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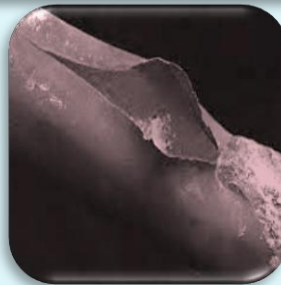
## BOILER RLA



Boiler assessment is not a case of waiting for failures to happen, TCR Arabia can help identify key areas and develop inspection programs. A pragmatic approach is adopted in handling the cases of remaining life assessment. Efforts are put in to collect as much data as possible on the component / equipment history. Often brain storming sessions are conducted with the concerned people using the boiler. The outside experts who are familiar with the operational details. To collect opinions and ideas, which are evaluated vis-à-vis the testing and studies conducted at a latter stage.

Item	Level I	Level II	Level III
Feature	Least detail	More detail	Most detail
Failure history	Plant records	Plant records	Plant records
Dimensions	Design or nominal	Measured or nominal	Measured
Condition	Records or nominal	Inspection	Detailed inspection
Temperature and pressure	Design operational	Operational or measured	Measured
Stresses	Design or operational	Simple calculation	Refined analysis
Material properties	Minimum	Minimum	Actual material
Material samples required?	No	No	Yes

### Plant Life Assessment



The above damages are amongst a vast array witnessed every day in plants around the world and occur due to various environmental, thermal and mechanical factors.

A common approach to dealing with failures and component damage is to immediately repair or replace the part, and in the case of a forced outage hope it makes it to the next planned outage. This may be sufficient for non-critical parts with relatively low value (both in terms of operational impact and replacement cost) but for critical components it may not be enough to apply a 'plaster' and hope the problem goes away.

There are many options for a plant to effectively manage asset degradation, and in some instances (with proper analysis) a part may even be suitable for operation until the next outage without repair / replacement despite its visual appearance or NDT results.

Using the right assessment and analytical tools is a major key to long term profitability, efficiency and reduced operational risk through effective plant life assessment. The question is *which assessments and which tools?*, and *how can you justify the expense of conducting them?* In this issue of Technology Newsletter we provide some key questions to discuss above topic in detail.

### Plant Asset Management- *the Key Questions*

#### 1. Can the component continue to be in service?

Once a component has been in service for a while and / or shows signs of degradation, the first question that arises is its fitness for further service under the current & past operating conditions - This is generally referred to as the **Fitness For Service (FFS)** approach.

If the component is found to be fit for service, then the next question of interest will be for how long? The answer can be well below the design life, particularly:

- ✓ If new environmental parameters were introduced
- ✓ If the loading conditions have been changed,
- ✓ If defects were introduced during the manufacturing/ welding.

Hence one needs to perform **Remaining Life Assessment (RLA)** taking into account all these changes. Note that we can never accurately predict the moment of failure so we must be conservative and predict a point where the probability of survival becomes unacceptably low.

#### 2. For how long?

#### 3. Can this capability be improved?

If the remaining life predicted is found low, can it be improved/ increased to the desired service life through **Life Extension, Performance & Optimization** e.g.

1. Repair or modification of the component
2. Possible changes of the environment to reduce corrosion etc.
3. Modify the operating conditions.

What are the consequences in terms of Safety and economical issues and what is the risk related to this failure – is it going to result in a leak or is it going to fail catastrophically – even if it is a leak, is it going to impact on plant safety. These are issues of **Safety, Risk and Reliability Management**.

Once the risk is quantified then decision has to be made by balancing the risk of continuing the operation with the defective component against the loss of the production related to the associated unplanned shutdown.

#### 4. What happens if it fails ?

#### 5. Why did it fail?

And finally if the component fails, we would like to establish exactly the root causes of this failure so that it can be avoided in future, through **Root Cause Analysis (RCA)**, e.g. by:

1. Putting the right maintenance/inspection procedures in place
2. Adopting the appropriate start-up/shutdown procedures
3. Changing the component design when the failure for e.g. occurs at a stress concentration location
4. Adopting the right water chemistry treatment, etc.

### Microstructure of the Month

MOC: SS 304L  
Magnification: 325X  
Etchant: 10% Oxalic Acid

#### Observation:

Microstructure shows austenite grains with presence of heavy strain lines in the direction of rolling/forming. No carbide precipitation is seen.



#### Useful Hits:

Normally for "300 series" austenite stainless steel microstructure is observed for carbide precipitation. If carbide precipitation is not observed then the material is considered acceptable under micro structure test. Presence of strain lines indicates the effect of mechanical working and higher internal stresses in the stainless steel. This internal stresses will help in promoting pitting and stress corrosion cracking, under corrosive condition. We from TCR always point out this aspect whenever we check microstructure for austenitic stainless steel, and if the application for SS is know we do not accept microstructure for stainless steel with such strain lines. Such efforts are appreciated by our end users.

Certifications:

ISO 9001-2015 Certificate

intertek  
Total Quality. Assured.

# CERTIFICATE OF REGISTRATION

This is to certify that the management system of:

## TCR Arabia Company Ltd.

Main Site: King Abdul Aziz Seaport Facility, P.O. Box8143, Dammam  
32211, Kingdom of Saudi Arabia

has been registered by Intertek as conforming to the requirements of:

## ISO 9001:2015

The management system is applicable to:

Conventional Non-Destructive Testing Services (NDT), Advanced Non-Destructive Testing Services (ANDT), Metallurgical Services, Mechanical Laboratory Testing Services, Welding Inspection Service, Post Weld Heat Treatment (PWHT) and Microbiology Testing Services, Civil Laboratory Testing Services

Certificate Number:

21111010003

Initial Certification Date:

25 March 2014

Date of Certification Decision:

10 March 2020

Issuing Date:

10 March 2020

Valid Until:

24 March 2023



Intertek



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Calin Moldovean

President, Business Assurance

Intertek Certification Limited, 10A Victory  
Park, Victory Road, Derby DE24 8ZF, United  
Kingdom

Intertek Certification Limited is a  
UKAS accredited body under  
schedule of accreditation no. 014.



### Certifications:

## Mechanical Testing Lab of TCR Arabia is now ISO-17025 Accredited



## CERTIFICATE OF ACCREDITATION

*This is to attest that*

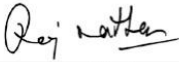
**TCR ARABIA COMPANY LTD**  
KING ABDUL AZIZ SEAPORT FACILITY  
DAMMAM 32224, KINGDOM OF SAUDI ARABIA

**Testing Laboratory TL-783**

has met the requirements of AC89, *IAS Accreditation Criteria for Testing Laboratories*, and has demonstrated compliance with ISO/IEC Standard 17025:2017, *General requirements for the competence of testing and calibration laboratories*. This organization is accredited to provide the services specified in the scope of accreditation.

Effective Date May 11, 2020



  
\_\_\_\_\_  
**President**

Visit [www.iasonline.org](http://www.iasonline.org) for current accreditation information.



### Approvals:

TCR Arabia is now an approved contractor in SABIC for providing high-end inspection services like HTHA/FFS, Metallurgy Solutions and Root Cause Analysis.

Classification: Internal Use



Tuesday, August 20, 2019

Subject: APPROVED CONTRACTOR CONFIRMATION

Dear Mr. Darwin,

This is to confirm that "TCR Arabia Ltd. KSA" is an approved third party and part of "Approved Contractor List" (ACL) of SAUDI BASIC INDUSTRIES CORPORATION (SABIC) to conduct business as a third party inspection & testing contractor for onshore/ offshore services for SABIC site & Mega projects. The onshore/offshore services are:

- Conventional NDT techniques (RT,UT, PT, MPT, VT & PMI)
- Advanced NDT techniques (ToFD, PAUT, MFL & tube inspection).
- Material testing (destructive)
- Welder qualification
- HTHA/FFS services
- Metallurgy solutions
- Root Cause Analysis

However, this certificate has been issued upon the request of above named contractor for whatever purpose it may serve him without any liability on the part of SABIC.

Best Regards,

*Gehad Al-Otaibi*  
for 

Gehad Al-Otaibi  
Senior Manager  
Global Suppliers relationship Management



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Shared Services  
Global Procurement Services  
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Jubail Freezone - Il City 31961  
Kingdom of Saudi Arabia  
T: 966 13 350 6600  
F: +966 13 350 6333  
[www.sabic.com](http://www.sabic.com)

Saudi Basic Industries Corporation  
Saudi Joint Stock Corporation  
Authorized capital: SAR 30 billion  
CR: 1010010813

الشركة السعودية للصناعات الأساسية  
شركة مساهمة سعودية  
رأس المال المصرح به 30 بليون ريال  
رقم التسجيل 1010010813

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[www.sabic.com](http://www.sabic.com)



ASNT Partner



ISO 9001-2015 Certified



ISO 17025 Accredited

### ARAMCO Appreciation Letters:





### SINOPEC Appreciation Letters:



## فرع شركة سينوبك انترناشيونال بترولسيوم سيرفيس كورپوريشن Branch of Sinopec International Petroleum Service Corporation

S.No. A 25183

TCR Arabia Company Limited,  
Dammam,  
KSA

20<sup>th</sup> March, 2022

### Letter of Appreciation

SINOPEC would like to appreciate the efforts of TCR Arabia in supporting our emergency welder qualifications requirement by meeting our stringent deadlines with utmost care and professional ability. We would like to express our appreciation to the strong technical team of TCR Arabia for the services rendered to SINOPEC.

We are delighted to find a technically sound, professionally able and a reliable partner to support in our inspection and testing needs.

Wishing TCR Arabia great success in the years ahead.

Best Wishes,



**Zhao Gangchen**

Project Director  
Branch of SINOPEC International  
Petroleum Services Corporation

\* مسج جيوفيزيالي • حفر • الانشآت • تاجر معدات ثقيلة • Geophysical Exploration • Drilling • Construction • Heavy Equipment Lease  
س.ت. ٢٠٥١٠٢٩٨٩٢، رأس مال ١٠٢٠٠٠٠٠٠٠٠٠٠٠ ريال سعودي - ص.ب ٣٣١٥٩ الخير ٣١٩٥٢ - المملكة العربية السعودية - تلفون: +٩٦٦ ١٣ ٨٥٧٥٨٠١ - فاكس: +٩٦٦ ١٣ ٨٥٧٥٨٠٢  
C.R. 2051029892, Capital SR. 102,000,000 - P.O.Box 32159, Al-Khobar 31952, Kingdom of Saudi Arabia - Tel.: +966 13 8575801 - Fax: +966 13 8575803

# CORROSION TESTING LABORATORY

## SAUDI ARAMCO APPROVED

### ISO 17025 Accredited



Approved by Saudi Aramco for:

- ✓ Mechanical Tests  
(Tensile, Bending, Hardness, V-Charpy Impact)
- ✓ Macrographic and Metallographic
- ✓ Chemical Analysis (PMI and OES)
- ✓ Corrosion Tests (ASTM A923, A262, G28 and G48)
- ✓ Failure Analysis
- ✓ Replica

### Services Portfolio



#### TESTING

##### Material Testing

###### Mechanical

Tensile, Impact, Hardness, Bend, Elongation, Yield

###### Corrosion

ASTM A923, A262, G28, G48

##### Welder Qualification

WPS, PQR, WQT, Welder Certification

##### Civil Laboratory

Construction Material Testing, Concrete, Soil, Aggregates & Field Tests

##### Metallurgy Testing

In-situ Metallography,

Failure Investigation

Remaining Life Assessment

Fitness for Service



#### INSPECTION

##### Non-Destructive Testing (NDT)

###### Conventional NDT

RT, MT, PT, UT, UTT, FM, PMI, HT

###### Advanced NDT

ToFD, PAUT, Corrosion Mapping  
Helium Leak, Thermography, MFL  
ECT, RFT, IRIS, HTHA, High Temp UT

##### Robotic Inspection Services

Submersible Inspections

Inspection of buried & above ground assets

##### Non-Metallic Testing Lab.

FRP/GRP/Composite Lab Testing



#### CONSULTING

##### Inspection Manpower

NDT Technicians, Plant Inspectors, Inspection Engineers, Corrosion Engineers

- Stress Analysis
- Risk Based Inspections (RBI)
- Damage Mechanism Study
- Third Party Inspection
- Coker Drum Inspection
- Trainings (NDT, Metallurgy, Welding)
- Plant Asset Integrity Management
- Corrosion Study



# TCR Arabia Company Limited

## Inspection, Testing & Advisory

Redefining Reliability

### Location

TCR Arabia Head Office & Labs are located in Dammam  
Branch Offices in Jubail & Yanbu



GPS Location: 26.450525, 50.193787



ASNT Partner



ISO 9001-2015 Certified



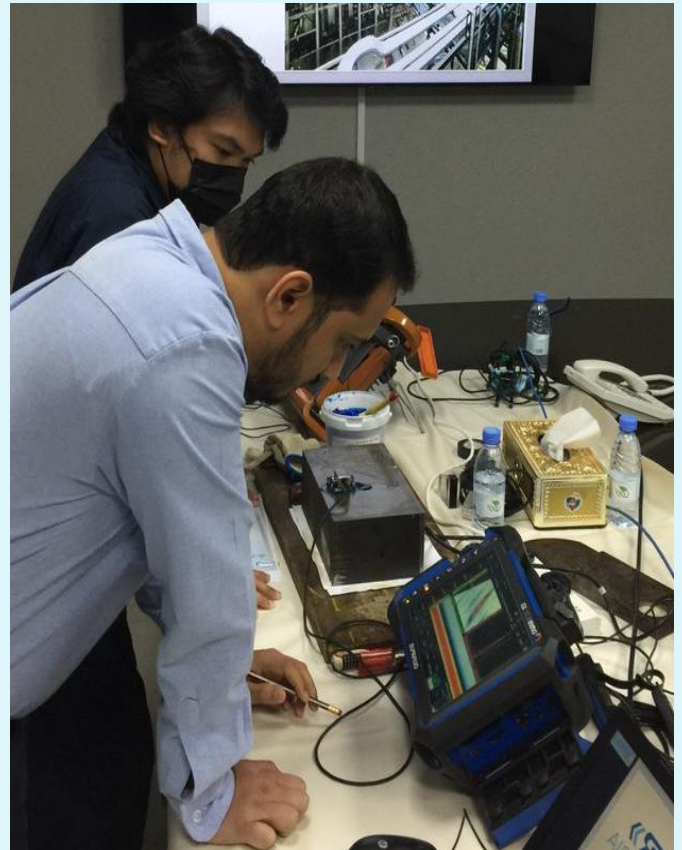
ISO 17025 Accredited

**Events**

**Online Qualification (HTHA)**



**“TCR Arabia has successfully qualified for HTHA Services in SABIC”**



### Events

#### NDT Trainings



### Events

#### Webinar on Insitu Metallography



#### Client Visit

