

# EFC Working Party 3: Corrosion by Hot Gases and Combustion Products

Business Meeting at EUROCORR 2010 in Moscow/RUS  
on 14 September 2010 Conference Room B Beginning: 16:15 h

## AGENDA

1. Opening and welcome
2. Three-year work programme of the Working Party
3. High temperature corrosion events in 2010 and later
4. EFC Workshop “Solutions for High Temperature Corrosion Protection in Energy Conversion Systems” in Frankfurt/Main on 30 September - 2 October 2009
5. Next EFC –WP3 Workshop in Frankfurt/Main on 26 – 28 September 2012 (tentative)
6. Joint session at EUROCORR 2011 in Stockholm/SE with WP15 on “High Temperature Corrosion in Refinery, Petrochemical and Process Industries”
7. Standardisation activities
  - CEN
  - ISO
8. Framework VII
  - Inclusion of HTC research
  - Competence Centres / ERA net
  - Other aspects
9. Further items to be raised by the WP members
10. Any other business

# EFC WORKING PARTY REPORT PRO-FORMA (July 2010)

## Working Party No. and Title: WP3 Corrosion by Hot Gases and Combustion Products

<b>MAIN OBJECTIVES FOR THE NEXT THREE YEARS:</b>		
To develop tools for a more precise assessment of high temperature corrosion resistance and for life-time prediction of materials and components under high temperature corrosion conditions.		
<b>DETAILED MEASURES BY WHICH THE ABOVE OBJECTIVES WILL BE ACHIEVED</b> (Please complete, as appropriate, using continuation pages if necessary)		
<b>No.</b>	<b>Type of Activity</b>	<b>Target Date(s)</b>
1	<u>WP Meetings</u> (state expected attendance levels & business/technical split) Different types of meetings a)WP business meeting in conjunction with each future EUROCORR (20-30) b)WP technical workshops (60-100)	<b>annually every 2-3 years</b>
2	<u>Sessions at EUROCORR</u> (identify special topics): 2 day topical session at EUROCORR 2010 1 or 2 day topical session on WP3 topics at EUROCORR 2011 depending on input	<b>2010 2011</b>
3	<u>Cooperation with other WPs e.g. Joint Sessions at EUROCORR</u> (give details): Workshop on "High Temperature Stress Relaxation Cracking Phenomena" together with EFC-WP15	<b>2011</b>
4	<u>Maintenance of a WP page on the <a href="http://www.EFCWEB.org">www.EFCWEB.org</a> website:</u> Contribution to WP page has been installed and is being kept up-to-date.	
5	<u>Contributions to the EFC Newsletter:</u> Have been sent to Paul McIntyre for 2010	<b>2010</b>

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No.	Type of Activity	Target Date(s)
6	<u>Organisation of EFC Workshops/Courses/Meetings, etc</u> (give details): Several EFC-WP3 workshops have been organised in the past (see also item 10: books from the workshops) and have become a cornerstone in the high temperature corrosion events worldwide. The next workshop is planned for 2012.	2012
7	<u>Organisation of Collaborative Research or Testing Programmes</u> (give details) See item 8 and EFC series book no. 53.	
8	<u>Participation in EU-supported Projects</u> (give details) In the 7th Framework Programme of the EU the following proposals were submitted: 1) RFS-PR-06093 <i>Advanced materials for oxyfuel combustion of coal</i> Not retained for financial support 2) CP-FP 214302-1 <i>Nanoscale surface modification to suppress environmental embrittlement of titanium aluminide alloys</i> Failed to pass one threshold in the first evaluation round 3) CP-IP 211329-1 <i>New multipurpose coating systems based on novel particle technology for extreme environments at high temperature</i> Successful in the first round, successful in the second evaluation round, has started in December 2008 4) CP-IP 213541-1 <i>Tailored materials to resist in severe environments</i> Successful in the first round, failed in the second evaluation round 5) New proposal planned in the frame of the European Marie Curie Network Programme	<b>2011</b>

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No.	Type of Activity	Target Date(s)
9	<p><u>Participation in the Development of Standards</u> (give details)</p> <p>Presently under work:</p> <ul style="list-style-type: none"><li>• ISO/TC 156 NP 21608 Corrosion of Metals and Alloys – Test Method for isothermal exposure testing under high temperature corrosion conditions for metallic materials</li><li>• ISO/TC 156 NP 13573 Corrosion of metals and alloys – Test method for thermal cycling exposure testing under high temperature corrosion conditions for metallic materials</li><li>• ISO/TC 156 NP 26146 Corrosion of metals and alloys – Method for metallographic examination of samples after exposure to high temperature corrosive environments</li></ul> <p>These documents are currently undergoing the different ISO voting stages.</p> <p>The following new documents are currently under work:</p> <ol style="list-style-type: none"><li>1) Corrosion of Metals and Alloys – Test method for high-temperature corrosion testing of metallic materials by fully embedding in salt, ash, or other organic solids</li><li>2) Corrosion of Metals and Alloys – Test method for high-temperature corrosion testing of metallic materials by partially embedding in salt, ash, or other inorganic solids</li><li>3) Corrosion of Metals and Alloys – Test method for high-temperature corrosion testing of metallic materials by immersing in molten salt or other inorganic liquids</li><li>4) Corrosion of Metals and Alloys – Test methods for high-temperature corrosion testing of metallic materials by coating with salt, ash, or other inorganic solids</li></ol>	

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No.	Type of Activity	Target Date(s)
10	<p><u>Preparation of Publications for the EFC Series of Books</u> (give details)</p> <p>EFC41: "Corrosion by Carbon and Nitrogen – Metal Dusting, Carburisation and Nitridation" edited by M. Schütze and H.J. Grabke, published</p> <p>EFC47: "Novel Approaches to the Improvement of High Temperature Corrosion Resistance" edited by M. Schütze and W.J. Quadackers (EFC WP3 on Corrosion in Hot Gases and Combustion Products), published</p> <p>EFC 52: "The First 50 Years of the EFC" edited by Jörg Vogelsang and Paul McIntyre (EFC Science and Technology Advisory Committee), WP3 contribution submitted</p> <p>EFC 53: "Standardisation of thermal cycling exposure testing" edited by M. Schütze &amp; M. Malessa, published</p> <p>EFC 57: "Protective Systems for High Temperature Applications: From Theory to Industrial Implementation" edited by M. Schütze and W.J. Quadackers, publication status: On the way to press.</p>	2010
11	<p><u>Other(s)</u> (please specify)</p> <p>A highlight of the work of wp 3 in 2009 was the workshop "Solutions for High Temperature Corrosion Protection in Energy Conversion Systems" which took place from 30 September to 2 October 2009 in Frankfurt/Main. The workshop organized by the wp had 51 oral papers and 30 posters and was attended by about 120 participants from all over the world. In the meantime selected papers from the workshop have undergone the reviewing process and are now ready for publication in a special issue of the journal Materials and Corrosion in 2010. Furthermore, it is planned to edit a book in the Green EFC Series which contains these papers. A next workshop is planned for 2012.</p> <p>At EUROCORR 2009 in Nice wp 3 had organized a well attended topical session of 2 days. Furthermore, the standardisation activities are pushed forward.</p>	

## List of Events (1)

Title, Date, Location	URL
8 <sup>th</sup> Conference Fatigue Damage of Structural Materials 19-24 September 2010, Hyannis/Massachusetts, USA	<a href="http://www.fatiguedamage.elsevier.com">www.fatiguedamage.elsevier.com</a>
Materials Congress 2010 “Materials for extreme Environments and Times” 20-23 September 2010, Kuala Lumpur, Malaysia	<a href="http://www.iom3.org/materials-congress-2010">www.iom3.org/materials-congress-2010</a>
6 <sup>th</sup> International Conference “Materials and Coatings for extreme Performances”20-24 September 2010, Yalta, Ukraine	<a href="http://www.ipms.kiev.org">www.ipms.kiev.org</a>
Turbine Forum 2010: Advanced Coatings for High Temperatures 22-24 September 2010 (rescheduled from April 2010), Nice, France	<a href="http://www.forumt.com">www.forumt.com</a>
61 <sup>st</sup> Annual Meeting of the International Society of Electrochemistry 26 September – 1 October 2010, Nice, France	<a href="http://event10.ise-online.org">http://event10.ise-online.org</a>
9 <sup>th</sup> Conference on Materials for Advanced Power Engineering 27-29 September 2010, Liège, Belgium	<a href="http://www.fz-juelich.de/conference/liege9">www.fz-juelich.de/conference/liege9</a>
13. Internationale Metallographietagung 29 September – 1 October 2010, Leoben, Austria	
13. Werkstofftechnisches Kolloquium Chemnitz 30 September – 1 October 2010, Chemnitz, Germany	<a href="http://www.wtk.tu-chemnitz.de">www.wtk.tu-chemnitz.de</a>
Titanium 2010 3-5 October 2010, Orlando, USA	<a href="http://www.titanium.org">www.titanium.org</a>

## List of Events (2)

<b>Title, Date, Location</b>	<b>URL</b>
Stainless Steel World America 2010 5-7 October 2010, Houston, USA	<a href="http://www.stainless-steel-world.net">www.stainless-steel-world.net</a>
Duplex World 2010 Conference & Exhibition 13-15 October 2010, Beaune, France	<a href="http://www.stainless-steel-world.net">www.stainless-steel-world.net</a>
Materials Science & Technology MS&T 2010 17-21 October 2010, Houston, USA	<a href="http://matscitech.org">http://matscitech.org</a>
Matériaux 2010 18-22 October 2010, Nantes, France	<a href="http://www.materiaux2010.net">www.materiaux2010.net</a>
Weiterbildungskurs: Korrosion – Grundlagen und Untersuchungsmethoden 25-27 October 2010, Frankfurt am Main, Germany	<a href="http://kwi.dechema.de/kurse">http://kwi.dechema.de/kurse</a>
Education in High Temperature Corrosion 26-28 October 2010, Forschungszentrum Jülich	<a href="http://www.fz-juelich.de/ief/ief-2//index.php?index=6">www.fz-juelich.de/ief/ief-2//index.php?index=6</a>
International Symposium on High-temperature Oxidation and Corrosion (ISHOC) 8-11 November 2010, Zushi, Japan	<a href="http://www.mkg.mtl.titech.ac.jp/ISHOC10">www.mkg.mtl.titech.ac.jp/ISHOC10</a>
MRS Fall Meeting 29 November-3 December 2010, Boston, USA	<a href="http://www.mrs.org">www.mrs.org</a>
TMS 2011 Annual Meeting & Exhibition 27 February – 3 March 2011, San Diego, USA	<a href="http://www.tms.org">www.tms.org</a>

## List of Events (3)

Title, Date, Location	URL
NACE Corrosion 2011 13-17 March 2011, Houston, USA	<a href="http://www.nace.org">www.nace.org</a>
Microscopy of Oxidation (8 <sup>th</sup> ) 11-13 April 2011, Liverpool, UK	<a href="http://www.liv.ac.uk/engdept/conferences">www.liv.ac.uk/engdept/conferences</a>
38 <sup>th</sup> International Conference on Metallurgical Coatings and Thin Films 2-6 May 2011, San Diego, USA	<a href="http://www.icmctf.org">www.icmctf.org</a>
The 11 <sup>th</sup> International Conference on the mechanical behavior of Materials (ICM11) 5-9 June 2011, Como, Italy	<a href="http://www.icm11.org">www.icm11.org</a>
Ti-2011 12 <sup>th</sup> World Conference on Titanium 19-25 June 2011, Beijing, China	<a href="http://www.ti-2011.com">www.ti-2011.com</a>
8 <sup>th</sup> International Conference on Diffusion in Materials 3-8 July 2011, Dijon, France	<a href="http://www.dimat2011.com">www.dimat2011.com</a>
Gordon Conference High Temperature Corrosion 24-29 July 2011, New London, USA	<a href="http://gordonresearchconferences.org">http://gordonresearchconferences.org</a>
5. Freiburger Tagung "Dampferzeugerkorrosion" 20-21 October 2011, Freiberg, Germany	<a href="http://www.sidaf.de">www.sidaf.de</a>



EFC-Workshop  
„Solutions for High Temperature Corrosion Protection in  
Energy Conversion Systems“

Frankfurt/Main, September 30 – October 2, 2009

43 oral papers, 36 poster papers

More than 120 participants from Europe, AUS, CAN,  
Iran, JAP, Mexico, PRC, South Korea, USA

Selected papers have been reviewed and submitted to  
Materials and Corrosion

- Online: Available next month
- Printed Journal: First half of next year

Next workshop planned for 26 – 28 September 2012

# Standardization at ISO TC 156 WG 13

Draft documents in process to become International Standards:

Title	Stage
ISO/NP 21608: Corrosion of metals and alloys -- Test method for isothermal exposure oxidation testing under high temperature corrosion conditions for metallic materials	30.99 (CD approved for registration as DIS)
ISO/CD 13573: Corrosion of metals and alloys -- Test method for thermal cycling exposure testing under high temperature corrosion conditions for metallic materials	30.20 (CD study/ballot initiated)
ISO/CD 26146: Corrosion of metals and alloys -- Method for metallographic examination of samples after exposure to high temperature corrosive environments	30.20 (CD study/ballot initiated)

New documents (under preparation, not registered yet):

1. Corrosion of Metals and Alloys – Test method for high-temperature corrosion testing of metallic materials by **fully embedding** in salt, ash, or other inorganic solids
2. Corrosion of Metals and Alloys – Test method for high-temperature corrosion testing of metallic materials by **partially embedding** in salt, ash, or other inorganic solids
3. Corrosion of Metals and Alloys – Test method for high-temperature corrosion testing of metallic materials by **immersing** in molten salt or other inorganic liquids
4. Corrosion of Metals and Alloys – Test method for high-temperature corrosion testing of metallic materials by **coating** with salt, ash, or other inorganic solids