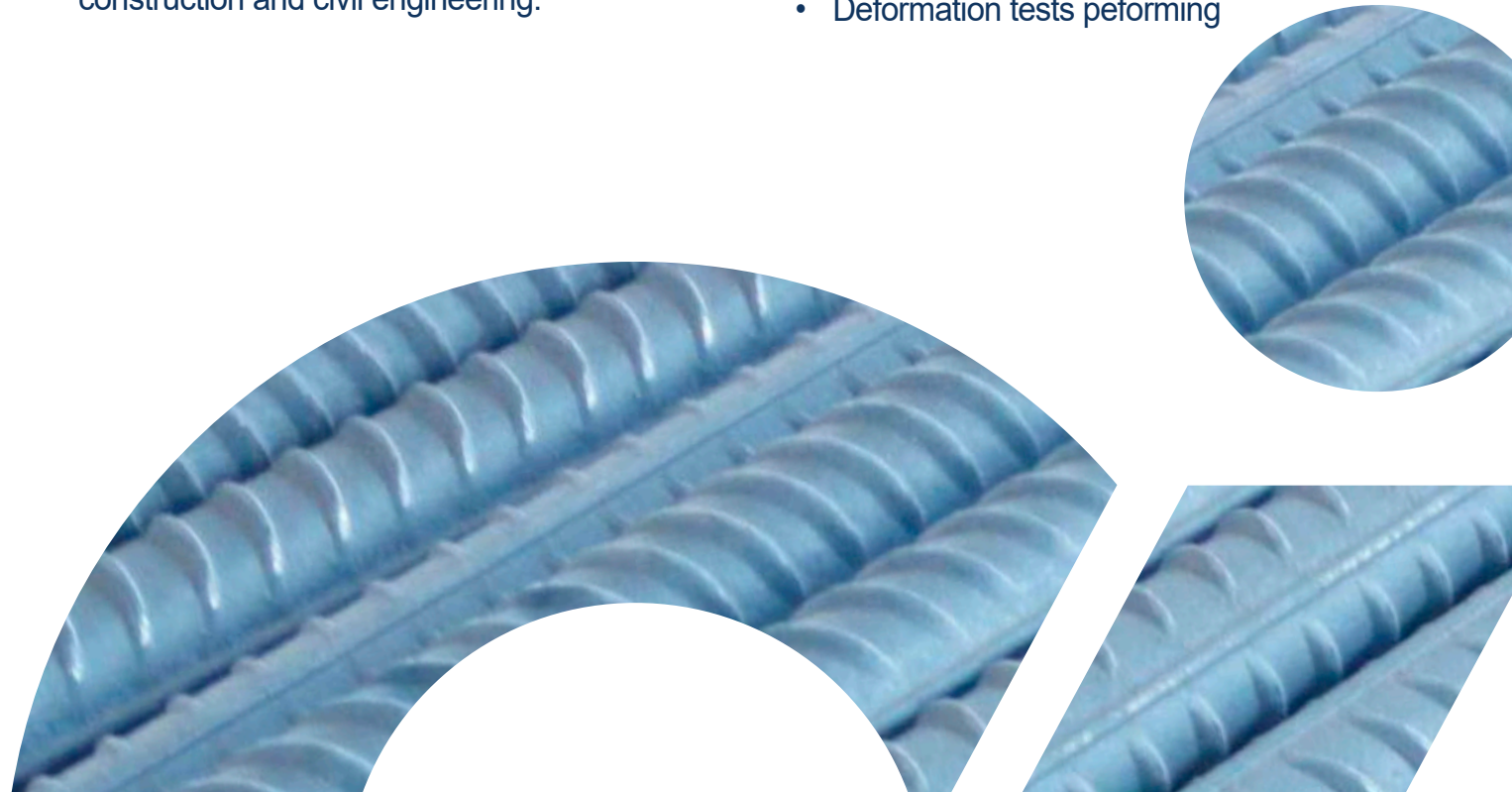
Rebar (short for reinforcing bar), known when massed as reinforcing steel or a steel bar or mesh of steel wires used as a tension device in reinforced concrete and reinforced masonry structures to strengthen and aid the concrete under tension. Concrete is strong under compression, but has weak tensile strength. Rebar significantly increases the tensile strength of the structure. Rebar's surface is often "deformed" with ribs, lugs or indentations to promote a better bond with the concrete and reduce the risk of slippage.

An **I-beam**, also known as **H-beam** (for universal column, UC), **w-beam** (for "wide flange"), **universal beam** (UB), **rolled steel joist** (RSJ), or **double-T**, is a beam with an I or H-shaped cross-section. The horizontal elements of the I are flanges, and the vertical element is the "web". I-beams are usually made of structural steel and are used in construction and civil engineering.

Inspection by CISS include (but not limited):

- Size measurement
- Shape
- Weight confirmation
- Labeling
- Packaging control
- Deformation tests performing

**STRUCTURAL
STEEL
PRODUCT**





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RAILWAY WHEELS INSPECTION

Wheels are cast or forged and are heat-treated to have a specific hardness.

New wheels are trued, using a lathe, to a specific profile before being pressed onto an axle. All wheel profiles need to be periodically monitored by **CISS GROUP**'s inspectors to ensure proper wheel-rail interface. Improperly trued wheels increase rolling resistance, reduce energy efficiency and may create unsafe operation.

A railroad wheel typically consists of two main parts: the wheel itself, and the tire (or tyre) around the outside. A rail tire is usually made from steel, and is typically heated and pressed onto the wheel, where it remains firmly as it shrinks and cools.



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Finished r/w wheels (pre-shipment inspection)

Main inspection scope include:

- Visual inspection
- Quantity check
- Witness of quality tests performed on the factory or review of valid tests reports
- Packing condition inspection
- Marking checking out if any requirement

Non-destructive testing of picked wheels in the automatic control line:

- Laser geometry control test
- Hardness test
- Ultrasonic test
- Magnetic Particle test

**RAILWAY
WHEELS
INSPECTION**





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RAILS INSPECTION

**The inspection of rails
is very important in
order to eliminate future
possible catastrophic
failures:**

- Dimensions measurements
- Hardness tests
- Chemical composition of steel
- Non-destructive test like ultrasonic test
- Bending test



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There are many effects that influence rail defects and rail failure.

These effects include bending and shear stresses, wheel/rail contact stresses, thermal stresses, residual stresses and dynamic effects.

Defects, which can be found due to contact stresses or rolling contact fatigue (RCF):

- tongue lipping
- head checking (gauge corner cracking)
- squats - which start as small surface breaking cracks

Other forms of surface and internal defects:

- corrosion
- inclusions
- seams
- shelling
- transverse fissures
- wheel burn

**RAILS
INSPECTIONS**





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