ISO/TC 142/WG 9
Particulate air filter intake systems for rotary machinery and stationary internal combustion engines

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Background: Minutes from the meeting in Amsterdam 2015-0608
Work items addressed: ISO 29461 - part 2 (NWI) and part 5 (PWI)

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Air filter intake systems for rotary machinery

Minutes of meeting in

Amsterdam, June 8, 2015, 08.30h – 12.00h

AAF international

Note: yellow back colour is used to indicate action items

Note: green back colour is used to indicate decisions

1. Opening of the meeting

Ulf opened the meeting at **08.30 hrs, June 8th, 2015.**

2. Roll call of experts

There were 16 experts and 1 invited observer documented at the meeting.

See separate attendee list, see **Annex 1**.

3. Adoption of agenda

The agenda was adopted with no changes.

The Convener presented the goals of the meeting:

(1) Introduction of new experts (from ETN)
(2) Status and progress of work concerning ISO 29461-2 (NWI)
(3) Status and progress of work concerning ISO 29461-5 (PWI)

4. ETN liaison

Ulf presented Ugo Simeoni that will be the liason member (expert) on the behalf of the ETN. Also attending was Peter Hall chairman of the Working group "filters" within ETN. This WG focus on filtration, and will specifically contribute with information and comments for the work in WG9. The liason with ETN and ISO TC 142/WG9 is formally adopted by the ISO/ETN. Documentation can be shared between the two groups. The convener of WG9 will keep the ISO livelink updated with relevant information concerning the ISO/ETN co-operation. Ulf also presented a summary of the comments received from the ETN:

Draft for ISO-29641-2

- A general comment, related as well to part 6, is that the Aramco test used as a reference is not reliable enough and, though it may be a good test for Middle East environment, it doesn't represent all the different conditions. The WG suggested that a more global test should be made and at least 3 different environments should be defined by the ISO WG9. The ETN WG could help in the specification identification of the different environments
- More detailed comments, see N159

Draft for ISO-29641-5

- Lifetime of filter important - 3 years of gas turbine operation is the relevant performance for the end users
- The draft should be better structured, for example “clear references to whether a single filter element or a complete filtration system is referred to”
- A upper limit for air flow not needed from the user perspective
- The ETN group should share data from salt testing – there has been a request to ETN group members for this
- RH level in the test should be defined (30 -90 % suggested)
- Particle size distribution needs to be specified (salt test)
- Definition of a harsh offshore environment needed
- Improved specification of the characteristics of the test rig assembly

ISO-29641-1

- Part 1 of the standard covers performance with very low RH and therefore it is not representative for most of the offshore environments. An Annex should be added in part 1 for marine environment.

5. ISO 29461-2, „Air intake filter systems for rotary machinery — Test methods — Part 2: Cleanable (pulse jet) filter systems“

The project leader, Chris Fischer presented the status of the work up to this point. There has been little progress since the last meeting in London.

5.1. Review of existing draft

Due to heavy load of the test facility, some testing is still waiting to be done. Chris went through the test data and the possible candidates for test dust to use.

5.2. Test procedure

The draft is still a bit unstructured, therefore the draft will be updated and commentary removed in order to make it easier to read. The test procedure was discussed. Still the suggested test procedure needs to be tested, specifically the mist/fog condition at the end of the test. One concern is the reproducibility of test data. At this point we have however little data to evaluate. The strategy is to complete the first test round at Donaldson in order to get an indication if the procedure makes sense. More laboratories/companies were invited to contact Chris to help with producing data

around this. ETN is going to try to support this by asking its members to sharing test data and/or conduct new tests. A method of how to generate the mist needs to be developed and defined. The target is to have this included in the draft to the next meeting in September.

5.3. Test dust to be used

This is the next step for the ISO 29461-2 work. The likely candidate right now is the new PTI dust, which is considerably cheaper that existing test dust and has a somewhat finer particle size. Test aimed to be ready and data to be presented at next meeting in Kanazawa, September 2015.

5.4. Comments on the draft

The comments from ETN (N159) was addressed and will be dealt with for the coming update, see annex 2. The project leader will address this in the next draft.

5.5. Action points

5.5.1. A method of how to generate the mist needs to be developed and defined. The target is to have this included in the draft to the next meeting in September.

5.5.2. Test dust data, Test aimed to be ready and data to be presented at next meeting in Kanazawa, September 2015

5.5.3. The comments from ETN (N159) was addressed and will be dealt with for the coming update, see annex 2. The project leader will address this in the next draft.

6. ISO/PWI 29461-5, “Air intake filter systems for rotary machinery - Part 5: Test methods for static filter systems in marine and offshore environments“

6.1. Status and discussion

The project leaders, Mike Garnett and Scott Taylor presented the status of the draft followed by a discussion about the humidity and dust generation and additional problems with this. This followed by a discussion of oil mist test, and how important this was for the end users.

The conclusion was to have an oil mist test in the draft since this seems to be of some interest for the end users. However in order to not create problems with repeatability, it was decided to include this as an annex, that could be used separately or as an addition to the standard test which should focusing on the salt removal efficiency and the possible leakage/leach through during high humidity and mist conditions.

The approach with flame photometer and also to measure the salt water leakage was regarded as important (salt water collection downstream the system). The water leakage needs to be investigated and a method how to perform that. The project leaders will together with the task group look into the possibilities and bring this to the next meeting.

The suggested dust loading procedure is intended to raise the pressure drop in order to detect salt/saltwater leakage downstream of the system. However experts pointed out the problem with using ASHRAE dust as the loading dust. It is known that dust generation (ASHRAE dust specifically) can give a large spread of Dust holding capacity results between laboratories. It was argued that the pressure drop is important to increase, since it is one factor for water/salt leakage. The final decision was to include the AC-fine (same as for the ISO 29461-1) dust to replace then ASHRAE dust. Or to use the grade A1, (less large particle fractions compared to ISO 12103-1 A2).

The humidity level in the test was debated and decided to be at 80% in order to enable repeatable and relevant data. The formation of salt crystals depends on the humidity and what salt is to be used. 80% is believed to be a good compromise between practical issues for the laboratory (difficult with higher RH) and the need for not generating dry crystal salt particles which will have other characteristics compared to salt generated in a higher RH environment.

6.2. Comments

The question if the salt should be NaCl of KCl was raised. The general meaning was that we should focus on the NaCl, but other salts may be needed? ETN will come back on this topic. It was stressed that the humidity cycles are very important in the test. For filter materials, some can work well for a few cycles but then lose their ability to protect from salt/water leakage. How many cycles that are needed cannot be stated right now, but this should be considered during the development of test method.

There was a question about a patented test method which is similar to what is discussed here (Steve Hiner). Is this creating problem for the work in the WG9-part 5? This was anticipated not likely to be a problem, but should be investigated. Steve Hiner could help the project leaders to check this. Finally the draft shall be updated and redundant information shall be removed.

6.3. Action points and decisions

6.3.1. The conclusion was to have an oil mist test in the draft since this seems to be of some interest for the end users. However in order to not create problems with repeatability,

it was decided to include this as an annex that could be used separately or as an addition to the standard test

6.3.2. Include AC-fine (same as for the ISO 29461-1) dust to replace then ASHRAE dust. Or to use the grade A1, (less larger particle fractions compared to ISO 12103-1 A2)

6.3.3. Relative humidity in the test air should be 80%

6.3.4. The water leakage needs to be investigated and a method how to perform that. The project leaders will together with the task group look into the possibilities and bring this to the next meeting.

6.3.5. Investigation on what salt to use (KCl or NaCl or other?), to be done by the ETN

6.3.6. There may be a patent about salt testing for gas turbines that may cause problems for the standard. To be investigated by project leaders assisted by Steve Hiner.

6.3.7. The project leaders with assistance of Convener will update the draft and redundant information shall be removed to simplify the further work.

7. Any other business

No other business

8. Next meetings for WG9

WG9 meeting in conjunction to plenary meeting

September 2015 (15th, depending on the slot time provided by secretary)

9. Closure of meeting

Ulf closed the meeting at exactly 12.00 hrs, June 8th, 2015.

Minutes of meeting submitted by Ulf Johansson

2015-06-08

Annex 1 - Attendance list

Member body	Name and First Name	e-mail	Attended as
SIS	Johansson Ulf	ulf.johansson@camfil.se	Convener
NEN	Feekes, Wim	wim.fekkes@aafeurope.com	Expert
BSI	Taylor, Scott	scott.taylor@aafgb.com	
ETN	Simeoni, Ugo	us@etn-gasturbine.eu	Expert
ETN	Hall, Peter	Peter.hall@eon-uk.com	Expert
CTI	Coltri, Carlo	carlo.coltri@vokesair.com	Expert
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METSTA	Kaukopaasi, Jan	Jan.kaukopaasi@ahlstrom.com	Expert
ANSI	Chris Fischer	chris.fischer@donaldson.com	Expert
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DIN	Bittermann, Heinz	heinz.bittermann@fiatec.com	Expert
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NBN	Van Gelder, Wim	wim.vangelder@donaldson.com	Expert
UNI	Romano, Ricardo	r.romano@lombardafiltri.it	Expert
UNI	Tronville, Paolo	paolo.tronville@polito.it	Expert
Hiner, Steve	ASME	Steve.hiner@clarcor.com	Observer

Annex 2 – Comments from ETN (GE comments with approval from the ETN group)

ef.	ISO/WD 29461-2 wording	GE Comment
Page ii	Therefore the results of this test method only apply to systems using the same pulse mechanism, pulse duration, and pulse timing as used in the device tested.	We would suggest to modify the wording as: Therefore the results of this test method only apply to systems operated ***at the same (or lower) airflow per cartridge***, using the same pulse mechanism, pulse duration, and pulse timing as used in the device tested.
5.3.1	If the system to be sold pulse cleans more than one element per pulse, the test system pulsing equipment must be scaled to provide that same pulse to a single element. [Bruce: foregoing assumes one element per pulse in the system to be tested. Suggest changing it to the more general: If the system to be tested pulses a different number of elements per pulse than the system to be sold, then the pulse hardware in the test device must be scaled to provide the cleaning pulse per element as the system to be sold.] The system must include the capability to disable pulsing and do continuous pulsing.	The system shall use the same diaphragm valves and the same blow pipes of the system to be sold. To allow using the same diaphragm valves and the same blow pipes even pulsing just one element (instead of two or more as in the system to be sold) the blow pipes ejecting holes, not used to clean elements, shall be rearranged (i.e.: rotated 180° to eject air downstream instead of upstream). Details of the geometry of the blow pipes shall be added to the test report. The compressed air header, where the diaphragm valves are installed on, shall have the same section used in the system to be sold. GE recognizes the impact of the location of the diaphragm valves close to the compressed air header ends. It is therefore allowed to install the diaphragm valves on a compressed air header longer than that strictly needed to lodge the required valves. Details of the geometry of the compressed air header shall be added to the test report.
5.3.1	The system to be tested shall not include any filtration downstream of the pulse cleaned filters. [? Should two stage systems be included?]	GE would appreciate if the standard would establish a test procedure for “combined” air filtration systems, too.
7.1	The loading test dust is to be determined.	What are the currently proposed alternative test dusts? (Finer type of dust which should be more challengeable