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USA-Russia Energy Efficient Window Tests and Simulation Round-Robin
Американо-Российские сравнительные теплотехнические испытания
энергоэффективных окон

1. Goals – Цели и задачи

The main goal of this project is to compare and evaluate the different methods of determining thermal properties of sample windows using hot-box testing, and climatic chamber methods, typical for Russian laboratories and compare obtained testing results with simulation by WINDOW 5.1 and THERM 5.1. The benefit of this project is that the discrepancy between labs would be reduced and differences in two testing methods (both in Russia and in USA) can be better understood.

2. Test methods (USA & Russia), and resulting performance indices:
Методы испытаний, сравниваемые характеристики

USA: standard “NFRC 100 – 2002: NFRC Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems”

Russia: standard (NIISP) “GOST 26602.1-99 WINDOWS and DOORS. Methods of determining of overall thermal resistance”

Performance Indices:

- a) U-factor [$W/(m^2K)$] and overall resistance R_o [m^2C/W];
- b) Not dimensional temperature difference ΔT between surface temperature of center of glazing τ_{cg} and lowest surface temperature of the window τ_{lw} $\Delta T = (\tau_{cg} - \tau_{lw}) / (T_{in} - T_{out})$, where T_{in} , T_{out} - average air temperatures of hot and cold chambers accordingly
- c) So far as USA and Russian standards use different standard values for inner and outer film coefficients and therefore it is necessary to standardize results in a consistent way in order to be able to compare them between each other and to simulation. The table with the final results could be of the form presented in Table 1.

3. Considered window types and materials:

Типы образцов окон и . . .

It is proposed to consider three major window types for this project, incorporating materials that are typical in both countries. The following are suggested operating types:

- a) Casement window (perhaps tilt and turn design?)
- b) Horizontal slider
- c) Curtain wall

Table 1. Sample table with the final results

No	Laboratory	Climatic Chamb.		Climatic Chamb. Standardized		Hot Box		Hot-Box Standardized	
		$R_o \pm \Delta R_o\%$ m^2C/W	$U_o \pm \Delta U_o\%$ $W/(m^2K)$	$R_o \pm \Delta R_o\%$ m^2C/W	$U_o \pm \Delta U_o\%$ $W/(m^2K)$	$R_o \pm \Delta R_o\%$ m^2C/W	$U_o \pm \Delta U_o\%$ $W/(m^2K)$	$R_o \pm \Delta R_o\%$ m^2C/W	$U_o \pm \Delta U_o\%$ $W/(m^2K)$
1									
...	...								
n									

The comparison of R_o/U_o between USA and Russia labs makes by [USA standard](#).

Type of window frames:

- a) Wood
- b) PVC
- c) T/B Aluminum

Types of glazing options:

- a) Double glazed
- b) Low-e coating
- c) Argon filled

For simulations it will be necessary to obtain detailed drawings with *dfx*-files, bill of materials, geometry of the spacers, etc.

4. **USA test laboratories** – list and characteristics of each lab (Bipin to provide)

Список и характеристики испытательных лабораторий США, участвующих в испытаниях

5. **Russian test laboratories** – list and characteristics of each lab

Список и характеристики российских испытательных лабораторий, участвующих в испытаниях

- Institute of Building Physics (Moscow)/ Москва, НИИСтройфизики

- Krasnoyarskstroycertifikatsiya (Krasnoyarsk)- building certification organization
- Samarastroycertifikatsiya (Samara) - building certification organization
- Saratovstroycertifikatsiya (Saratov) - building certification organization
- Research building institute Mosstroy (Moscow)/НИИМосстрой

The description of each laboratory needs to have complete information about labs and how they make tests:

- Mail address, e-mail address, name of leader;
- Description of climate camera with drawings
- list of measurement instruments (particularly thermo-sensors and secondary apparatus and procedure for treatment information from sensors),
- intervals between measurements temperature and fluxes, how often making checkout of thermo-sensors and apparatus for supporting steady temperature in cold-side and warm-side cameras (chambers)
- what procedure and equipment used for this

Each laboratory also need to provide one complete example of testing with complete documentation.

Recommendation: it is very desirable to have presence of independent but competent person in time of test and corresponding report about it.

6. **Funding** – Supposed cost of Russian part of the work is 15 k\$.

Финансирование организации и проведения испытаний

7. **Dates and terms:** The job will be completed after the 4 month after the payment and the arrival of the testing samples.

Сроки проведения испытаний

8. **Person, responsible for organization of testing:**

USA: ??? (Bipin, Charlie?)

Ответственные за организацию и проведение испытаний

Russia: Spiridonov A.V (APROK, Moscow) / Спиридонов А. В. (АПРОК, Москва, Локомотивный пр. 21, 095-482-4012)

Recommendations:

Issue of booklet (NFRC-APROK) about results and experience of conducting of international round-robin tests.

Issue of special web-site page (NFRC, APROK, CEERE) with descriptions and results of international round-robin tests.

Not bad idea is possibility of download used sample drawings in order to anybody can check himself.

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