



BERDAN
CIVATA 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.



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.

Berdan Civata & Laboratory Services INC. was established in Tarsus in 1979 by Yunus ŞEMŞİ and Mechanical Engineer M.Sc. Hasan ŞEMŞİ, 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 indepedented 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, confidentiality 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 Civata laboratory is the 1rst 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 Certified Test Laboratory established by Berdan Civata & 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 feld of Quality-Control.

- Complying with thè principles of scienti(city, confidentiality 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 Certified Test Laboratory Reports add global confidence 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.



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

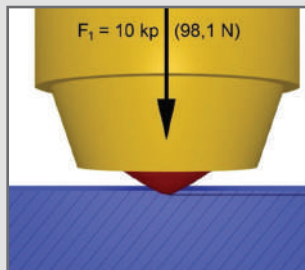
- Bakelite Device
- Sanding & Polishing Device

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.

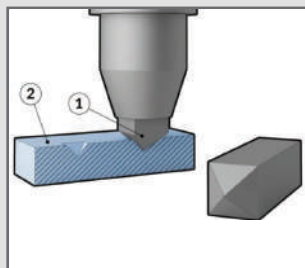
Measurements are made within the scope of TS EN ISO 6508-1 standards.



Vickers Hardness Test

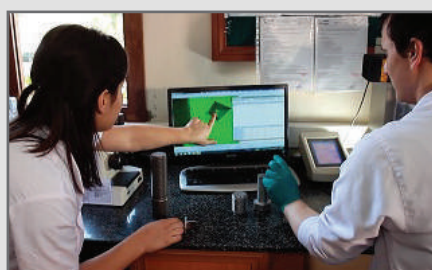
The field of application of the Vickers hardness test is very wide; suitable for very soft and very hard materials. The Vickers hardness test is based on the principle that a standardized pyramid-shaped diamond tip with a square bottom and an apex angle of 136° is pressed onto the sample surface, under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

PERIODIC TABLE OF THE ELEMENTS

Atom Number →

1

← Element Symbol

Element Name →

Hydrogen

← Atomic Mass

State of Matter

(According to the values of the element name)

GAS

LIQUID

SOLID

UNKNOWN

Alkali Metal

Alkaline Earth

Semimetal

Halogen

Lanthanide

Actinide

Nonmetal

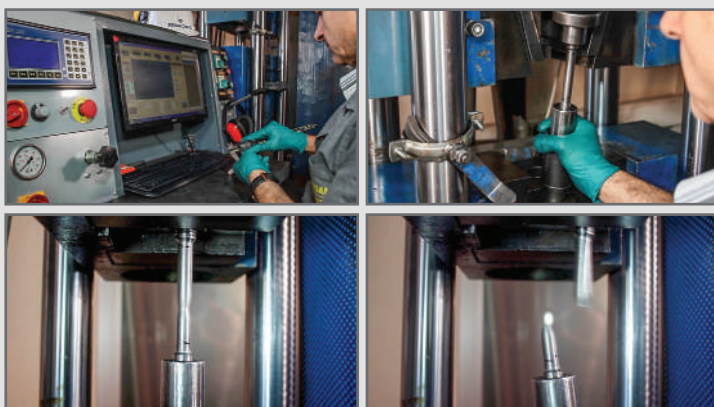
Transition Metal

Basic Metal

Noble Gas

1																	18	
1 H Hydrogen 1.008																	2 He Helium 4.002602	
3 Li Lithium 6.94	4 Be Beryllium 9.0121831											5 B Boron 10.81	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.99840323	10 Ne Neon 20.1797	
11 Na Sodium 22.98976928	12 Mg Magnesium 24.305											13 Al Aluminum 26.9815385	14 Si Silicon 28.085	15 P Phosphorus 30.973761998	16 S Sulfur 32.06	17 Cl Chlorine 35.45	18 Ar Argon 39.948	
19 K Potassium 39.0983	20 Ca Calcium 40.078	21 Sc Scandium 44.955908	22 Ti Titanium 47.88	23 V Vanadium 50.9415	24 Cr Chromium 51.9961	25 Mn Manganese 54.938044	26 Fe Iron 55.845	27 Co Cobalt 58.933194	28 Ni Nickel 58.6934	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.63	33 As Arsenic 74.921595	34 Se Selenium 78.971	35 Br Bromine 79.904	36 Kr Krypton 83.798	
37 Rb Rubidium 85.4678	38 Sr Strontium 87.62	39 Y Yttrium 88.90584	40 Zr Zirconium 91.224	41 Nb Niobium 92.90637	42 Mo Molybdenum 95.94	43 Tc Technetium 98	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.90550	46 Pd Palladium 106.42	47 Ag Silver 107.8682	48 Cd Cadmium 112.414	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.757	52 Te Tellurium 127.6	53 I Iodine 126.90547	54 Xe Xenon 131.29	
55 Cs Cesium 132.90545196	56 Ba Barium 137.327	57 - 71 Lanthanide		72 Hf Hafnium 178.49	73 Ta Tantalum 180.94788	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.222	78 Pt Platinum 195.084	79 Au Gold 196.966569	80 Hg Mercury 200.59	81 Tl Thallium 204.38	82 Pb Lead 207.2	83 Bi Bismuth 208.9804	84 Po Polonium 209	85 At Astatine 210	86 Rn Radon 222
87 Fr Francium 223	88 Ra Radium 226	89 - 103 Actinide		104 Rf Rutherfordium 261	105 Db Dubnium 262	106 Sg Seaborgium 266	107 Bh Bohrium 264	108 Hs Hassium 277	109 Mt Meitnerium 268	110 Ds Darmstadtium 271	111 Rg Roentgenium 272	112 Cn Copernicium 285	113 Nh Nihonium 286	114 Fl Flerovium 289	115 Mc Moscovium 290	116 Lv Livermorium 293	117 Ts Tennessine 294	118 Og Oganesson 294
57 La Lanthanum 138.90547	58 Ce Cerium 140.12	59 Pr Praseodymium 140.90766	60 Nd Neodymium 144.242	61 Pm Promethium 145	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.92535	66 Dy Dysprosium 162.500	67 Ho Holmium 164.93033	68 Er Erbium 167.259	69 Tm Thulium 168.93402	70 Yb Ytterbium 173.045	71 Lu Lutetium 174.967				
89 Ac Actinium 227	90 Th Thorium 232.0377	91 Pa Protactinium 231.03688	92 U Uranium 238.02891	93 Np Neptunium 237	94 Pu Plutonium 244	95 Am Americium 243	96 Cm Curium 247	97 Bk Berkelium 247	98 Cf Californium 251	99 Es Einsteinium 252	100 Fm Fermium 257	101 Md Mendelevium 258	102 No Nobelium 259	103 Lr Lawrencium 260				

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 evidential load up to a certain level or until the material breaks completely.

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

Europe's Strongest Tensile Test Device

Europe's STRONGEST TENSILE TEST device, designed, manufactured and patented by Berdan Civata, is located in the inventory of Berdan Civata'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.

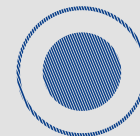
- EN 10288-3
- EN 6157-3
- EN ISO 26157-3
- ISO 6157-2
- EN ISO26157-2

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 Assembled 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 Civata 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

Mobile Hardness Measurement Device

- TS EN ISO6508-1



Coating Thickness Measurement Device

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



Surface Roughness 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.

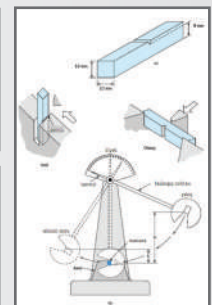
- TS 6956
- EN ISO 4287



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)
- Profile Projection



REFERENCES

IHI

 **GAMA**

 **TEKFEN**



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