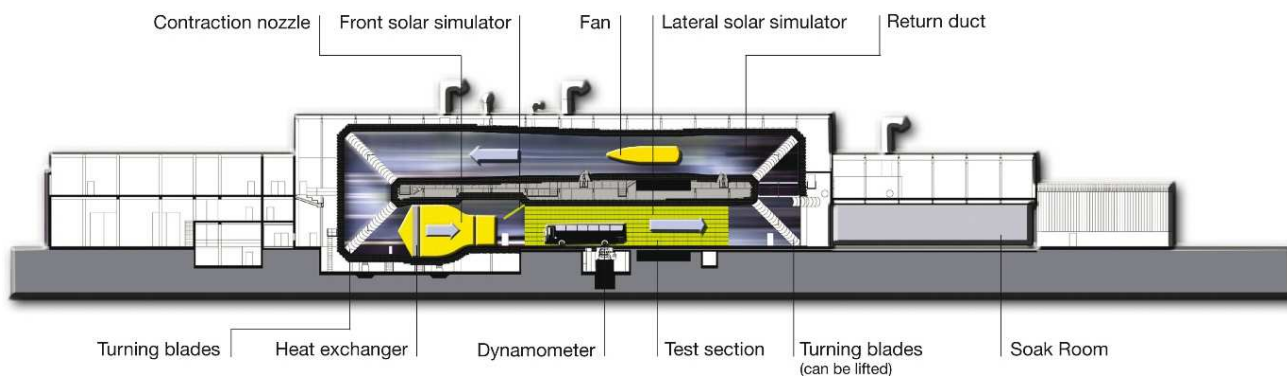
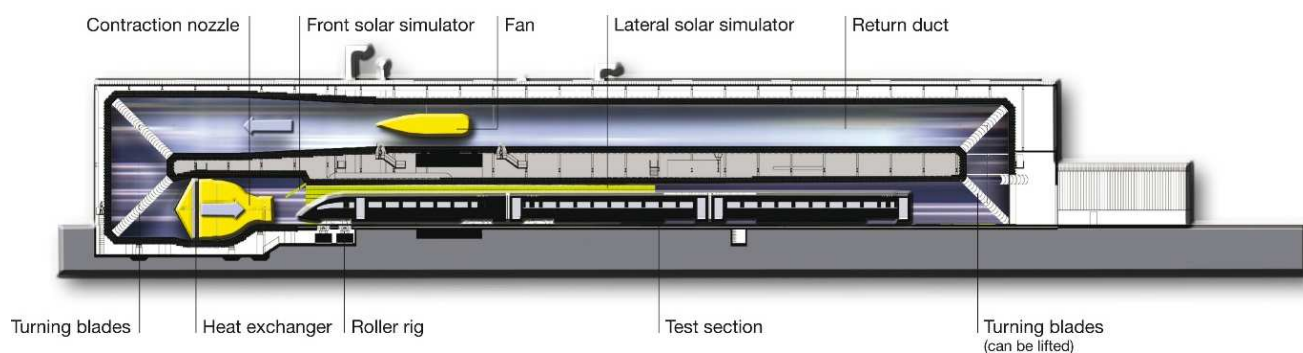


Technical Data Relevant For Aviation Testing

Small Climatic Wind Tunnel (small CWT)



Large Climatic Wind Tunnel (large CWT) / Icing Wind Tunnel (IWT)



Description	small CWT	large CWT / IWT
CWT contraction nozzle dimensions width / height / area	3.5 m / 4.6 m / 16.1 m ²	
Contraction ratio of nozzle	3.98	5.72
Test section width height cross sectional area	4.9 m to 5.1 m 5.9 m to 6.0 m 27.2 m ² to 28.7 m ²	4.9 m to 5.6 m 5.9 m to 6.2 m 27.2 m ² to 32.2 m ²

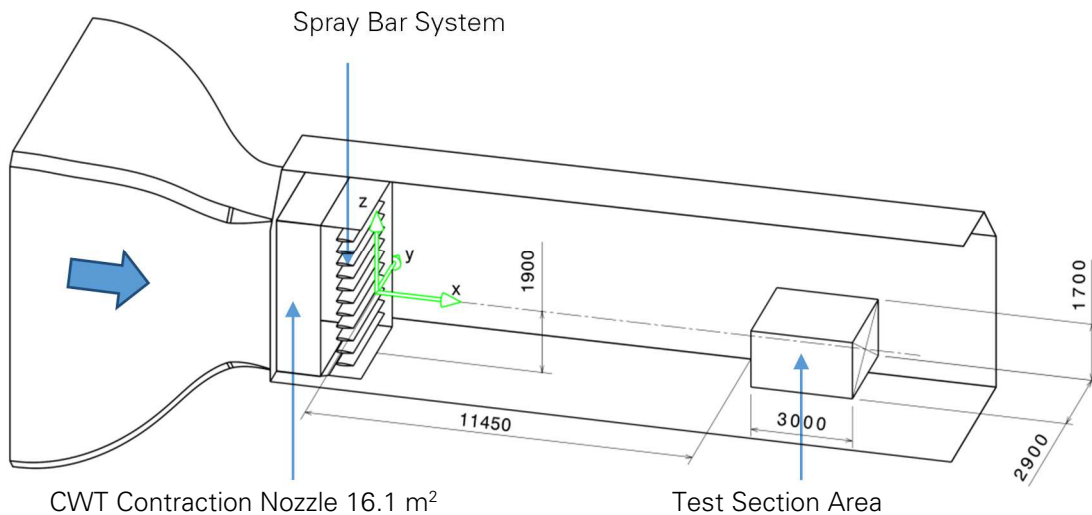
Distance between nozzle / <i>spray bars</i> and start of test section / <i>test area</i>	3.5 m / 11.45 m	
Test section length	33.8 m	100.0 m
Description	small CWT	large CWT / IWT
Dimensions of lateral solar simulator length / height	30.0 m / 4.3 m	60.0 m / 4.3 m
Maximum wind speed	120 km/h	300 km/h
restrictions at low temperatures -20 °C (no load inside CWT)	120 km/h	200 km/h
large and small CWT combined -30 °C (1.1 MW load)	-	150 km/h
Maximum temperature range	-45 °C to +60 °C	
Maximum temperature gradient in the temperature range -20 °C to +60 °C	10 K/h	
Relative humidity at temperatures > +10 °C	10% to 98%	
Solar intensity of lateral solar simulator at fixed 30° angle of incidence operating temperature > -10 °C	200 W/m ² to 1,000 W/m ²	
Solar intensity of front solar simulator maximum wind speed: at incidence angles < 45 ° up to 120 km/h at incidence angles >= 45 ° up to 50 km/h operating temperature > -10 °C	200 W/m ² to 1,000 W/m ²	
Exhaust systems (mixed air)	max. 9 kg/s (20 pound/sec) with +300 °C	
Water supply for water brake system	max. 5.5 bar (80 psi) 700 l/min (11000 gph)	
Kerosene (JetA1) tank for permanent supply	4500 l / max (1200 gallons); 500 l/h (854 pound/h)	
General rain, snow and ground icing systems	stationary ceiling-mounted rain and icing system, mobile (snow) nozzles	

Auxiliary and test voltages for large CWT / IWT	
200 – 1,000 V DC	2 x 175 kVA 350 A max
1,000 – 3,600 V DC	350 kVA 235 A max
3x200–1,000 V 40 – 60 Hz	350 kVA 500 A max
200 – 1,200 V 16 2/3 Hz	350 kVA 350 A max
500 – 1,800 V 40 - 60 Hz	350 kVA 350 A max
3 x 400 V 50 Hz	350 kVA 500 A max
20 – 200 V DC	200 A max

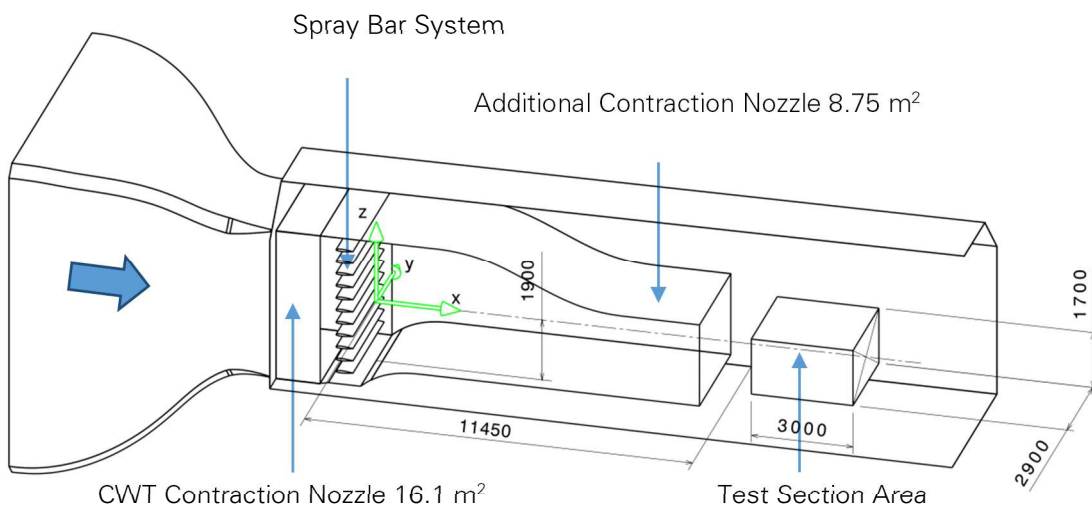
Icing Wind Tunnel (IWT)

The large CWT can be modified into one of the largest IWT worldwide by the temporary installation of a spray bar system (SBS) located at the CWT contraction nozzle exit.

Test setup 1 with 16.1m² contraction nozzle is specially suitable for low speed tests up to 20 m/s:



With an additional contraction nozzle speeds from 10 m/s up to 80 m/s can be achieved in the test section area:



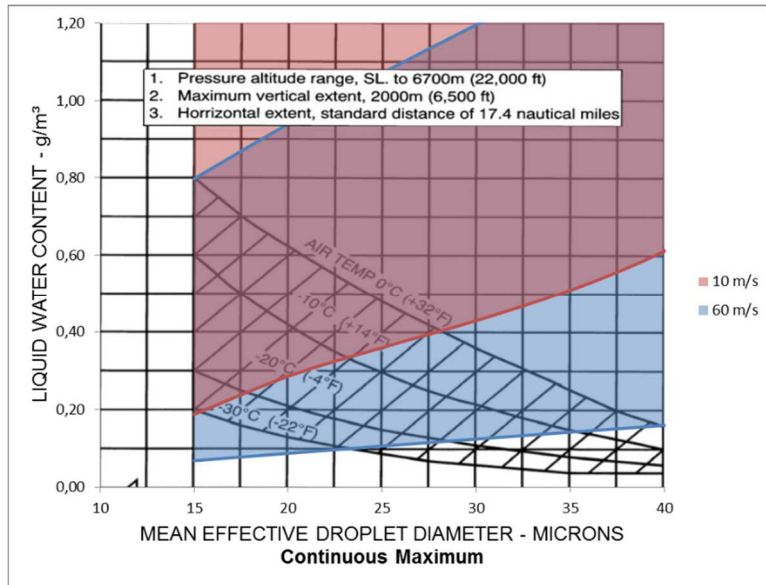
Description	IWT cross section 16.1 m ²	IWT cross section 8.75 m ²
CWT contraction nozzle dimensions width / height	3.5 m / 4.6 m	3.5 m / 2.5 m
Distance between spray bars and start of test section	~ 11.5 m	
Test section length	3 m	3 m
Minimum wind speed	10 m/s	10 m/s
Maximum wind speed	20 m/s	80 m/s
Restrictions at low temperatures		
at -20°C and maximum load of xx kW ¹ inside CWT	20 m/s	xx m/s
at -30°C and maximum load of xx kW ¹ inside CWT	20 m/s	xx m/s
Maximum temperature range for icing cloud simulation	-2°C to -30°C	
LWC range ² at 20 µm MVD	0.15 to 1.4 g/m ³	0.1 to 5.5 g/m ³
LWC range ² at 40 µm MVD	0.3 to 3 g/m ³	0.12 to 8.5 g/m ³
Icing rig water treatment (temperature / conductance)	+2°C to +80°C / 0.06 µS/m	
Icing rig compressed air treatment	up to +80°C	

¹ e.g. with a running engine

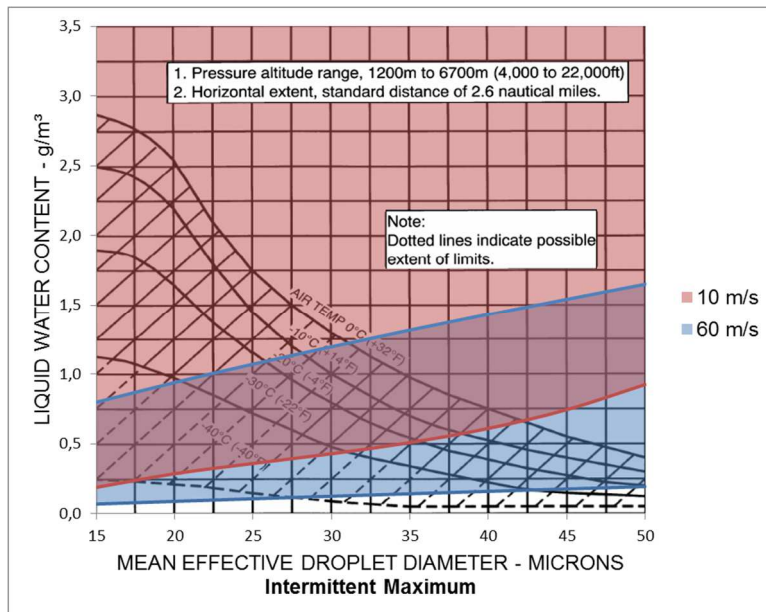
xx.... information not yet but soon available

² calculated value for cross section 8,75m² needs to be validated

The diagrams below show the design icing characteristics envelope of FAR Part 25 Appendix C (respectively EASA CS25 / CS29 Appendix C) in terms of LWC (g/m^3) vs. mean effective droplet diameter (μm). The IWT icing cloud operative envelope is shown by the pink and blue areas for 10 m/s and 60 m/s, respectively.



Continuous maximum (stratiform clouds) atmospheric icing conditions



Intermittent maximum (cumuliform clouds) atmospheric icing conditions