SAE G-12 Fluids Subcommittee
Lisbon, May 2006

AS5900
Some changes

Laboratoire international des matériaux antigivre

LIMA AMIL

Anti-icing Materials International Laboratory

Change #1

1.1 Objective:

. . .

Note: These test methods are based on glycol based fluids, other testing may be required for non-glycol based fluids.

Suggestion by Aerodynamics Working Group and shown to Fluids group in Pittsburgh, :

Change #2

Change for new reference fluid formulation

Paragraph 2.1.3
Reference fluid:

Component	**Percent by Weight**
Propylene Glycol	68.0
Tripropylene Glycol	20.0
Demineralized Water	12.0

The fluid shall be homogenous.

Change #3

Some additions for clarity

3.1.3 Design Features: The test duct floor shall be horizontal, while the ceiling shall slope upward linearly 8 mm from Station 2 to Station 3.

a. for High Speed Ramp Tests duct surfaces shall be hydraulically smooth, resulting in a dry BLDT ≤ 3.0 mm at Station 3, ***at 65 m/s ± 5.***

b. or Low Speed Ramp Tests duct surfaces shall be hydraulically smooth, resulting in a dry BLDT ≤ 3.3 mm at Station 3, at 35 m/s ***± 3.***

Change #4

To reflect reality: change 4 mm to 3 mm

3.5.2 Test Duct Gas Pressures:

3.5.2.1 Total Pressure, P_1: May be measured as the static pressure in the settling chamber immediately upstream of the test duct, Station 1, using a ***3*** mm diameter flush orifice tapped into the chamber sidewall if the velocities are low, in accordance with standard wind tunnel practice.

3.2.5.2 Inlet Static Pressure, P_2: Measured using a ***3*** mm diameter flush orifice tapped into the middle of the ceiling at Station 2, free of flow disturbances from the Station 2 temperature probe.

3.2.5.3 Outlet Static Pressure, P_3: Measured using a ***3*** mm diameter flush orifice tapped into the middle of the ceiling at Station 3.

This is what AMIL has always been using in both wind tunnels, equivalent to 1/8''

Change #5

Paragraph 5.1

Each fluid shall be tested at selected fluid temperature including 0, ***-10 (in the case of Type II, III and IV fluids)*** and -20 °C, or to the coldest usable test fluid temperature identified by the fluid manufacturer (if colder than -20 °C in approximately 10 °C increments). Each fluid shall be tested at a minimum of three target temperatures (not necessarily the exact same temperatures).

[A1] Change voted at Fluids meeting Pittsburgh May05

Issue

Aerospace Standard 5900 Paragraph 7.1:

…

Each fluid shall be tested at selected fluid temperature including 0 to -20 °C, or to the coldest usable test fluid temperature identified by the fluid manufacturer (if colder than -20 °C in approximately 10 °C increments). *Each fluid shall be tested at a minimum of three target temperatures* (not necessarily the exact same temperatures). Three BLDT measurements shall be made within ± 3 °C at each target temperature to improve data precision and accuracy. BLDT measurements of the dry test duct shall also be made immediately prior to and after each target temperature sub-set of fluid BLDT measurements. *A minimum set of nine BLDT measurements* shall be performed in conjunction with the fluid measurements for a minimum of 36 BLDT measurements.

Can be interpreted to: 0, -20 and LOUT

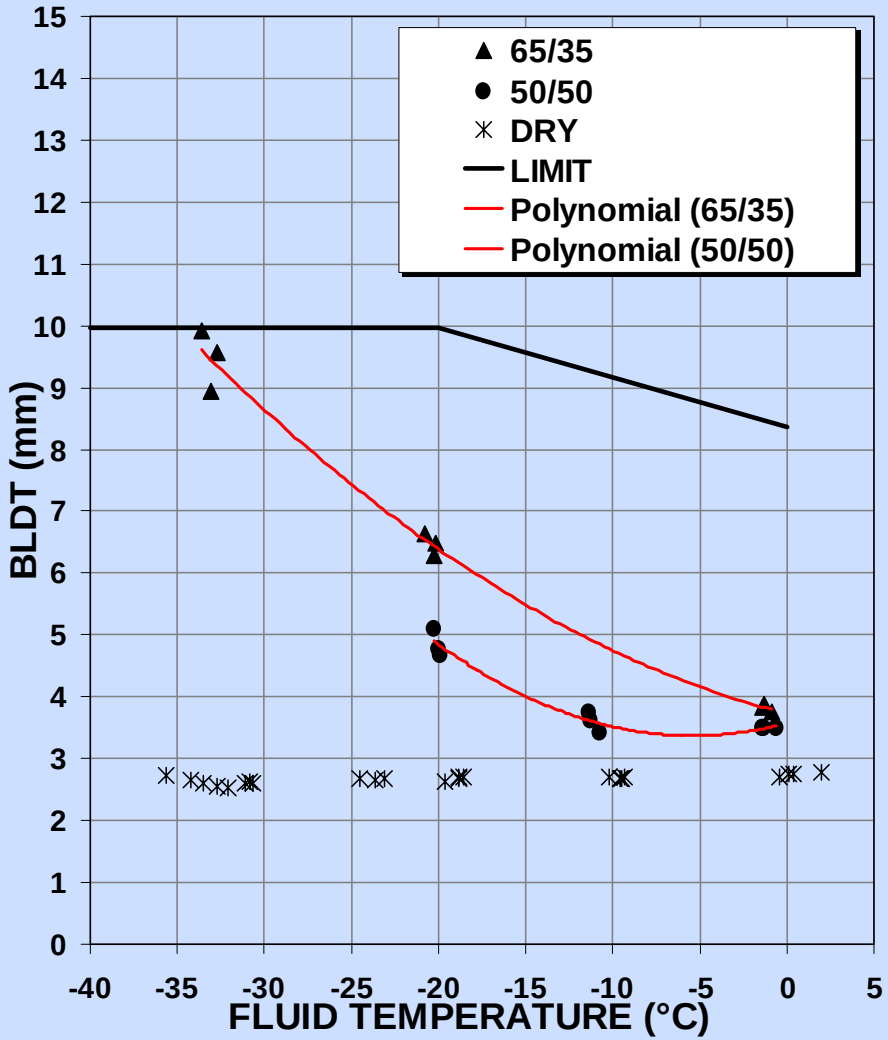
Probably

Aerospace Standard 5900 Paragraph 5.1:

Each fluid shall be tested at selected fluid temperature including 0 to -20 °C, or to the coldest usable test fluid temperature identified by the fluid manufacturer (if colder than -20 °C (in approximately 10 °C increments). *Each fluid shall be tested at a minimum of three target temperatures* (not necessarily the exact same temperatures). Three BLDT measurements shall be made within ± 3 °C at each target temperature to improve data precision and accuracy. BLDT measurements of the dry test duct shall also be made immediately prior to and after each target temperature sub-set of fluid BLDT measurements. *A minimum set of nine BLDT measurements* shall be performed in conjunction with the fluid measurements for a minimum of 36 BLDT measurements.

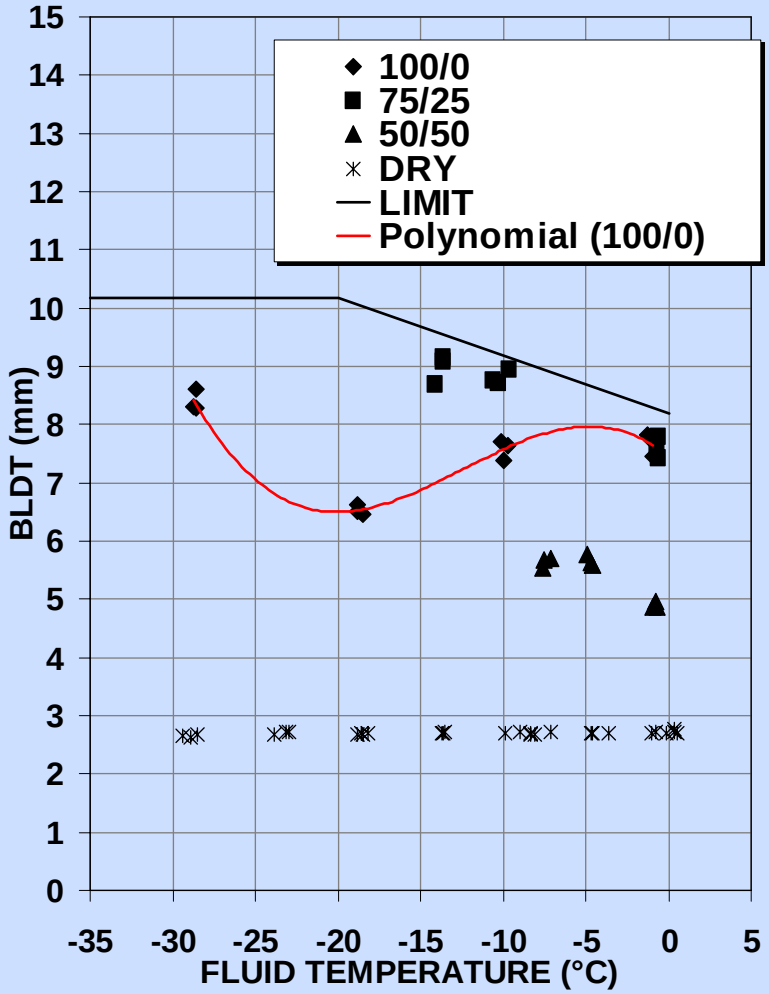
Must be: 0, -10, -20 *(-30)* and LOUT

Type I Example Trend



BLDT ↑ with ↓ T

Type IV Example Trend



BLDT ↑ with ↓ T, then ↓, then ↑

Suggested Change

If we decide not to move the coma back to its intent, at least:

Aerospace Standard 5900 Paragraph 7.1:

Each fluid shall be tested at selected fluid temperature including 0**, -10** ***(in the case of Type II, III and IV fluids)*** **and** -20 °C, or to the coldest usable test fluid temperature identified by the fluid manufacturer (if colder than -20 °C in approximately 10 °C increments). *Each fluid shall be tested at a minimum of three target temperatures* (not necessarily the exact same temperatures). Three BLDT measurements shall be made within ± 3 °C at each target temperature to improve data precision and accuracy. BLDT measurements of the dry test duct shall also be made immediately prior to and after each target temperature sub-set of fluid BLDT measurements. *A minimum set of nine BLDT measurements* shall be performed in conjunction with the fluid measurements for a minimum of 36 BLDT measurements.

Change #6

Request from Aerodynamics Working Group for better reproducibility of the results

5.5.1 General Accuracy: A measure of accuracy of the overall procedure is provided by test duplication. Expected accuracy on δ^*_f value (at a given precise temperature) is about ±0.1 mm. Consequently, taking into account the temperature sensitivity of the results (about 0.2 mm/°C), the δ^*_f ***and*** δ^*_r values from various identical tests performed at temperatures within ±1 °C shall be within ±0.3 mm.

Next Step

Check the reference fluid in low speed ramp

Ballot