# Minutes of EFC WP 15
# Corrosion in the Refinery and Petrochemical Industry

**Virtual**

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# Content

# 1 WELCOME

Francois Ropital opened the virtual meeting.

61 persons attended this virtual meeting. The list of participants is enclosed in Appendix 1.

# 2 EFC WP 15 ACTIVITIES

## 2.1 Tribute to the Memory of Stefan Winnik

Stefan passed away on 12th December 2021. Stefan gave outstanding contributions to our corrosion activities. He was the initiator and the driving force for the EFC green book on Corrosion Under Insulation (CUI). Our corrosion community will miss Stefan. The EFC WP15 send its sympathy to his wife Alison.

## 2.2 EFC WP 15 activities And Minutes of Meetings

Information on the activities of EFC WP 15, was presented by Francois Ropital. This information can also be found on the EFC web site where the minutes of previous WP15 meetings can be consulted and downloaded. More information is enclosed in Appendix 2.
https://efcweb.org/WP15.html

EFC hub platform:
EFC launches a web platform to share information and collaborative works. The web link is https://efc.solved.fi/activities/wp/list. 81 WP15 members joined the platform. In this platform news on the activities of WP15 and collaborative works (such as publication of EFC green books) will be shared. Every person interested by WP15 activities are welcome to join this platform.

## 2.3 Publications from WP15

Available revision of publications:

The third revision of the EFC Guideline 55 “Corrosion under insulation” is achieved and the book is available since August 2020 :
https://www.elsevier.com/books/corrosion-under-insulation-cui-guidelines/de-landtsheer/978-0-12-823332-0.

Revision of the EFC Guideline 46 “Amine units corrosion in refineries”. This revision takes place in the frame of a joint WP13-15 task force. The book is available.
https://www.elsevier.com/books/corrosion-in-amine-treating-units/van-roij/978-0-323-91549-6

Advancement on a new guideline on corrosion in sea water cooling systems:

This task force takes place in the frame of a joint WP9 (marine corrosion) WP15 and in collaboration with French Cefracor “corrosion of heat

exchangers" group. The writing of the document is in progress and a full version is expected by June 2022.

### 2.4 EUROCORR 2022

Eurocorr 2022 "Corrosion in a Changing World – Energy, Mobility, Digitalization Materials science and advanced technologies for better corrosion protection" will take place in Berlin, Germany from 28 August - 1 September 2022.

All updated information (sessions, registration) are available on the web site is: https://eurocorr.org/2022.html
A session dealing with corrosion in refineries and petrochemistry plants will take place on Wednesday 31 August (date to be confirmed).

### 2.5 EUROCORR 2023

Eurocorr 2023 will take place in Brussels, Belgium from 27 to 31 August 2023.

### 2.6 Next 2022 WP15 full meeting

The annual WP15 full meeting will take place during the Eurocorr 2022 week 28 August - 1 September. This meeting will take place in Berlin and is planned on Thursday 1 September morning (the date and the form (hybrid ?) have to be confirmed).

## 3 CORROSION IN COOLING WATER SYSTEMS

Francois Ropital gave a presentation of the content of the EFC WP15-9 guideline on corrosion in sea water cooling. Most of the chapters have been reviewed. More information is given in Appendix 2.

Francois Dupoiron and Antoine Surbled gave a presentation on the advancement of the Cefracor (French corrosion association) guideline on cooling water exchangers. This guideline will be accessible to operational personnel and not only experts. It should be available in an English version by the end of 2002. The content of this guideline is given in Appendix 3.

A case study of corrosion in cooling water treatment was presented by Federico Ciacco and Alessandro Vanacore. A bad design and incorrect treatment of a tower led to failures in the circuit. Appropriate visual inspections and thickness measurements could have detected the problem before the final failure. More information is given in Appendix 4.

## 4 CORROSION IN BIOREFINERY PROCESSES

Namurata Pälsson reported on the Member Research Consortium (MRC) project launched by RISE on the corrosion of corrosion resistant alloys under hydrothermal carbonization and liquefaction conditions. The next step of the project will concern the effect of chloride on corrosion of different alloys with and without acid at high temperature and pressure. More information can be found in Appendix 5.

A PhD work in progress was presented by Jean Kittel on the corrosion of carbon, low alloyed and stainless steels by vegetable & waste oils used for the production of bio-fuels via hydrotreatment processes. Carbon steel and low alloy steel show linear evolution of corrosion rates with acid value. At 220 °C, the limit of 0.1 mm/y is reached when the acid value exceeds a few mg KOH/g. The amount of corroded metal is proportional to the quantity of consumed free fatty acid. More information can be found in Appendix 6.

To conclude the biorefinery corrosion topic, Marco de Marco presented an overview on the new corrosion phenomena that refiners will have to deal with. The presence of greater quantities of oxygenated species, water and organic acids (fatty acids) entails variable risks of corrosion. $CO_2$ and chlorides may also be present and dissolved in the aqueous phase. Hydrogen mixing can mitigate corrosion at high temperature but less data are available than for conventional petroleum refining units. More information can be found in Appendix 7.

# 5 CORROSION MODELLING

Slawomir Kus presented an integrated real-time corrosion prediction as a path for corrosion digital twin approach. In the refinery digital transformation, Corrosion Digital Twin (CDT) is a key element: it allows the duplication of number of corrosion processes and to predict their current and future status. CDT can enable a wide access on corrosion information to operate with safe and reliable conditions. More information can be found in Appendix 8.

# 6 CORROSION MONITORING

The presentation of Kjell Wold concerned digital connected services to enhance value of corrosion monitoring data. Wireless standardization and digital data have made on-line communication more affordable and they allow remote handling of plan information as well as corrosion data. Examples have been given on how remote digital services can contribute to proactive maintenance with a minimized need for site visits. More information can be found in Appendix 9.

# 7 CORROSION FAILURES

Marco de Marco reported a corrosion failure in Top Pump Around (TPA) line from the column to pumps in a FCC fractionator. In 2021 two leaks were detected on a 30 years old FCC fractionator that was revamped in 2015. No corrosion inhibitor has been used in the TPA, only dispersants. Some remediations have been proposed. More information can be found in Appendix 10.

# 8 CORROSION UNDER INSULATION

Gino De Landtsheer gave some information on the preparation of the revision for a 2023-24 new edition of CUI EFC publication n°55. Volunteers are still welcome to join the dedicated task force.

Dale Matthews presented an hybrid approach to Volatile Corrosion Inhibitors (VCIs) and Soluble Corrosion Inhibitors (SCI) for addressing CUI/Scab Repair and Flange corrosion. ZIF tape is a self-fusing, corrosion inhibiting tape based on silicone elastomers with proprietary corrosion inhibitor chemistry that is impregnated into the matrix. More information can be found in Appendix 11.

The World Class Maintenance (WCM) “Best Practise for Risk Based CUI management” was then presented by Geert Henk Wijnants. It is based on ISO HLS (High Level Structure) and is integrated in the Asset Management structure of ISO 55001. Innovative CUI projects started including workshops, development of best practise for insulation inspection, review on CUI approaches, launch of web-site. More information can be found in Appendix 12.

To conclude the CUI item, Clare Watt gave some views on strategies to optimise inspection, insulation system design to minimize failures, monitoring, materials (Thermal Spray Aluminium), data sharing.

# 9 OTHER POINTS FROM THE AUDIENCE

For a next WP15 meeting, Andres Rivero proposed to exchange on hydrogen (production, transport) as a in development energy source.

# 10 NEXT MEETINGS

2022 Autumn Full WP 15 Meeting:
This meeting will take place in Berlin during the Eurocorr 2022 and is planned on Thursday 1 September morning (the date and the form (hybrid ?) have to be confirmed).

2023 Spring WP15 Meeting :
The form of this meeting will discuss during the 2022 Autumn Full WP 15 Meeting.