BERDAN
CİVATA B.C.

LABORATORY

SERVICES

TURKISH ACCREDITATION AGENCY

ACCREDITATION CERTIFICATE

As a Testing Laboratory,

BERDAN CİVATA SOMUN MAKİNA YEDEK PARÇA SANAYİ VE LABORATUVAR HİZMETLERİ TİCARET SANAYİ A. Ş. DENEY LABORATUVARI

Tarsus-Mersin Organize Sanayi Bölgesi 5. Cad. No:6 Huzurkent / Tarsus 33540 MERSİN / TURKEY

is accredited in accordance with TS EN ISO/IEC 17025:2017 standard within the scope given in Annex following the assessment conducted by **TURKAK**.

Accreditation Number : **AB-0657-T**

Accreditation Date : **01 August 2013**

Revision Date / Number : **18 April 2019 / 04**

This certificate shall remain in force until **16 November 2021**, subject to continuing compliance with the standard **TS EN ISO/IEC 17025:2017**, related regulations and requirements.

TÜRKAKREDİTASYON KURUMU TÜRKAK *1999*

Orbay EVRENSEVDİ
Acting Secretary General

Turkish Accreditation Agency (TURKAK) is a signatory to the European co-operation for Accreditation (EA) Multilateral Agreement (MLA) and International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Agreement (MRA) in the scope of ISO/IEC 17025.

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Berdan Cıvata & Laboratory Services INC. was established in Tarsus in 1979 by Yunus ŞEMSİ and Mechanical Engineer M.Sc. Hasan ŞEMSİ, and today it has become one of the leading fasteners manufacturer in Turkey with its knowhow and production experience of semi century. In 2013, it started testing and analysis services by establishing an indepented test laboratory was accredited according to ISO 17025 by TÜRKAK. It is a candidate to be the most comprehensive metal laboratory preferred in Turkey for tests and analyzes carried out with the principle of scienti(cness, con(dentiality and impartiality.

In the Metal Industry, the most important feature that distinguishes our laboratory, where almost all mechanical and chemical tests can be performed, from other accredited laboratories is its experienced staff and wide test device capacity.

Berdan Cıvata laboratory is the (rst choice of many local and foreign global companies that are aware of the critical impact of the correct test sample preparation on the test results, as well as knowing and applying the correct test/analysis application methods.

It is of great importance that the reports prepared as a result of the tests and analyzes have national and international validity. With the awareness of all these points, Turkey's Fasteners Industry has its FIRST & ONLY TÜRKAK TS EN ISO IEC 17025 Accreditation Certi(ed Test Laboratory established by Berdan Cıvata & Laboratory Services INC.

Main purpose of our TÜRKAK TS EN ISO IEC 17025 Accredited Laboratory,

In accordance with national and international standards is to provide services with its expert staff and advanced technology test & analyses devices in the (eld of Quality-Control.

- Complying with thè principles of scienti(city, con(dentiality and impartiality,
- Customer-oriented and have high price-performance ratio,
- Easily accessible and providing high service speed,
- Have clear, understandable and internationally valid reporting,

WHY ACCREDITED LABORATORY?

- Accredited Certi(ed Test Laboratory Reports add global con(dence and value to your products.
- Test laboratories are periodically included in interlaboratory comparison tests as required by accreditation. The test results achieved by the accredited laboratory are compared with many laboratories around the world and is guaranteed the reliability of the test results.

After your samples for analysis and material testing are delivered by courier or by hand to our accredited test laboratory, the tests are carried out quickly and the test results are reported to by email.

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www.berdancivata.com

SERVICE SUPPLIED / WORKED SECTORS

- Wind Power Plants (Turbines)
- Nuclear Power Plants
- Geothermal & Combined Cycle Power Plants
- Dams & Hydroelectric Power Plants
- Refineries, Petro-Chemical & Gas Facilities
- Pipelines & Energy Transmission Lines
- Defense Industry
- Aeronautics & Space
- Bridges (Steel Construction & Suspended Bridges)
- Highways, Tunnels & Viaducts
- Airports, Hangar & Cargo Buildings
- Industrial Facilities & Heavy Steel Constructions
- Space Frame Systems
- Sports Complexes
- Pressure Vessels & Boilers
- Ports, Shipyards & Maritime

MAIN DEVICES

- **Rockwell Hardness Measurement Device**
- **Vickers Hardness Measurement Device** (Micro Hardness)
- **Chemical Analysis Test Device** (Up To 20 Elements)
- **Tensile Test Device** (60 Tons Capacity)
- **Tensile Test Device** (500 Tons Capacity – Europe Strongest, Patented by Berdan)
- **Torque Test** (Friction Coefficient Measurement) **Device** (30.000 N/m Capacity – Up To M72)
- **Charpy Impact Tester** (Up To -150°C)
- **Magnetic Particle** (Crack) **Control Test Device**
- **Surface Roughness Measurement Device**
- **Coating Thickness Measurement Device**
- **Mobile Hardness Measurement Device**
- **Profile Projector**
- **Ultrasound Device**
- **Optical Microscope**
- **Stereo Microscope**

SAMPLE PREPARATION AND PRE-INSPECTION DEVICES

- **Bakelite Device**
- **Sanding & Polishing Device**

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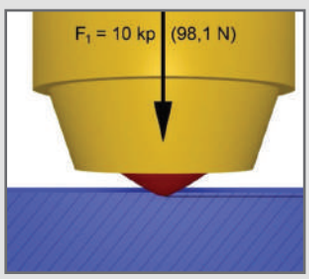
Device calibrations are carried out periodically by accredited institutions and organizations [ANADOLU KALİBRASYON, TESTKAL, EGEM ET, S&Q Mart, TSE Sojuz Test, TDB Calibration etc.].

Rockwell Hardness Test

The Rockwell Hardness test is based on measuring the depth of the trace formed on the material under constant load. Depending on the type of material to be measured, a 120° conical diamond tip or 1/16" and 1/8" diameter steel balls are used as tracers and according to material type is applied 60, 100 or 150 kg pressure.

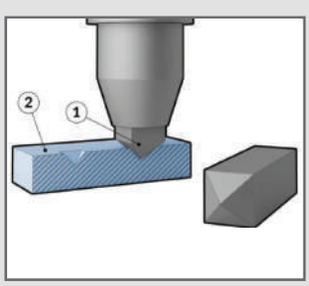
Measurements are made within the scope of TS EN ISO 6508-1 standards.




Vickers Hardness Test

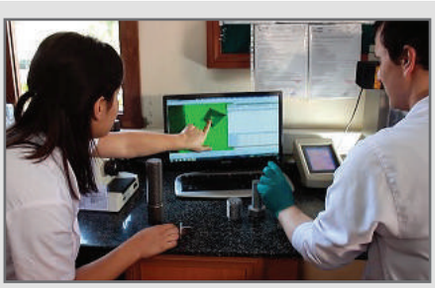
The field of application of the Vickers hardness test is very wide; suitable for very soft and very hard materials. The Vickers hardness test is based on the principle that a standardized pyramid-shaped diamond tip with a square bottom and an apex angle of 136° is pressed onto the sample surface, under variable loads to have a trace.

Measurements are made within the scope of TS EN ISO 6507-1 standards.




Optical Microscope

- ASTM E112

Stereo Microscope

- ASTM E112

Chemical Analysis Test

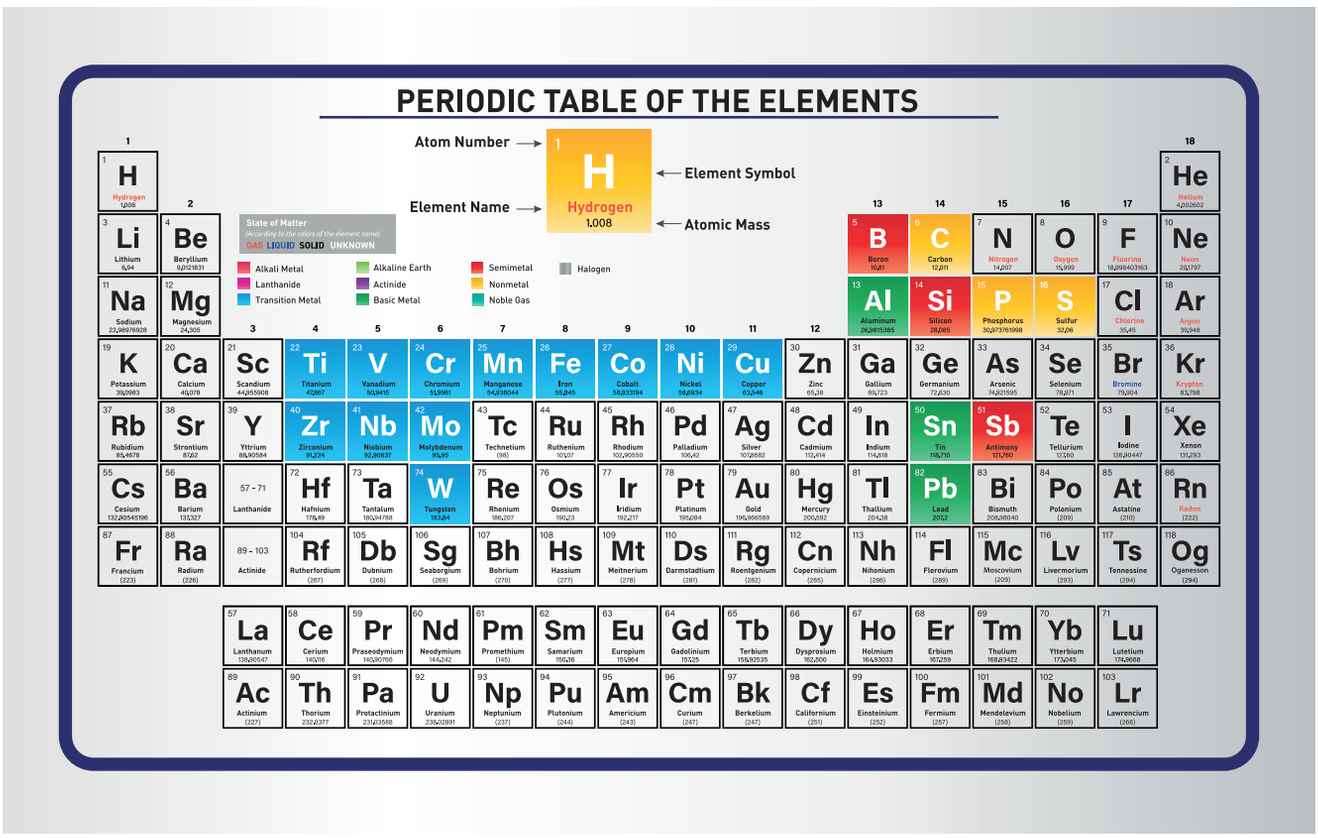
This test is applied to determine the chemical content of metallic materials with an optical emission spectrometer device. All known elements emit radiate with different properties when exposed to electric current. When these radiates are analyzed and examined with a spectrometer device, it is seen that each element has its own speci(c spectrum line.

According to these properties, the elements and amounts in metallic materials are determined.

Elements tested in chemical analysis:

Elements tested for chemical analysis:

Element	Symbol	Element	Symbol	Element	Symbol
Carbon	C	Nickel	Ni	Vanadium	V
Silicon	Si	Niobium	Nb	Tungsten	W
Manganese	Mn	Aluminum	Al	Lead	Pb
Phosphorus	P	Copper	Cu	Tin	Sn
Sulfur	S	Cobalt	Co	Antimony	Sb
Chromium	Cr	Boron	B	Zirkonium	Zr
Molybdenum	Mo	Titanium	Ti	Iron	Fe



Tensile Test

Tensile Testing,is a destructive engineering and materials science test to determine the behavior of the sample, in which a force is applied to a sample with controlled tension under an evidentialload up to a certain level or until the material breaks completely.

- 60 Tons - TS EN ISO6892-1
- 500 Tons - TS EN ISO6892-1

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Europe's Strongest Tensile Test Device

Europe's STRONGEST TENSILE TEST device, designed, manufactured and patented by Berdan Cıvata, is located in the inventory of Berdan Cıvata's Accredited Test Laboratory according to ISO 17025:2017.

In this test device with a length of 1.5 m and a weight of 750 Kg, a tensile test of an M72 diameter 10.9 grade wind turbine tower connection bolt was carried out as a whole without thinning, and it was observed that it broke at 430 tons.

Magnetic Particle (Crack) Control & Ultrasound Tests

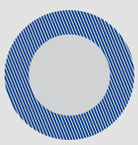
Magnetic Particle (Crack) Control Test is used to determine the cracks on the surface under UV light by magnetizing the product with the help of electric current.

- ISO 9934
- ISO 10228-1

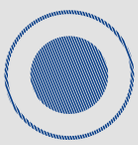
Ultrasound Device is used to determine cracks and gaps inside products.

- EN 10288-3
- EN 6157-3
- EN ISO 26157-3
- ISO 6157-2
- EN ISO26157-2

The part where crack control is made in the magnetic particle is indicated with blue colored.
The part where crack & gap control is made in the ultrasound device is indicated with blue colored.



The part where crack control is made with magnetic particle test



The part where crack control is made with ultrasound test

Torque (Friction Coefficient Measurement) Test Device

Torque Testing is the most important way to determine how an object will respond when it is tightened until it fails or breaks intentionally during normal operation. The purpose of the Torque Test applied to the fasteners is to determine the maximum force that must be applied for the desired [correct] tightening of the fasteners and the maximum strength points of the fasteners during the tightening process. If a fastener is tightened with a high torque, ignoring its properties, it is faced with consequences such as elongation, deterioration and even breakage. If it is tightened at low torque by ignoring the features it has, it will cause loosening and separation of the connection. For this reason, it is essential to use torque control made fasteners in order to extend the life of the fasteners.

Torque Test in Fasteners helps fasteners to be tightened with appropriate pre-tension by testing 3 different types of friction that occur during tightening.

Types of Friction in Assemblied Fasteners:

- Friction between bolts/studbolts/anchors' exterior surfaces and nuts' exterior surfaces
- Friction between nuts' compression surfaces and washers' compression surfaces
- Friction between under heads of bolts/studbolts/anchors' and washers' compression surfaces when the fasteners used without nuts

The tightening force applied to tighten the fasteners with the appropriate pre-tension is first used to eliminate these frictions and then to obtain pre-stress.

According to Berdan Cıvata ISO 17025, there is Europe's one of two Most Powerful Torque Test Device with a capacity of 30,000 N/m in the inventory of the Accredited Test Laboratory. With this device, torque test is implemented to fasteners up to M72 diameter [including M72].

- 3.500 N/m - ISO 16047, EV1090-2, EN14399-2
- 30.000 N/m - ISO 16047, EV1090-2, EN14399-2

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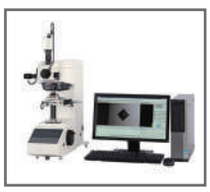
Mobile Hardness Measurement Device

- TS EN ISO6508-1



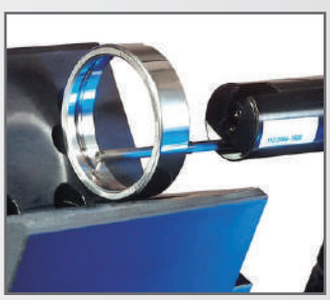
Coating Thickness Measurement Device

- ISO 2808
- ASTM B499
- EN 10638
- EN 10684
- ISO 4042

Surface Rougness Measurement Device

The aim is to determine the surface roughness of the manufactured parts and to examine the effect of cutting speed, one of the parameters affecting the surface roughness.

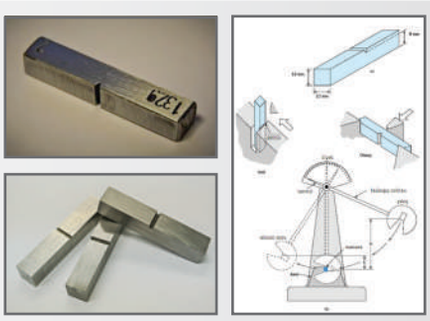
- TS 6956
- EN ISO 4287



Charpy Impact Test

In the impact test, the amount of required energy is determined to break the sample under a dynamic stress. Found value is called as the impact resistance of the material.

- EN ISO148-1



Sample Preparation and Visual Inspection

- Sample Preparation (Bakelite Device)
- Sample Preparation (Sanding-Polishing)
- Pro(le Projection

REFERENCES


IHI
GAMA
TEKFEN
REYHER
ATEŞ
WELDING & COATING
ASTALDI S.p.A.
ALSTOM
WÜRTH
TECNICAS REUNIDAS
SIEMENS Gamesa
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