

# Minutes of the meeting of ISO TC 156 WG 13 DECHEMA e.V., Frankfurt/Main 4<sup>th</sup> December 2003

## Agenda

1. Welcome and introduction by the convenor
2. Discussion of the international situation on standardization of high temperature corrosion testing
3. Aims of WG 13
4. Work itmes of WG 13 (reporting and discussion)
  - 4.1 Continuous gravimetric testing
  - 4.2 Discontinuous oxidation testing  
Report by Toshio Maruyama on ISO working document no. ISO/TC 156 N 1122 (19 March 2003) "Test method for isothermal oxidation test at elevated temperatures for metallic materials"
  - 4.3 Cyclic oxidation testing  
Report by Michael Schütze on the status of the European COTEST initiative
  - 4.4 General guidelines for post-exposure examination  
Report by Steve Osgerby on a first draft for an ISO document
5. Resolution on the next steps
6. AOB
7. Date and place of next meeting

## Minutes

The meeting started at 10 a.m.

**1.** Michael Schütze welcomed all participants of the meeting. He introduced Steve Osgerby as the secretary and himself as the convenor of the working group ISO TC 156 WG 13.

**2.** A list of actual existing standards in high temperature testing was shown, these were mainly developed for testing of ceramic coatings. Those standards that seemed to be irrelevant for high temperature corrosion testing were deleted from the list while further entries were made. The list is given in the annex.

DECHEMA e.V. will collect all standard documents listed in table 1, the Japanese Industry Standards JIS will be provided by Toshio Maruyama.

If relevant standards are not mentioned in the list, they should be reported to DECHEMA.

**3.** The aims of WG 13 were defined to be the development of reliable and meaningful test procedures for the high temperature corrosion testing of metallic materials. The need was mentioned by Ian Wright to define the meaning of "High temperature". Further discussion led to the definition of different types of high temperature corrosion testing as follows:

High Temperature Corrosion occurs

- when external heat is added to the system and
- the temperature is higher than the dew point of aqueous phases of the atmosphere.
- or in dry atmospheres the temperature is higher than 373 K.

Further discussion by e-mail led to the final definition of High Temperature Corrosion:

- external heat is added to the system and
- the temperature is higher than the dew point of aqueous phases of the environment but at least 373 K.

Definition of High Temperature Corrosion testing methods:

- Thermo gravimetric Testing: in-situ mass measurements at elevated temperatures on a single specimen without intermediate cooling
- Continuous Isothermal Exposure Testing: single post exposure mass measurement on a series of specimens without intermediate cooling
- Discontinuous Isothermal Exposure Testing: series of mass measurements on a single specimen with intermediate cooling at predetermined times not necessarily regular
- Thermal Cycling Oxidation Testing: series of mass measurements on a single specimen with repeated, regular and controlled temperature cycles

4. Toshio Maruyama reported on the working document no. ISO/TC 156 N 1122 (11<sup>th</sup> March 2003) originally named "Test method for isothermal oxidation test at elevated temperatures for metallic materials". Based on the definitions given above the title was changed to "Test method for Continuous Isothermal Exposure Testing at elevated temperatures for metallic materials".

Several modifications and amendments to the original document were made based on intense discussion. The chapters 1 to 4 were completed while only the items Test piece support and Test environment of the chapter 5 could be addressed due to lack of time.

It was decided to continue the work on the document by email. The items 4.3 to 6 were not addressed due to lack of time and will be dealt with at the next WG 13 meeting. This meeting will take place in Stockholm on 12<sup>th</sup> May 2004 in conjunction with the general ISO TC 156 meeting.

The meeting was closed at 7 p.m.

## Annex

*Table 1: List of existing standards relevant for high temperature corrosion*

<b>Work Item Title</b>	<b>CEN/TC 184 EN(V)</b>	<b>ASTM Comm. C28</b>	<b>JIS Ceramics Div.</b>	<b>ISO/TC 206 Project No.</b>
<b>Ceramic Coatings</b>				
Coating thickness by probe profilometer	prEN 1071-1	-	R 1636; 98	PWI 06
Adhesion by a scratch test	prEN 1071-3	-	-	ISO/WD 20502
Chemical composition (EPMA)	ENV 1071-4; 95	-	-	
Porosity (metallography)	ENV 1071-5; 95	-	-	
Adhesion (rockwell indentation test)	WI 131	-	-	
Hardness and modulus by depth sensing indentation	WI 152	-	-	
Hot salt corrosion resistance (VAMAS project)		-	-	
Fracture strain by 4 point bending	WI 158	-	-	
Coating thickness by cross section	WI 159	-	-	

Measurement of Metal and Oxide Thickness by Microscopical Examination of s Cross Section		B 487 – 85		
Interfacial shear strength tensile testing	NWI	-	-	
Adhesion of coatings by interfacial indentation	NWI	-	-	
Adhesion of multi-pass fatigue testing	NWI	-	-	
Adhesion evaluation by progressive indentation testing	NWI	-	-	
Adhesion (Peel test)	-	-	-	ISO/WD 20503
Combined creep and temperature cycling of heating wires	-	B 76-65;78-65	-	
Standard guide for High Temperature Oxidation Testing of nonoxide advanced ceramics at atmospheric pressures and low gas velocities		Working draft V3		
Continous testing of high temperature testing			Z 2281-1993	
Method of cyclic oxidation testing at elevated temperatures for metallic materials			Z 2282-1996	
Standard Practice for simple static oxidation testing (Discontinued 2002)		G 54		

*Table 2: Attendees at the meeting*

Maik Malessa, Dechema e.V.

Toshio Maruyama, Tokyo Institute of Technology

Steve Osgerby, National Physical Laboratory

Francisco J. Perez-Trujillo, Universidad Complutense Madrid

Michael Schütze, Dechema e.V.

Peter K. M. Szakalos, Swedish Institute for Metals Research

Ian G. Wright, Oak Ridge National Laboratory

Frankfurt/Main, 26<sup>th</sup> January 2004

Maik Malessa