

**Minutes of EFC WP 15
Corrosion in the Refinery Industry**

Estoril (Portugal)

5 September 2013

Prepared by

François Ropital Part 1-5

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1 WELCOME

Francois Ropital opened the meeting.

17 persons attended the meeting and briefly introduced themselves. The list of participants is enclosed in Appendix 1.

2 EFC WP 15 ACTIVITIES

2.1 EFC WP 15 activities And Minutes of Meetings

Information on the activities of EFC WP 15; Corrosion in the Refinery Industry, 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.

<http://www.efcweb.org/Working+Parties-p-104085/WP+15-p-104111.html>

2.2 Publications from WP15

The following publications from this working party are available:

- EFC Guideline n°46: "Amine Unit Corrosion Survey"
<http://www.woodheadpublishing.com/en/book.aspx?bookID=1299>
- EFC Guideline n°55: "Corrosion under insulation CUI guidelines"
<http://www.woodheadpublishing.com/en/book.aspx?bookID=1486>

More information on the availability of these EFC guidelines and how to order these can be obtained with the following web link:

<http://www.efcweb.org/Publications/List+of+EFC+Publications.html>

Discussion on proposals for revision of these publications:

- EFC Guideline n°55: "Corrosion under insulation (CUI) guidelines".

An update is planned (see section 3 of this document)

Discussion on proposals for future publications:

- A best practice guideline to avoid and characterize high temperature stress relaxation cracking of austenitic materials.

2.3 Downloading Previous Eurocorr Conference Papers

Papers from the previous Eurocorr conferences (from Eurocorr 2004 to 2012) can be downloaded via the member's pages of each of the national member societies of EFC. The list of EFC member societies is available on the web page:

<http://www.efcweb.org/Who+we+are/Member+Societies.html>

Please contact your member society for more information on access to these papers.

2.4 EUROCORR 2013

This annual working party meeting was held in Estoril during the Eurocorr 2013 conference "Corrosion control for a blue sky".

The session dealing with refinery corrosion has been held on 3 September. A joint session co-organized with WP 19 (Corrosion of polymer materials) on the behaviour of plastic materials in refineries petrochemical and chemical plants took place on 4 September

Attendance of these sessions was between 35 and 55 persons, figures that reflects the good attendance of the 2013 conference with nearly 900 participants.

2.5 EUROCORR 2014

Eurocorr 2014 "Improving materials durability: from cultural heritage to industrial applications" will take place in Pisa, Italy from 8-12 September 2014 (Tuesday to Friday). Its web site is:

<http://www.eurocorr2014.org/>

During this meeting, the proposal of a joint session co-organized with WP 3 (Corrosion by hot gases and combustion products) on High Temperature Corrosion in the Refinery, Petrochemical and Chemical Industries has been discussed and decided .

Abstracts for the refinery session and the joint session are welcomed and the deadline for submission is **13 January 2014. The submission is open.**

2.6 EUROCORR 2015

Eurocorr 2015 "Earth, Fire, Water, Corrosion happens everywhere" will take place in Graz, Austria from 6-10 September 2015.

2.7 Collaboration with NACE

Exchange of information between WP15 and the NACE groups dedicated to the same topics are encouraged. Rob Scanlan and John Wodarczyk are the EFC WP15 representatives for the NACE meetings during the annual NACE Conferences and Technical week to inform on the WP15 activities. The minutes of the EFC WP15 and NACE STG 34 meetings are exchanged between Linda Goldberg and Francois Ropital. As mentioned in other paragraphs of these minutes, CUI, plastic materials and the corrosion failure atlas are potential topics of collaboration with NACE.

EFC and NACE presidents decided to co-organize a "Bring on the heat" (BOTH) conference in 2013 in Europe: this conference will take place in Frankfurt Dechema head offices on 14 and 15 November 2013.

2.8 Next 2014 WP15 spring meeting

The participants agreed to continue to have 2 working party meetings per year: one in spring and one during the annual Eurocorr conference.

Gino De Landtsheer from Borealis proposed to host the next spring meeting in **Mechelen-Brussels (Belgium)** on **Tuesday 8 April 2014**. Could you save this date.

3 CORROSION UNDER INSULATION – REVISION OF EFC GUIDELINE

A revision of the guideline appears useful, especially for old equipment that will not be covered by the future ISO standard. The revision is in progress and proposals of modifications have been received for the different chapters. Stefan Winnik will prepare a draft of the complete revised document for its examination during the 8 April 2014 WP15 spring meeting.

4 OTHER TOPICS OF DISCUSSION DURING THE MEETING

The following topics have been discussed:

- Application of thermal spray aluminium (TSA) directly on wet pipe and to manually-cleaned girth welds Corrosion of tank roofs,
- Corrosion when reprocessing FAME biodiesels ,
- Cracking of Cr-Mo-V welds.

5 NEXT MEETINGS

2014 Spring WP15 Meeting

This meeting will take place on **8 April 2014** in Mechelen (Brussels) – Belgium (Borealis offices).

2014 Autumn Full WP 15 Meeting:

This meeting will take place in Pisa, Italy, during the Eurocorr 2014 conference from 8-12 September 2014.

Appendix 1

List of participants

Participants EFC WP15 meeting 5th September 2013 Estoril (Portugal)

Name	Company	Country
Martin Hofmeister	Bayernoil Raffineriegesellschaft mbH	GERMANY
Gino De Landtsheer	Borealis	BELGIUM
Hermenegildo Ruiz	CEPSA	SPAIN
Pedro Rangel	CEPSA	SPAIN
Francois Ropital	IFP Energies nouvelles	FRANCE
Adam Ovington	International Paint Ltd	UK
Leena Castrén	Neste Jacobs Oy	FINLAND
Christoph Scharsching	OMV Refining & Marketing GmbH	AUSTRIA
Johan van Roij	Shell Global Solutions International B.V.	NETHERLANDS
Bert Wolfs	Sitech	NETHERLANDS
Steve Mc Coy	Special Metals / PCC energy EP	UK
Andres Rivero	Statoil ASA	NORWAY
Anni Visgaard Nielsen	Statoil Refinery, Kalundborg,	DENMARK
Stephen Brennom	Sulzer Chemtech USA	USA
Fred Van Rodijnene	Sulzer Metco Europe GmbH	GERMANY
Johan Sentjens	Temati	NETHERLANDS
Maria Elena Gennaro	Venezia Technologie SPA	ITALY

Appendix 2

EFC WP15 Activities

(Francois Ropital)



AGENDA EFC Working Party 15 Corrosion Refinery Industry Meeting

09h45-10h15 Welcome - WP15 Activities (F. Ropital)

- Eurocorr 2014 (Pisa-Italy) sessions and workshops with WP3 (High temperature)
- Eurocorr 2015 (Graz - Austria) sessions and workshops,
- publications,
- collaborations with NACE (publications, joint conferences)
- next meeting: next spring 2014
- other points

10h15-10h45 Corrosion failures - Topics from the audience

- WP15 corrosion failure atlas (web page) - new cases to be included
- Corrosion when reprocessing FAME biodiesels
- Discussion on cases and questions from the participants

10h45-11h15 Thermal Spray Aluminium Coatings

- Application of TSA directly on wet pipe and to manually-cleaned girth welds (S. Brennon Sulzer Chemtech USA In)

11h15-13h00 Corrosion under insulation

- Status on the revision of the CUI guideline

13h00-14h00 Lunch break

14h00- Possible continuation on the CUI guideline revision

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Presentation of the activities of WP15

European Federation of Corrosion (EFC)

- Federation of 31 National Associations
- 20 Working Parties (WP)
- Annual Corrosion congress « Eurocorr »
- Thematic workshops and symposiums
- Working Party meetings (for WP15 twice a year)
- Publications
- EFC - NACE agreement (20% discount on books price)
- for more information <http://www.efcweb.org>

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EFC Working Party 15 « Corrosion in Refinery » Activities

<http://www.efcweb.org/Working+Parties-p-104085/WP%2B15-p-104111.html>

Chairman: Francois Ropital

Deputy Chairman: Hennie de Bruyn

The following are the main areas being pursued by the Working Party:

Information Exchange

Sharing of refinery materials /corrosion experiences by operating company representatives.

Forum for Technology

Sharing materials/ corrosion/ protection/ monitoring information by providers

Eurocorr Conferences

WP Meetings

One WP 15 working party meeting in Spring,

One meeting at Eurocorr in September in conjunction with the conference,

Publications - Guidelines

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Publications from WP15

- **EFC Guideline n°40 « Prevention of corrosion by cooling waters »** available from <http://www.woodheadpublishing.com/en/book.aspx?bookID=1193>

Update in relation with Nace document 11106 "Monitoring and adjustment of cooling water treatment operating parameters" Task Group 152 on cooling water systems

- **EFC Guideline n° 46 on corrosion in amine units**
<http://www.woodheadpublishing.com/en/book.aspx?bookID=1299>

- **EFC Guideline n° 42 Collection of selected papers**
<http://www.woodheadpublishing.com/en/book.aspx?bookID=1295>

- **EFC Guideline n° 55 Corrosion Under Insulation**
<http://www.woodheadpublishing.com/en/book.aspx?bookID=1486>



- Future publications : suggestions ?

- best practice guideline to avoid and characterize stress relaxation cracking ?

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Working Party 15 « collaboration with NACE »

- Exchange of minutes of meetings between WP15 and NACE STG34 meetings
- Web cast of the meeting of the NACE TEG 205X Refining Information Exchange at CORROSION 2010 and diffusion to WP15 members
- Joint document EFC n°40 "Prevention of corrosion by cooling in relation with Nace document 11106 "Monitoring and adjustment of cooling water treatment operating parameters" Task Group 152 on cooling water systems
- BOTH (Bring on the Heat Conference)
Frankfurt 14 - 15 November 2013
<http://www.efcweb.org/both.html>



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EFC Working Party 15 plan work 2013-2016

- Sessions with other EFC WP at Eurocorr
 - 2014 Pisa-Italy (8-12 Sept), Workshop on high temperature corrosion in with WP3 ?
 - 2015 Graz-Austria (6-10 Sept)
 - 2016 Montpellier - France (11-15 Sept)
- Update of publications
 - CUI guideline
- New Publications: best practice guideline to avoid and characterize stress relaxation cracking ?
- Education - qualification - certification
 - List of "corrosion refinery" related courses on EFC website ?
 - Proposal of courses within Eurocorr ?



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Information : Future conferences related to refinery corrosion

•8-10 October 2013
ESOPE Paris France

(construction technologies, Codes, Standards and European Directives for stationary and transportable Pressure Equipment)

•12-14 November 2013
Stainless Steel World conference Maastricht NL

•9-13 March 2014
Nace Conference 2014 San Antonio USA

•8-12 September 2014
EUROCORR 2014 Pisa Italy

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Joint NACE-EFC BOTH Conference Frankfurt 14-15 November 2013

Bring On The Heat conferences all over the World

The program would include:

- Insulation
- Corrosion Under Insulation (CUI) / Thermal Spray Aluminum (TSA)
- Passive Fire Protection (PFP)

<http://www.efcweb.org/both.html>



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WP15 Corrosion Atlas Web page

<http://www.efcweb.org/WorkingParties/WP+Corrosion+in+the+Refinery+Industry/WP+15+Refinery+Corrosion+Atlas.html>



EUROPAÏSCHE FEDERATION KORROSION
EUROPEAN FEDERATION OF CORROSION
FEDERATION EUROPÉENNE DE LA CORROSION

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Who we are

EFC Membership

Working Parties

WP Corrosion and Scale Inhibition
WP Corrosion by Hot Gases and
Corrosion Products
WP Nuclear Corrosion
WP Environment Sensitive
Fracture
WP Surface Science and
Mechanisms of Corrosion and
Protection
WP Corrosion Education
WP Physico-chemical Methods of
Corrosion Testing
WP Marine Corrosion
WP Microbial Corrosion
WP Corrosion of Steel in Concrete
WP Corrosion in Oil and Gas
Production
WP Coatings
WP Corrosion in the Refinery
Industry
WP 15 Refinery Corrosion Atlas
CUI Remedial Web Page
WP Cathodic Protection
WP Automotive Corrosion

Welcome > Working Parties > WP Corrosion in the Refinery Industry > WP 15 Refinery Corrosion Atlas

EFC Working Party 15: Corrosion in the Refinery Industry

WP 15 REFINERY CORROSION ATLAS

On the page you will find some corrosion failure cases from the refinery and process industries. These documents are only given for information and do not engage EFC.

Failure case n°1: High temperature corrosion of a first stage reactor of a hydrocracking unit
Failure case n°2: Chloride stress corrosion cracking of a H2S stripping tower in a hydrosulfurisation unit
Failure case n°3: Creep and cracks in a hydrosulfurisation unit
Failure case n°4: Chloride stress corrosion cracking of mounting hardware in a FCC
Failure case n°5: Metal dusting corrosion of a furnace tube in reforming unit
Failure case n°6: Sulfidation in an atmospheric distillation unit
Failure case n°7: HF stress corrosion cracking in an alkylation unit
Failure case n°8: Carbonate stress corrosion cracking in an FCC unit

If you would like to add other failure cases, you can complete the enclosed file and send it to Francois Ropital email: francois.ropital@tpe.fr

Thank you to Martin Hofmeister and Andres Rivero for proposing new cases

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Corrosion Failures

In course of an investigation, aimed at finding the potential cause(s) of the extraordinary high rate of corrosion in our crude distillation units, we found volatile, short chain carboxylic acids (formic, acetic, propionic and even butyric acid) in side streams and effluent waters.

We regularly re-process biodiesel (FAME) containing wastes blended to the incoming crude, originated as pigging sludge from a dedicated FAME pipe and also from off-spec production, we suspect that FAME decomposition products could be at least one source of these volatile acids.

It would be very important for us to know what practices are followed by the partner refineries:

- do they have any FAME containing waste collected in the refinery?
- if yes, do they re-process it together with the crude? Did it cause any corrosion problem?
- If not re-processed what is the recommended way in handling this type of waste?

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EFC CUI guideline update

	Update	Full	Partial	Volunteer(s)
Chapters				
Chapter 1 - Introduction	y		y	S. Winnik
Chapter 2 – Economic Consideration	y	y		S. Winnik
Chapter 3 – Ownership and Responsibility	Y	Y		S. Winnik
Chapter 4 - RBI Methodology for CUI Unit Prioritisation	Y	Y		H. de Bruyn, J. Van Roij, J. Pugh
Chapter 5 – Inspection Activities/ Strategy	Y			H. de Bruyn, J. Van Roij
Chapter 6 – NDE/NDT Screening Techniques for CUI	Y			A. Demma
Chapter 7 – Recommended Practice to Mitigate CUI	Y		Y	S. Winnik, M. MeLampy, J. Pugh
Chapter 8 – Design for the Prevention of CUI	N			H. de Bruyn, M. MeLampy, A. Ovington
Appendices				
A NDE/NDT Techniques	Y	Y		A. Demma, S. Winnik
B Cost-Economic Evaluation	Y		Y	S. Winnik
C Application of TSA	Y		Y	S. Winnik, F. Van Rodijne
D Use of Protective Guards	Y		Y	xxx
E Additional Guidelines of the Implementation of CUI Best Practice	?			H. de Bruyn
F Coatings	Y	Y		M. MeLampy, A. Ovington
G Quality Assurance	?			J. Thirkettle
H Insulation Material Types and Forms	?			J. Sentjens
I Cladding/ Jacketing Materials	?			
J Case Studies	Y		Y	