Minutes of MGT Meeting

04 October 2017, Ansaldo Fondazione, Genoa, IT

Attendees:

Enrico Bianchi	Ansaldo Energia
Luc Prieels	ACTE
Grant Terzer	Capstone
Jafar Alzaili	City University London
Frederic Siros	EDF
Peter Breuhaus	IRIS
Ambra Giovannelli	Roma Tre
Federico Cernuschi	RSE
Mario Ferrari	UNIGE
Svend Bram	VUB
Ugo Simeoni	ETN

1. Welcome and Introduction

U. Simeoni opened the meeting and welcomed the participants. He presented the main topic of the meeting, which was the discussion of the standard "ISO 19372 – Microturbine applications – Safety". He stated that other European manufacturers were interested in the topic but for business reasons they couldn't join the meeting.

2. ISO 19372 – Microturbines applications – Safety: topics for a revision proposal

E. Bianchi opened the discussion introducing the standard ISO 19372 and its implications for the design of the microturbines. He highlighted the need to comply with harmonised standards drawn by the European standards organisation. He specified that although directives allow to adopt different solutions than the ones proposed in the standard, the manufacturer has still to justify it with a technical assessment, which eventually could also not be accepted.

E. Bianchi went through his presentation, highlighting the topics of the standard that according to Ansaldo Energia would need to be revised.

<u>Safety requirements</u>

In the Chapter 5 and Annex C it is not clear which standard the manufacturers should follow, whether the ISO13489 or IEC 61508. It was suggested to mention the different way to achieve proper safety and underline the preferred way.

<u>Reverse rotation</u>

In the standard it is not mention the reverse rotation of the turbine, which according to Ansaldo's risk assessment is feasible until the point when the gas is injected in the turbine. This could lead to severe damages of the machine and potential safety issues for the operations.

<u>External combustion and hybrid applications</u>

Hybrid systems (e.g. microturbine with external combustor burning biomass or microturbine for solarised applications) are not mentioned in the standard; therefore also safety issues related to these systems are not covered.

Air flow control, combustion air

In the chapter 5.12.4 it is stated that proof of adequate compressor rotation speed shall be used to verify the combustion air flow rate. However, the rotational speed may not be a sufficient indication of air flow, according to the tests done by Ansaldo.

G. Terzer agreed and stated that Capstone use the purge time to indicate the sufficient air flow.

Turbine design issues regarding critical speed

The standard is not clear about the operation of the microturbine on the critical speed. Participants agreed that the microturbine shouldn't operate on the critical speed but it can still operate in a safety mode above the critical speed.

Speed measuring approach, starting systems

The standard doesn't provide recommendation on how to detect the turbine speed. Operators can't rely on the power electronics as the data provided are a measurement of the sine wave from the generator, which is a result of the current pushed to the generator during the start up. The speed is supposed to be a verification of corrected air flow.

Speed control should be a priority in the safety logic and for this reason there must be a double reading.

Inlet air filtering

The standard is not clear about the composition of "saliferous atmosphere". If this is referred to an atmosphere that accelerates oxidation, according to the participants it is not available on the market an air filtration system that can prevent oxidation and it would be better to give recommendations aiming to protect electronics and other components from oxidation.

Icing monitoring, dp measuring

The topic is not clear and should be part of the air filtration monitoring. The standard doesn't provide any recommendations on this regard. The participants agreed that measuring a delta pressure on the air filters allows the supervision of both filter clogging and ice build-up.

Waste disposal through combustion

The participants agreed that the chapter 5.9.6 needs to be revised as the waste disposal injection system can create flammable gases and ATEX zones through the turbine path.

Supervision of ventilation flow

From the safety point of view, the ventilation flow monitoring shouldn't be only interlocked to the start-up sequence of the turbine. It was highlighted that the recommendations on the flow monitoring in the chapter 5.17.10 should be revised.

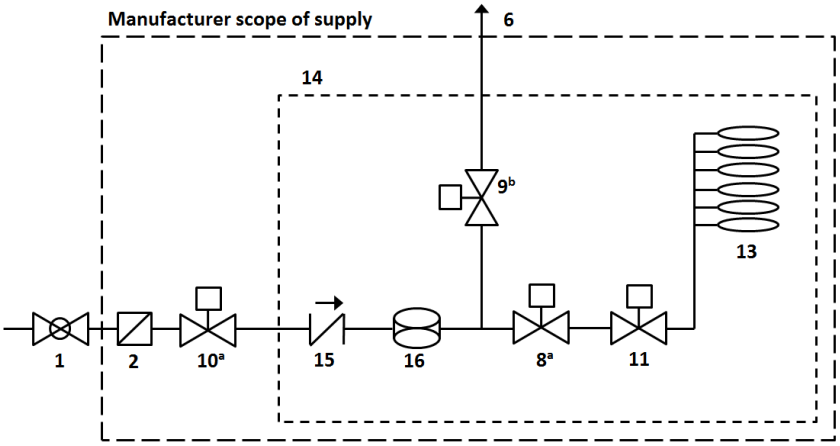
Recuperator

The standard doesn't mention the recuperator, which is a key element of the microturbine package and may impact on the safety. There is a need to investigate the applicability of the Pressure Equipment Directive and the overall design needs to be analysed regarding the lifetime fatigue and safety issues.

Fuel system

It is not clear whether the standard recommends to the manufacturer to supply the parts outside the enclosure limit. The OEMs agreed that they don't supply any part outside the enclosure.

The four different schematics of the fuel systems were shown and discussed. It was agreed that further clarifications should be written for the schematics a), b) and c). Ansaldo highlighted that, according to their design requirements, the schematic d) doesn't comply with safety requirements. Therefore, they would suggest to consider the below schematic to be added to the standard.



It was highlighted that the ISO19372 doesn't cover appropriately the requirements to connect the turbine to the grid, specifically for Europe.

Further details about the topics are available in the presentation ETN ISO19372.

3. Conclusions and next steps

It was agreed that ETN should follow up with the ISO 19372 convenor and report the comments discussed during the meeting.
It was agreed that ETN should also be in contact with the CEN (European Committee for Standardization) in order to discuss a potential cooperation on the European standard.
It was agreed that the next meeting should be organised in the spring 2018 in order to follow up on the cooperation with the ISO committee and the CEN.

Annex I: Action list

Action Owner	Description	Deadline date
ETN	To follow up with the ISO 29372 convenor.	3 November 2017
ETN	To contact the CEN.	3 November 2017