CITADEL
Engineering
Company
CEC

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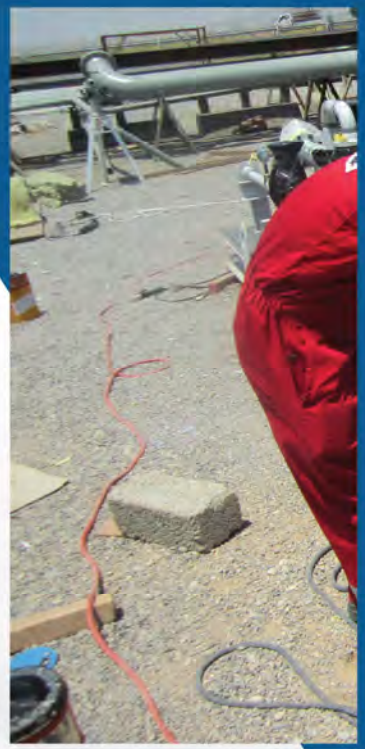
YOU HAVE A BUSY SCHEDULE TO ATTEND TRAINING COURSES?

No Problem, We Have The Solution For You.For those who are busy with their studies or have a busy schedule at work and they don't have enough time to atiend training courses, Citadel is glad and proud to set up a new service in Kurdistan Region and Iraq as well, which is online training course, you can simply go to our website and choose the training course you are interested in to take part in. Our online courses include most of the OSHA Training Courses, Hydrogen Sulfide (H2S) Awareness, Back Safety in the Workplace, Confined Space Awareness Training, Personal Protective Equipment (PPE) Program and 20 more training courses. Check our website now to get more information about each training course, Register your name and pay online and take the training when you are free. With Citadel Academy, you have options where to take the training course; in house training or at citadel academy or outside Iraq, we can arrange that according to your requirements.

OUR VALUED CUSTOMERS

ENGINEERING

- FEASIBILITY STUDIES, FRONT-END ENGINEERING & DESIGN (FEED)
- ENGINEERING, PROCUREMENT, CONSTRUCTION & COMMISSIONING (EPCC)
- CUSTOM PROCESS SYSTEMS
- ENERGY AUDITS & PROCESS OPTIMISATION
- PLANT OPERATIONS
- HAZOP, HAZID, HSEIA, FMEA, COMAH STUDIES AND QRA
- ICSS/ PLC/ DCS/ESD/ F&G/ SCADA/ BMS SYSTEMS
- CONTROL ROOM HOT CUT-OVER
- F&G DETECTION AND SUPPRESSION SYSTEMS
- POWER STUDIES & POWER MANAGEMENT SYSTEM
- LIQUID AND GAS METERING SKIDS
- HIGH INTEGRITY PRESSURE PROTECTION SYSTEM (HIPPS)
- PRODUCED WATER TREATEMENT
- CHEMICAL INJECTION SKIDS
- WELLHEAD CONTROL PANELS
- WATER INJECTION SYSTEMS
- INSTRUMENT CALIBRATION SERVICES



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OUR HISTORY

Citadel Engineering Services was originally incorporated in Erbil, Kurdistan Region in 2015 as Calibration & Inspection company. After initial involvement in several development projects in the early days of oil exploration in the Kurdistan Region, CEC was contracted one of the 1st Calibration and Inspection Bodies in KRG. Established in 2014, CITADEL transformed grain trading in United States, by offering innovative Engineering and inspection services. The Company was registered in United States as United Citadel Engineering Company & in Hong Kong as Citadel Engineering Company. The current structure of our company, consisting of 5 business segments operating across 4 geographical regions, was formed in 2015. We have done this through continual improvement and innovation and through supporting our customers' operations by reducing risk and improving productivity.

CITADEL ENGINEERING HAS A HISTORY OF PROVIDING LEADERSHIP AND INNOVATION IN PERFORMANCE IMPROVEMENT.

OUR TEAM

CEC is led by a dynamic group of individuals with many years of experience in their respective fields. We are organized into lines of business and we operate across different regions. An Experienced Team CEC's Engineering and Training Services stand on a firm foundation of knowledge, experience, and world-class performance improvement methodologies. Our Team's coaching, training, and facilitation skills are enriched by "Real-World" experience in their specialty fields including Project Management, and Calibration.

UNPARALLELED EXPERTISE ACROSS OUR WIDE RANGE OF SOLUTIONS

OUR APPROACH - SUSTAINABLE PERFORMANCE MANAGMENT

Sustainable Performance Management is CITADEL Engineering approach to helping our customers achieve sustainable success across the full value chain of the organization. To enhance overall business performance and reach sustainability, performance excellence initiatives must be effectively planned, deployed, monitored, and periodically reviewed for effectiveness and efficiency. Sustainable Performance Management leverages an interactive set of performance improvement frameworks (e.g., ISO 9001 and related standards), methodologies (e.g., Lean Six Sigma), tools (e.g. Statistical), and behaviors (e.g., teamwork,), providing optimal flexibility to develop the right solution for our customers.

- Focusing on preserving the successful elements of an organization's existing management system, process design, and process improvement initiatives.
- Tools related to process design and process improvement.
- Helping to enhance staff competence at all levels of the organization.

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CALIBRATION DEPARTMENT

When looking for calibration laboratory services, you want one state-of-the-art laboratory that can help youmeet all your business requirements.

That's just what Citadel Calibration Laboratory delivers. Our focus and commitment to excellence have madeus the largest calibration and repair laboratory in the Iraq & Kurdistan Region.
s in peak operating condition.

In-Lab Calibration – The Majority of our customers choose this convenient option. You can either ship your instruments into our lab located North Iraq, Kurdistan or you can choose to drop them off. In either case, we will quickly process your calibrations, and, in most cases, we will ship them back in five business days. Our labs are staffed running multiple shifts, so you can rest assured we will get your instrument back to you quickly and safely. Many of our labs offer local pickup and delivery services.

Onsite Calibration – Another flexible option is to have your instruments calibrated at your facility. This premium service offers you the convenience of having our technicians bring our calibration standards and perform the calibration services onsite. You will work with our onsite coordinators to schedule the work to be performed when it's convenient for you. You receive the same levels of quality service you have come to expect from our In-lab calibrations. While not everything can be calibrated onsite, this service offers maximum flexibility. Ask your sales rep for more information. (Some exclusions and minimum rates apply)

Managed Services, No single provider can provide services on every type of instrument. We can manage all your calibrations through our extensive network of approved vendors. Send your instrument to one of our labs, we will find the suitable vendor that can perform the work you need and manage the entire transaction for you helping you consolidate your suppliers and reduce your costs.

Citadel is Offering UKAS, PJLA, NVLAP, A2LA and ILAC from Our Partner Labs in United States and United Kingdom

In-Process Calibration Services – In addition to our standard instrument calibration services, we also offer in-process calibration services at your facility. Our highly trained technicians can come onsite to calibrate your in-process instruments including transmitters, sensors, switches, recorders, controllers, ovens, chambers and more. Contact us for an individual consultation.

Repair Services – We know that instruments fail or get damaged and replacing them is not always an option. This reason is why we operate our Repair Center out of our calibration lab. We can offer cost effective repairs on many of the instruments we calibrate. Our repairs are generally less expensive and completed faster than the OEM. All repairs come with an accredited calibration so you can be sure your instrument is in peak operating condition.

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INSPECTION DEPARTMENT

Whether you are developing products, projects, or processes, you need trusted independent inspection to ensure that both your legal obligations and the high standards you expect are met at every stage. Our comprehensive range of inspection services helps you to reduce risk, control quality and quantity, and meet all relevant regulatory requirements across different regions and markets

NON-DESTRUCTIVE TESTING (NDT)

Non-Destructive testing from CITADEL – ensures the safe and efficient operation of your equipment and assets by detecting defects before they result in severe damage and assures compliance with international standards. From construction sites, pipelines and refineries to shipyards and power plants, you need to monitor and improve the reliability of your processes and equipment. Our Non-Destructive Testing (NDT) services offer you complete or sample examination of your assets, using well-designed procedures and highly trained and certified NDT inspectors. As a result, we can provide you with complete and valuable data, enabling you to make informed asset management decisions. We offer you the most effective NDT methods to investigate the integrity of your equipment and assets. Our comprehensive range of NDT methods can help you.

RADIOGRAPHIC TESTING

Industrial radiography is used for a variety of applications but is commonly performed using two different sources of radiation, X-Ray and Gamma ray sources. The choice of radiation sources and their strength depends on a variety of factors including size of the component and the material thickness. Within the broad group of X-Ray and Gamma ray sources are a variety of camera choices with varying radiation strengths. CITADEL Engineering Services X-Ray capabilities run the gamut from 4 MEV units utilized to radiograph extremely large and thick castings and forgings, to portable X-Ray cameras used for field weld applications and thin wall material inspection. Gamma sources vary from very low level fluoroscopic units to perform real time corrosion under insulation surveys, to Iridium (Ir192) and Selenium (Se 75) sources used for a variety of weld inspections, to Cobalt (Co 60) inspections for thick component testing.

THERE ARE MANY ADVANTAGES TO RADIOGRAPHY INCLUDING:

inspection of a wide variety of material types with varying density, ability to inspect assembled components, minimum surface preparation required, sensitivity to changes in thickness corrosion, voids, cracks and material density changes, the ability to detect both surface and subsurface defects and the ability to provide a permanent record of the inspection. The disadvantages of radiography are: safety precautions are required for the safe use of radiation, access to both sides of the specimen are required, orientation of the sample is critical, and determining flaw depth is impossible without additional angled exposures.

CITADEL NDT Services supplies a complete line of radiographic services for both shop and field applications. Our staff of qualified, certified, professional radiographers operates within strict safety parameters and produce high quality radiographs that allow us to utilize our interpretation skills honed through many years of experience to determine if an anomaly is actually a defect or can be accepted per code requirements.

Allow the experts at CITADEL Company to prescribe the proper radio graphic technique for your needs.

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ULTRASONIC TESTING

Traditional Ultrasonic inspection uses high frequency sound energy to conduct examinations and perform measurements. Considerable information may be gathered during ultrasonic testing such as the presence of discontinuities, material or coating thickness. The detection and location of discontinuities is enabled by the interpretation of ultrasonic wave reflections generated by a transducer. These waves are introduced into a material and travel in a straight line and at a constant speed until they encounter a surface. The surface interface causes some of the wave energy to be reflected and the rest of it to be transmitted. The amount of reflected vs. transmitted energy is detected and provides information on the size of the reflector, & therefore the discontinuity encountered. Three basic ultrasonic techniques are commonly used:

- PULSE-ECHO AND THROUGH TRANSMISSION
- NORMAL/ANGLE BEAM
- CONTACT AND IMMERSION

PHASED ARRAY INSPECTION SERVICES

Phased array technology generates an ultrasonic beam with the capability of setting beam parameters such as angle, focal distance and focal point size through computercontrolled excitation. Furthermore, this beam can be multiplexed over a large array. These capabilities offer a series of possibilities. For instance, we can now quickly vary the angle of the beam to scan a part without moving the probe and replace multiple transducers with a single element that produces various angle beams electronically. Inspecting a part with a variable angle beam also maximizes detection regardless of the defect orientation, while optimizing signal-to-noise ratio. Phased Array applications include, Angle beam inspection primarily used for weld inspection, Time of Flight Diffraction (TOFD) for detection and sizing of defects and the ability to more readily inspect complex geometries. For weld inspection Phased Array increases the probability of detection by offering the inspector additional tools to visualize the reflectors and their position within the weld. The ability to record the weld scans also allows us to utilize phased array for many projects that are constructed to ASME Code requirements.

TIME OF FLIGHT DIFFRACTION (TOFD) INSPACTION SERVICES

TOFD is utilized for the rapid scanning of welds and the heat affected zones of in-service components to detect their integrity. However, due to the software image utilized in TOFD, we normally recommend using Phased Array technology to image the defects once they have been detected using TOFD.

EDDY CURRENT TESTING

Eddy Current testing uses the principals of electromagnetism as the basis for conducting inspections.When alternating, current is applied to a conductor a magnetic field develops in and around the conductor. When a second conductor is introduced into the magnetic field an induced current flow is created. Eddy currents are a type of induced current. In the case of eddy current inspection, eddy currents are created using a probe. Inside the probe is a length of electrical conductor which is formed into a coil. AC flows in the coil at a chosen frequency and a dynamic expanding and collapsing magnetic field forms around the coil as the ac flows through the coil. When electrically conductive material is placed in the coil's magnetic field, electromagnetic induction occurs, and eddy currents are induced. These eddy currents flowing in the material generate their own "secondary" magnetic field that opposes the coil's primary magnetic field. The strength of the generated currents, known as the standard depth of penetration, vary depending on probe frequency, material conductivity and permeability.

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LIQUID PENETRANT TESTING

Penetrant testing – Based on the properties of capillary action, or the phenomenon of a liquid rising or climbing when confined to a small opening due to surface wetting properties of the liquid, Penetrant testing is used for finding surface breaking discontinuities on relatively smooth, nonporous surfaces.
There are two main types of Penetrant, Fluorescent or Visible. Within each method there are several methods including water washable, postemulsifiable-lipophilic, solvent removal and postemulsifiable-hyperdrophilic. The type and penetrant method are chosen based on sensitivity levels 1-4 and are based on job site conditions and other variables.

MAGNETIC PARTICLE TESTING

Used for finding surface/near surface defects in ferromagnetic material, Magnetic Particle testing (MT) is a versatile inspection method used for field and shop applications. Magnetic particle testing works by magnetizing a ferromagnetic specimen using a magnet or special magnetizing equipment. If the specimen has discontinuity, the magnetic field flowing through the specimen is interrupted and leakage field occurs. Finely milled iron particles coated with a dye pigment are applied to the specimen. These are attracted to leakage fields and cluster to form an indication directly over the discontinuity. The indication is visually detected under proper lighting conditions.

THIRD PARTY INSPECTION

Third-party quality control inspection of fabrication for Welding and NDT, also as well as inspection of bolting and painting of structural steel and piping. CITADEL provides Quality Control (QA/QC) inspectors who are qualified inspectors (e.g., CWI / CSWIP / API & NDT). QA/QC inspectors perform fabrication inspection and verification of the manufacturing process. Inspectors conduct visual inspections of material for conformance with the approved specifications, plans and codes, as well as verification of Certified Material Test Reports (CMTR) for materials used.
Materials and components are observed at key points during the manufacturing process in fabrication facilities. CITADEL AWS or CSWIP certified welding inspectors also witness welder and welding procedure qualification tests as applicable to the scope of the project. Typical duties for in-process fabrication inspection includes- visual observations, monitoring of processes, verifying fit-up and assembly, dimensional accuracy, Hydro Testing, Factory Acceptance Testing and product completion (Including preservation prior to shipping).

- Ensuring Quality of Products.
- Detecting deviations from specification as early as possible in the manufacturing process.
- Monitor compliance with standards, procedures and specifications.
- Provide weekly reporting and ensure Ares of Concern are brought to the client's attention.
- Supplying qualified and competent inspectors, with experience in fabrication

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TANK INSPECTION

When storing or transporting hazardous substances, reducing the risk of leakage is vital. Tank corrosion can cause environmental contamination and losses. As a result, you need to ensure the safety and reliability of your tanks. Our tank inspection services help you to avoid disasters and ensure that your tanks meet all relevant regulations.

Our "Inspection Department" provides comprehensive tank testing programs adhering to API-653 in service and out of service inspections guidelines, and our customized non-intrusive tank inspection program that allows owners to determine the relative condition of their storage tanks without entering the asset.

API-653 inspections are performed using the following inspection techniques:

- In Service and Out of Service Visual Inspection
- Ultrasonic thickness readings
- Ultrasonic Corrosion Surveys of tank shells and roofs
- Magnetic Flux Exclusion (MFE) testing of tank floors
- Ultrasonic Prove up of indications found during MFE testing for volumetric determination
- Tank Strapping
- API 653 calculations Including safe fill height
- Edge Settlement

All our API-653 inspections utilize our electronic reporting system allowing the rapid generation of field tank reports, on site. Most reports are fully complete by the time the crew demobilizes from the job site. CITADEL Services also provides tank project coordinators that are responsible for the oversight of the tank project from the time product has been removed from the tank until the tank has been filled and turned over to operations for continued use. This allows us to ensure the proper cleaning has been performed prior to inspection crew's mobilization therefore ensuring the effective use of all resources during the project.

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PIPELINE INTEGRITY

Pipeline Integrity is regulated by the Department of Transportation and the Office of Pipeline Safety in USA and is defined as the verification of pipeline structural integrity and continued functionality of the corrosion inhibiting equipment installed, along with the analysis of any active corrosion found. CITADEL Services ensures the integrity of transmission and distribution pipeline systems by employing a variety of NDT technique.
Pipeline integrity services from CITADEL: in-trench evaluation of pipeline anomalies, in support of in-line inspection programs performed by pipeline operators.

Our procedures and reporting system enable operators to comply with regulatory audits. Reports for pipeline inspections are generated by technicians from the collected data, and are then given a 100% check by our quality review team prior to being posted to customers. Preliminary reports can be delivered quickly if needed. Our pipeline integrity services include:

Non-Destructive Examination:

- UT Straight beam
- UT Shear wave
- UT FAST (Our proprietary technique)
- Phased Array UT
- TOFD UT
- Automated/Encoded UT
- MT
- RT
- API certified Inspector

Welding Inspection and Welder Qualification:

- CWI Inspection
- State Certified Welder Testing Lab
- AWS Certified Testing Lab

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Soil Condition Testing:

- Pipe to Soil Potential
- Soil Resistivity
- Soil pH
- Sub-foot / Sub-meter GPS

Positive Material Identification

All of our pipeline integrity reporting is performed in the field using electronic reporting formats that enable the downloading of electronic data from our inspection equipment to our field computers. Our report is standardized, concise, efficient and thorough and uses a centralized web server to allow our clients (utilizing a secure web server) to download their reports electronically.

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HSE DEPARTMENT

AIR, DUST, NOISE, ODOR AND VIBRATION

CITADEL offers a range of environmental field sampling and testing services to provide evidence that you are committed to minimizing your environmental impact.
We can help you ensure compliance with all relevant regulations for your industry for dealing with air, dust, noise, odor and vibration emissions. Our services include sampling air, dust and particles, noise monitoring, odor and vibration measurement and electromagnetic field assessment.

ENVIRONMENTAL WASTE MANAGEMENT SERVICES

Treating your industrial waste in a responsible way is good for your business reputation and good for the environment. Call the CITADEL environmental waste management services team for your new waste management plan today.The residual byproducts and dangerous waste resulting from manufacturing and processes need to be recycled, reconditioned or disposed of in a responsible manner that complies with environmental legislation. Our environmental waste management services can help you to recycle, treat and dispose of your waste to ensure you meets your own ethical standards as well as governing regulatory requirements.

HEALTH, SAFETY AND ENVIRONMENT

To minimize workplace health and safety hazards and meet current environmental regulations, you need an integrated and robust and integrated health, safety and environment strategy.
Having worked with a range of major industry sectors, Citadel is the industry leader for health, safety and environment services. We work according to national and international standards and are accredited by recognized standards bodies. Our health, safety and environment services professionals have the expertise to carry out the necessary risk assessments and help you ensure your installations, material, equipment and facilities meet all relevant standards and regulations.

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TRAINING DEPARTMENT

Citadel Engineering Company is a leading edge and one of the top business and educational organizations in the Iraq, with diversified activities such as NDT Services, Advance NDT services, Welding Inspection, NDT Level III Consultancy, Pre-and Post-Shipment Inspections as well as a wide variety of Training and Certification Programs.

Authorized Agent in Middle East

CITADEL is Authorized Examination Center of American Society for Nondestructive Testing (ASNT), Agent of American Welding Society (AWS), offers American Petroleum Institute (API) Training and Certification Programs and Painting/Coating Training and Certification Programs. Whether you are looking to gain a better general understanding about a specific management system standard or wish to learn how to audit an organization against the requirements of a standard, Citadel Academy can help you.

CITADEL Academy provides a full comprehensive training program to suit the individual needs and requirements of each business.

CITADEL ACADEMY
YOU DESERVE THE KNOWLEDGE

Training can be conducted in-house or at our many conference centers in the Middle East, Europe or USA and Canada and other overseas locations.Utilizing your Certification Company's training resources has many advantages; it knows your company and the problems you have. Training Courses will be conducted as below subjects:

- -Business & Management
- -Health and Social Care / Work
- -Finance
- -Human Resources
- -CAD
- -Coaching
- -Communication Skills
- -Communications & Media
- -Construction
- -Design
- -Energy
- -Engineering / Industry
- -Finance
- -Health & Safety
- -Hospitality & Tourism
- -Human Resources
- -Information Management
- -Insurance
- -IT Design/ Multimedia
- -IT Pro (3039)
- - IT User (632)
- - Languages
- - Law & Legal
- - Marketing
- - Mini MBA
- - Negotiation
- - Office Management
- - Information Management
- - Insurance
- - IT Design/ Multimedia
- - Oil & Gas
- - Personal Development
- - Pharmaceutical
- - Project Management
- - Quality Assurance
- - Real Estate
- - Sales
- - Science & Research
- - Security
- - Supply Chain Management

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CALIBRATION SERVICES

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Pressure Safety and Relief Valve Calibration Facility - The accuracy and reliability of the instruments and devices designed to monitor, control and supervise your industrial processes is vital. Our valve and instrumentation calibration and maintenance service assures the accuracy of your instruments and consistent process control.

Flow Meter Calibration - A flowmeter measures the rate that fluid or gas moves through it. Test and measurement professionals use them in a wide variety of applications where accurate flow measurements are critical, including (but not limited to) HVAC, energy and utilities, water management, aerospace, agriculture and the pharmaceutical industry. In applications like these, it's important to calibrate the flowmeters that make the measurements. Regular calibrations assure you that the flowmeter's measurements are as accurate as their specifications say they are.

Dosimeter and Survey Meter Calibration - Citadel Partner Lab in the US. Calibration Tests for Direct-Reading Dosimeters. We are continually working on being able to calibrate and test other models of Electronic Dosimeters and Survey Meters.

- NIST Traceability
- North Dakota Radioactive Material License Number 33-16216-01
- CS-137 Sources used for testing
- Normally check to +/- 10% of delivered dose for Dosimeters and +/- 20% for Survey Meters

TEMPERATURE DIVISION

From handheld thermometers, RTDs and thermocouples to benchtop dry block calibrators and temperature baths, Citadel's ISO 17025 accredited temperature calibration services accommodate a wide range of instruments in order to meet the crucial precision temperature measurement requirements of our customers. Our metrology labs offer secondary/industrial level thermometer calibration, thermocouple calibration, and temperature transmitter calibration. We also offer reference-level SPRT probe and primary standard temperature calibrations by comparison to Indium, Tin, Zinc, and Aluminum fixed point reference cells. Citadel's temperature calibrations are ISO 9001-compliant, with true SI Unit traceability through NIST, equivalent sources, or physical constants.

CITADEL Calibration Lab offers temperature calibration services in our 17025 accredited calibration laboratory across Iraq, including resistance thermometry measurements (PRT probe calibrations). We also offer the convenience of high quality on-site calibration services at your location, calibrated to OEM or custom specifications. Whether you have one thermometer, or a series of high-accuracy temperature baths, you can be certain that Citadel's team of quality and metrology experts will provide industry-leading calibration services.

THERMOMETER CALIBRATION - INFRARED AND HANDHELD

Infrared thermometer calibration of instruments such as the Fluke VT04, VT04, and 62 series and Extech IR Thermometers

Liquid in Glass and Digital/Handheld Thermometers of all types ranges

Field/On-Site Measurements Available From -195° C To 600° C

RTD CALIBRATION

RTD probes such as the Fluke Calibration 5600 series, and all models and ranges from brands like Thermo Probe, Isotech, and Ametek / Jofra , Resistance Thermometry devices (RTDs) calibrated by SPRT (Hart 5699) fixed point or comparison up to 660° C

THERMOCOUPLE CALIBRATION

Electrical calibration of thermocouple devices including Types J, K, T, E, R, S, N, and B thermocouples from -270° C to 1,820° C On-Site/Field Temperature Indicator Calibrations Available

DRY BLOCK, TEMPERATURE OVEN, BATH, AND FURNACE CALIBRATION

Dry well / dry block calibration such as the Fluke 9000 & 9100 series & the Ametek/Jofra RTC, CTC, & ITC

series Ice Baths and Liquid calibration baths including models from Fluke Calibration, Techne, and GE/Druck Thermocouple calibration ovens / furnaces such as the Fluke Calibration 9100 series

COMMON TEMPERATURE INSTRUMENT BRANDS	COMMON TEMPERATURE INSTRUMENTS
AccuMac, Altek	Liquid-in-Glass , Infrared Thermometers , Thermocouples
Ametek, Ashcroft	Temperature Indicators and Dry Block Calibrators
Cooper-Atkins, Druck, Extech	Furnaces
Fluke, Fluke Calibration	Temperature Calibrators
FLIR, Hart Scientific	Surface, Thermistor, and RTD Probes
Isotech, Techne	RTD Simulators
Tegam, Transmation, Yokogawa	Hot Plates

WEIGHT CALIBRATION SERVICE CAPABILITY

Citadel's mass standard calibration laboratories are climate controlled, with temperature maintained at 20°C and humidity between 20% and 60%. The labs are fully enclosed with the internal air supplied by a dedicated, circulatory HVAC system to reduce any airborne material and maintain the labs stringent environmental controls. We ensure all weights are provided an adequate temperature stabilization period which allows them to acclimate to the lab.

Our mass calibration labs are equipped with marble tables for the lab comparators, thus reducing vibrations to nonexistent levels. Citadel Calibration Lab (CCL) utilizes certified test weights to perform modified single and double substitution Echelon II and III calibration verifications. With traceability to SI units through NIST, and ISO-9001-compliant calibrations, Citadel's accredited mass calibration capabilities exceed the most stringent quality requirements. Our quick turnaround time and our competitive pricing will beat most OEMs.

WE CALIBRATE WEIGHT SETS FROM LEADING MANUFACTURERS

TORQUE DIVISION

Our customers depend on us to accurately and quickly source, calibrate and repair their torque tools. With nationwide lab coverage and the widest ISO accredited range of torque services, our torque calibration and torque standard calibration services cater to both high-torque applications and those with very exacting low-torque requirements. Citadel Calibration Lab (CCL) also offers a wide range of torque wrenches, torque multipliers, torque screwdrivers and other torque tools, from both traditional and dependable to the most precise and longlasting torque tools today.

GAS DETECTOR CALIBRATION

Gas monitors need to be calibrated regularly. At CCL Safety, we carry calibration and bump test docking stations from BW Honeywell, Detcon and RAE Systems monitors as well as calibration gas and sensors. However, if you do not want to invest in the equipment necessary to calibrate the monitors yourself, we offer calibration services. We also can take care of your custom alarm point setting needs. We know repair time is down time for your gas monitors, so we get them repaired and returned to you quickly. To do this, we carry a long list of parts and calibration supplies including pumps, gas, regulators, electronics and replacement sensors, as well as bump test and auto-calibration stations for many major brands.

CALIBRATION OF TOTAL STATION

Being a fully accredited authorized service and distribution partner of Leica Geosystems means that we can offer full instrument calibration, as well as servicing and repairs on a wide range of surveying equipment. Our service technicians are manufacturer factory trained to the very highest standards and undertake regular, and ongoing, professional training so that you can be confident on the quality of service we provide. Understanding the rigors of the construction site and potential implications of using inaccurate instrumentation, we would be happy to talk you through the benefits of regular scheduled maintenance for your equipment. CITADEL CALIBRATION LAB is leading provider of precision measuring instruments. The company is promoted by pioneers in the field of Surveying instruments, Laser instruments, GIS GPS equipment's and other high precision systems. Company Name' diverse product line provides complete measurement solutions for surveying, mapping and GIS, industrial measurement and construction applications. Our Services have been used to complete major projects.

METER SYSTEM SUPPORT:

Liquid Measurement Services
Meter Calibration and Repairs
Certified Hose Testing, Certified Process Pipe Testing
Fuel Meter Sales, Fuel Meter Repairs, New and Reconditioned

FIELD SAMPLING SERVICES:

Hydrocarbons Field Sampling
Floating Piston Cylinder Inspection and Repair

METER CALIBRATIONS

Citadel Calibration Lab (CCL)' Measurement Services team provides dependable liquid and gas meter services ranging from new installations, scheduled maintenance, calibration, repairs and part sales to analysis and allocation services.

OUR METER PROVING SERVICES INCLUDE:

METER SERVICES:

Electronic and Mechanical Meters
Orifice Flow Meters
Liquid Turbine Flow Meters
Liquid Positive Displacement Flow Meters
Gas Sampling
Liquid Sampling
LACT Unit Proving and Repairs

PROVING / REPAIR / SUPPLIES FACILITY:

Liquid Turbine Flow Meters
Liquid Positive Displacement Flow Meters
Totalizer Repair
Composite Cylinder Repair
Mechanical Meter Repair
Measurement Supplies

DATA PROCESSING:

Chart Integration
Flow Computer Data Collection
Flow Data Editing and Validation
System or Field Balancing
Allocations

CITADEL
Engineering
Company
CEC

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LIQUID FLOW METER PROVING AND LACT UNITS

Meter proving is the physical testing of the performance of a liquid meter in a liquid service. The main purpose of the test is to assure accuracy. The basic principles of proving a liquid meter are the same whether it is a Coriolis Meter, Turbine Meter, or A Positive Displacement Meter. Each type of meter has its own characteristics when being proved, but the basic principles are the same:

When proving a meter, the process-fluid conditions must be as stable as possible throughout the proving process. This includes: Temperature / Flow / Rate / Pressure / Density

LACT units are designed for unattended custody transfer of crude oil from a seller to a buyer. The LACT design is determined by:

Flow rate
Operating pressure
Gravity
Temperature of the oil

Minimum pressure drop through the piping and components is desirable. LACT units have traditionally been fitted with positive-displacement meters, but a turbine meter can be used with certain types of fluid. New units being built today utilize Coriolis meters because they have no moving parts and can offer a lower cost.

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INSPECTION DEPARTMENT

Whether you are developing products, projects, or processes, you need trusted independent inspection to ensure that both your legal obligations and the high standards you expect are met at every stage. Our comprehensive range of inspection services helps you to reduce risk, control quality and quantity, and meet all relevant regulatory requirements across different regions and markets.

NON-DESTRUCTIVE TESTING SERVICES

Non-Destructive testing from CITADEL – ensures the safe and efficient operation of your equipment and assets by detecting defects before they result in severe damage, and assures compliance with international standards.From construction sites, pipelines and refineries to shipyards and power plants, you need to monitor and improve the reliability of your processes and equipment. Our Non-Destructive Testing (NDT) services offer you complete or sample examination of your assets, using well-designed procedures and highly trained and certified NDT inspectors. As a result, we can provide you with complete and valuable data, enabling you to make informed asset management decisions. We offer you the most effective NDT methods to investigate the integrity of your equipment and assets. Our comprehensive range of NDT methods can help you.

CITADEL CAN PROVIDE AND PERFORM BELOW NDT SERVICES

Visual Testing (VT) / Magnetic Particle Testing (MPI) / Liquid Penetrant Testing (PT) / Ultrasonic Testing (UT) / Phase Array Ultrasonic Testing (PAUT) / Radiography Testing (RT) / Time of Flight Different Inspection (TOFD)

VISUAL TESTING (VT)

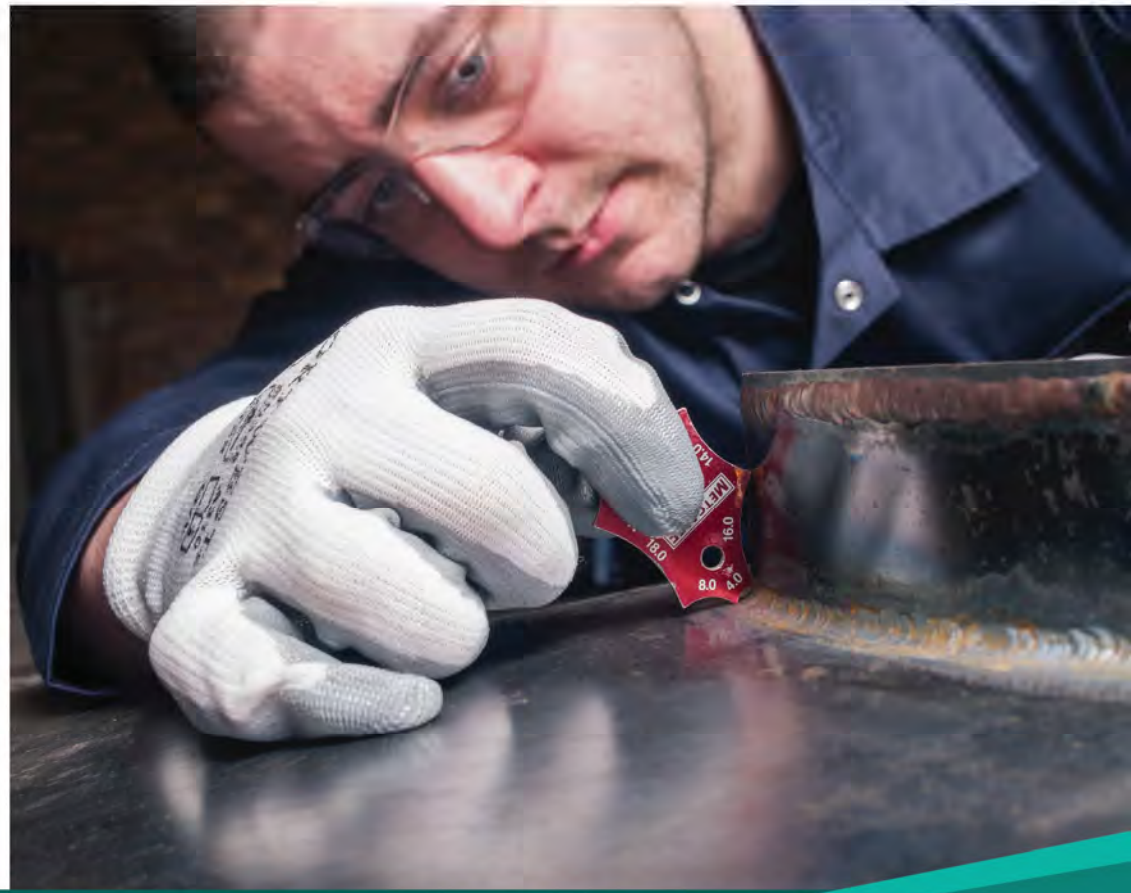
Visual Inspection, also known as Visual Testing (VT), is the oldest, most versatile, and most commonly used non-destructive test (NDT) method. Used alone or in conjunction with other test methods, qualified visual inspection is a reliable and highly cost-effective tool for quality control.
Direct visual inspection applies proper lighting, measurement, and comparative tools with the experience of our qualified technicians to determine design compliance and conformance to drawings, codes and specification requirements.

SOME OF THE ATTRIBUTES WE LOOK FOR INCLUDE:

Cracks / Corrosion / Surface flaws / Banding / Surface discontinuities / Material consistency

MAGNETIC PARTICLE TESTING (MPI)

Is a non-destructive testing (NDT) process for detecting surface and shallow subsurface discontinuities in ferromagnetic materials such as iron, nickel, cobalt, and some of their alloys. The process puts a magnetic field into the part. The piece can be magnetized by direct or indirect magnetization. Direct magnetization occurs when the electric current is passed through the test object and a magnetic field is formed in the material. Indirect magnetization occurs when no electric current is passed through the test object, but a magnetic field is applied from an outside source. The magnetic lines of force are perpendicular to the direction of the electric current, which may be either alternating current (AC) or some form of direct current (DC) (rectified AC).



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LIQUID PENETRANT TESTING (PT)

Penetrant testing – Based on the properties of capillary action, or the phenomenon of a liquid rising or climbing when confined to a small opening due to surface wetting properties of the liquid, Penetrant testing is used for finding surface breaking discontinuities on relatively smooth, nonporous surfaces. There are two main types of Penetrant, Fluorescent or Visible. Within each method there are several methods including water washable, post-emulsifiable-lipophilic, solvent removal and postemulsifiable-hyperdrophilic. The type and penetrant method are chosen based on sensitivity levels 1-4 and are based on job site conditions and other variables.

PHASE ARRAY ULTRASONIC TESTING (PAUT)

Phased array technology generates an ultrasonic beam with the capability of setting beam parameters such as angle, focal distance and focal point size through computer-controlled excitation. Furthermore, this beam can be multiplexed over a large array. These capabilities offer a series of possibilities. For instance, we can now quickly vary the angle of the beam to scan a part without moving the probe and replace multiple transducers with a single element that produces various angle beams electronically. nspecting a part with a variable angle beam also maximizes detection regardless of the defect orientation, while optimizing signal-to-noise ratio. Phased Array applications include, Angle beam inspection primarily used for weld inspection, Time of Flight Diffraction (TOFD) for detection and sizing of defects and the ability to more readily inspect complex geometries. For weld inspection Phased Array increases the probability of detection by offering the inspector additional tools to visualize the reflectors and their position within the weld. The ability to record the weld scans also allows us to utilize phased array for many projects that are constructed to ASME Code requirements.

ULTRASONIC TESTING (UT)

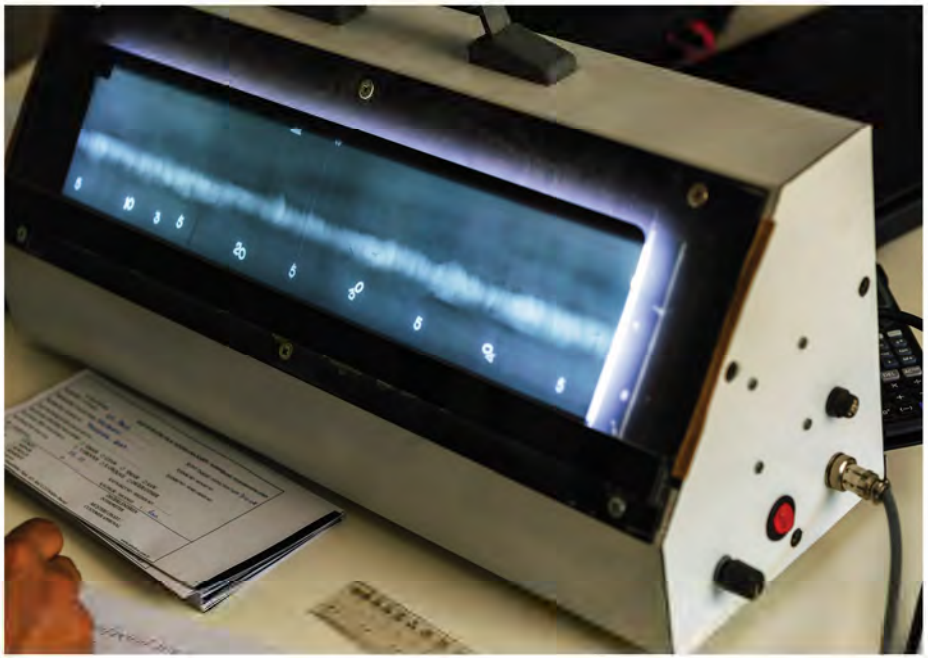
Traditional Ultrasonic inspection uses high frequency sound energy to conduct examinations and perform measurements. Considerable information may be gathered during ultrasonic testing such as the presence of discontinuities, material or coating thickness. The detection and location of discontinuities is enabled by the interpretation of ultrasonic wave reflections generated by a transducer. These waves are introduced into a material and travel in a straight line and at a constant speed until they encounter a surface. The surface interfaces cause some of the wave energy to be reflected and the rest of it to be transmitted. The amount of reflected vs. transmitted energy is detected and provides information on the size of the reflector, & therefore the discontinuity encountered.

Three basic ultrasonic techniques are commonly used:

- Pulse-echo and through transmission
- Normal/Angle Beam
- Contact and Immersion

RADIOGRAPHY TESTING (RT)

Industrial radiography is used for a variety of applications but is commonly performed using two different sources of radiation, X-Ray and Gamma ray sources. The choice of radiation sources and their strength depends on a variety of factors including size of the component and the material thickness. Within the broad group of X-Ray and Gamma ray sources are a variety of camera choices with varying radiation strengths. CITADEL Engineering Services X-Ray capabilities run the gamut from 4 MEV units utilized to radiograph extremely large and thick castings and forgings, to portable X-Ray cameras used for field weld applications and thin wall material inspection. Gamma sources vary from very low-level fluoroscopic units to perform real time corrosion under insulation surveys, to Iridium (Ir192) and Selenium (Se 75) sources used for a variety of weld inspections, to Cobalt (Co 60) inspections for thick component testing.



There are many advantages to radiography including: inspection of a wide variety of material types with varying density, ability to inspect assembled components, minimum surface preparation required, sensitivity to changes in thickness corrosion, voids, cracks and material density changes, the ability to detect both surface and subsurface defects and the ability to provide a permanent record of the inspection. The disadvantages of radiography are: safety precautions are required for the safe use of radiation, access to both sides of the specimen are required, orientation of the sample is critical, and determining flaw depth is impossible without additional angled exposures.

CITADEL NDT Services supplies a complete line of radiographic services for both shop and field applications. Our staff of qualified, certified, professional radiographers operates within strict safety parameters and produce high quality radiographs that allow us to utilize our interpretation skills honed through many years of experience to determine if an anomaly is actually a defect or can be accepted per code requirements. Allow the experts at CITADEL Company to prescribe the proper radio graphic technique for your needs.

TIME OF FLIGHT DIFFERENT INSPECTION (TOFD)

TOFD is utilized for the rapid scanning of welds and the heat affected zones of in-service components to detect their integrity. However, due to the software image utilized in TOFD, we normally recommend using Phased Array technology to image the defects once they have been detected using TOFD.

EDDY CURRENT TESTING

Eddy Current testing uses the principals of electromagnetism as the basis for conducting inspections. When alternating, current is applied to a conductor a magnetic field develops in and around the conductor. When a second conductor is introduced into the magnetic field an induced current flow is created. Eddy currents are a type of induced current. In the case of eddy current inspection, eddy currents are created using a probe. Inside the probe is a length of electrical conductor which is formed into a coil. AC flows in the coil at a chosen frequency and a dynamic expanding and collapsing magnetic field forms around the coil as the ac flows through the coil. When electrically conductive material is placed in the coil's magnetic field, electromagnetic induction occurs, and eddy currents are induced. These eddy currents flowing in the material generate their own "secondary" magnetic field that opposes the coil's primary magnetic field.

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LIFTING INSPECTION SERVICES

Crane, hoisting and lifting equipment inspection from CITADEL – ensure the safety and reliability of your equipment and compliance with statutory requirements. Whether you own or operate cranes, lifting or hoisting equipment, you need to ensure that they are safe, and in compliance with statutory requirements. That is where our crane, hoisting and lifting equipment inspection can help. The objective of this service is to independently assure the safe and proper working capability and condition of each individual Crane or Lifting and Hoisting Equipment. CITADEL Inspectors know and understand the legal conditions and regulatory requirements throughout the world. We know exactly how and when lifting and hoisting equipment must be assessed, tested or inspected. Our expertise, experience and modern facilities enable us to trance any defects in a timely manner

AT CITADEL ENGINEERING, WE ARE INSPECTING MOST OF THE LIFTING EQUIPMENT AND VEHICLES AS BELOW:

- Mobile
- Side-boom
- Forklift
- Grader
- Boldozer
- Wheel Loader
- Well Head Cage
- Excavator
- Lorry Truck
- Wire Rope
- Slings
- Shackles
- Chain Blocks
- Lifting Gear
- Lever Hoist
- Chain Sling
- Clamps
- Beams
- Man basket

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OTHER INSPECTION SERVICES

RIG INSPECTION SERVICE

Citadel is an Independent Company provides Rig Inspection Services for Rig Equipment, Rig Controls, Software & Cyber security, BOP & Well Control + ROV's, HSE & Dropped Object Audits and Rig Intake Management Third Party Rig Inspections or Pre-Drill/Hire Inspections will be conducted prior to hiring a rig to

ENSURE MEETS THE FOLLOWING REQUIREMENTS:

- It is in an acceptable operational condition
- It meets a client's required specifications
- It is suitable to start drilling operations

In order to ensure optimum performance of your rig, Reduce Downtime and Maintain Safety of yourPersonnel, Planned Maintenance and Accurate Inspections are essential.

THE SURVEY WILL COVER THE FOLLOWING AREAS (DEPENDING ON THE RIG TYPE):

- Drilling Equipment
- Rig Floor and Derrick
- Well Testing Equipment
- Mud System
- Marine Equipment
- Bulk System
- Power Plant
- Electrical Equipment
- Safety Equipment
- Maintenance System
- Spare Parts
- BOP and Well Control Equipment

IRIS INSPECTION

INTERNAL ROTARY INSPECTION (IRIS) SYSTEM (IRIS) is an Ultrasonic Method for the nondestructive testing of pipes and tubes. The IRIS probe is inserted into a tube that is flooded with water, and the probe is pulled out slowly as the data is displayed and recorded. The Ultrasonic beam allows detection of metal loss from the inside and outside of the tube wall. The IRIS probe consists of a Rotating Mirror that directs the Ultrasonic Beam into the Tube Wall. The mirror is driven by a small turbine that is rotated by the pressure of water being pumped into. As the probe is pulled the spinning motion of the mirror results in a helical scan path.

FEATURES

- Field-proven and commonly used in boilers, heat exchangers, and fin-fan tubes.

- Often used as a back-up to electromagnetic examination of tubes, to verify calibration and accuracy. Especially useful as a follow-up to remote field testing due to the full sensitivity near tube support structures provided by IRIS.

- The IRIS probe must be moved very slowly (approximately 1 inch per second, or 2.5 cm/s), but it produces very accurate results (wall thickness measurements typically accurate to within 0.005 inch, or 0.13 mm).

CITADEL PROVIDED IRIS INSPECTION TO SEVERAL COMPANIES INCLUDING:

HKN ENERGY LTD. · OILSERV · DNO · qaiwan group

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TANK INSPECTION

When storing or transporting hazardous substances, reducing the risk of leakage is vital. Tank corrosion can cause environmental contamination and losses. As a result, you need to ensure the safety and reliability of your tanks. Our tank inspection services help you to avoid disasters and ensure that your tanks meet all relevant regulations. Our "Inspection Department" provides comprehensive tank testing programs adhering to API-653 in service and out of service inspections guidelines, and our customized non-intrusive tank inspection program that allows owners to determine the relative condition of their storage tanks without entering the asset.

API-653 INSPECTIONS ARE PERFORMED USING THE FOLLOWING INSPECTION TECHNIQUES:

- In Service and Out of Service Visual Inspection
- Ultrasonic thickness readings
- Ultrasonic Corrosion Surveys of tank shells and roofs
- Magnetic Flux Exclusion (MFE) testing of tank floors
- Ultrasonic Prove up of indications found during MFE testing for volumetric determination
- Tank Strapping
- API 653 calculations Including safe fill height
- Edge Settlement

All our API-653 inspections utilize our electronic reporting system allowing the rapid generation of field tank reports, on site. Most reports are fully complete by the time the crew demobilizes from the job sites. CITADEL Services also provides tank project coordinators that are responsible for the oversight of the tank project from the time product has been removed from the tank until the tank has been filled and turned over to operations for continued use. This allows us to ensure the proper cleaning has been performed prior to inspection crew's mobilization therefore ensuring the effective use of all resources during the project.