Identification of the installation/facility :

Country:	Italy
Location (city):	Capua (CE)
Name of the facility:	Icing Wind Tunnel (IWT)
Date of construction:	2002
Owner:	Italian Aerospace Research Center (CIRA)
Contact point:	Ing. Antonio Ragni (tel. +39 0823 623526, a.ragni@cira.it)
Internet site:	www.cira.it

Technical characteristics:

1 - Type of infrastructure

Wind tunnel	■
Propulsion bench	☐
Structures facility	☐
Material facility	☐
Simulator (ex. Flight simulator, tower, …)	☐
Flight test bed (aircraft, embedded facilities, …)	☐
Supercomputers	☐
Other	☐

2 - Main technical characteristics

The Icing Wind Tunnel (IWT) is a closed loop circuit, refrigerated, pressurised aerodynamic and icing wind tunnel with three interchangeable test sections and one Open Jet configuration.

TEST SECTION	Dimension [m]	Speed (Mach)	Temperature [°C]	Altitude [m]
MAIN	2.25 x 2.35	0.41	-32 < Ts < +40	7000
SECONDARY	1.15 x 2.35	0.7	-40 < Ts < +40	7000
ADDITIONAL	3.60 x 2.35	0.25	-32 < Ts < +40	7000
OPEN-JET	2.25 x 2.35	0.34	-32 < Ts < +40	7000

The cloud generation for the icing conditions simulation is carried out by the Spray Bar System, able to generate water droplets with diameters (MVD) and Liquid Water Content (LWC) covering the overall envelope prescribed by the FAR 25/29 Appendix C for both continuous and intermittent cloud conditions. Furthermore, the system is capable to generate Super-Cooled Large droplets (SLD), within the range of freezing drizzle conditions. State-of-the-art instrumentation allows CIRA to assess the cloud conditions.

3 - Research domains which can be addressed (refer to ACARE taxonomy
http://www.acare4europe.com/sites/acare4europe.org/files/document/ASD-Annex-final-211004-out-asd.pdf)

AIRCRAFT Sector
What follows is structured in terms of Taxonomy Area -> Doman - Technology

1. Flight Physics
   b. Unsteady aerodynamics – Flow control
   d. Airflow control
   e. High Lift Devices
   f. Wing Design
3. Propulsion
   d. Air-breathing propulsion - Low powered de-icing devices
4. Aircraft Avionics, Systems & Equipment
   Ice Protection Systems
6. Integrated Design & Validation (methods & tools)
   b. Flight/Ground Tests
10. Innovative Concepts & Scenarios
   b. Breakthrough Technologies

4 - Main (or specific) associated measurement techniques

- Droplet sizing techniques (PDPA, FSSP, OAP)
- LWC measurements (icing blade, hot-wire, robust probe)
- Cloud Uniformity measurements (icing grid, cylinders)
- Ice accretion (manual ice tracing, ice thicknesses, laser scanning)
- Infrared thermography
- Particle Image Velocimetry
- Laser Doppler Velocimetry
- Hot-wire anemometry
- Pneumatic measurements

5 - Operational status

Fully operational

6 - Pictures

Fig. 1: General view of the Icing Wind Tunnel (IWT) and close-up of the spray bar system

Fig. 2: Engine flow simulation system

Fig. 3 Typical test articles in the three test sections

Financial elements:

Replacement cost (M€uros)

Less than 10	☐
10 to 30	☐
30 to 60	■
60 to 100	☐
More than 100	☐

Practices concerning:

Access policy: contract or purchase order

Support: national

Comments:

Further information is available on:
http://www.cira.it/en/impianti-en/iwt-icing-wind-tunnel
http://www.youtube.com/watch?v=fKGlpUi_Cps

Origin of information ('signature'): author and date

Ing. Antonio Ragni June 2014