



# **National Fenestration Rating Council Incorporated**

**NFRC 703-2010[E1A1]**

**Research Program Manual**

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## ***FOREWORD***

The National Fenestration Rating Council, Incorporated ("NFRC") has developed and operates a uniform rating system for energy and energy-related performance of fenestration products. The Rating System determines the U-factor, Solar Heat Gain Coefficient (SHGC), and Visible Transmittance (VT) of a product, which are mandatory ratings for labeling NFRC certified products and are mandatory ratings for inclusion on label certificates, and are supplemented by procedures for voluntary ratings of products for Air Leakage (AL), and Condensation Resistance. Together, these rating procedures, as set forth in documents published by NFRC, are known as the NFRC Rating System.

The Rating System employs computer simulation and physical testing by NFRC-accredited laboratories to establish energy and related performance ratings for fenestration product types. The Rating System is reinforced by a certification program under which NFRC-licensed responsible parties claiming NFRC product certification shall label and certify fenestration products to indicate those energy and related performance ratings, provided the ratings are authorized for certification by an NFRC-licensed certification and Inspection Agency (IA).

The requirements of the rating, certification, and labeling program (the "Certification Program") are set forth in the most recent versions of the following as amended, updated or interpreted from time to time:

- NFRC 700 Product Certification Program (the "PCP")
- NFRC 705 Component Modeling Approach ("CMA") Product Certification Program (the "CMA-PCP").

Through the Certification Programs and the most recent versions of its companion programs as amended, updated or interpreted from time to time:

- The laboratory accreditation program (the "Accreditation Program"), set forth in the NFRC 701 Laboratory Accreditation Program (the "LAP")
- The IA licensing program (the "IA Program"), set forth in NFRC 702 Certification Agency Program (the "CAP")
- The CMA Approved Calculation Entity ("ACE") licensing program (the "ACE Program")

as set forth in the NFRC 708 Calculation Entity Approval Program (the "CEAP"), NFRC intends to ensure the integrity and uniformity of NFRC ratings, certification, and labeling by ensuring that responsible parties, testing and simulation laboratories, and IAs adhere to strict NFRC requirements.

In order to participate in the Certification Programs, a manufacturer / responsible party shall rate a product whose energy and energy-related performance characteristics are to be certified in accordance with mandatory NFRC rating procedures. At present, a manufacturer/responsible party may elect to rate products for U-factor, SHGC, VT, Air Leakage, Condensation Resistance, or any other procedure adopted by NFRC, and to include those ratings on the NFRC temporary label affixed to its products, or on the NFRC Label Certificate. U-factor, SHGC and VT, AL, and Condensation Resistance rating reports shall be obtained from a laboratory, which has been accredited by NFRC in accordance with the requirements of the NFRC 701.

The rating shall then be reviewed by an IA which has been licensed by NFRC in accordance with the requirements of the NFRC 702. NFRC-licensed IAs also review label format and content, conduct in-plant inspections for quality assurance in accordance with the requirements of the NFRC 702, and issue a product Certification Authorization Report (CAR), or approve for issuance an NFRC Label Certificate for site-built or CMA products and attachment products. The IA is also responsible for the investigation of potential violations (prohibited activities) as set forth in the NFRC 707 Compliance and Monitoring Program.

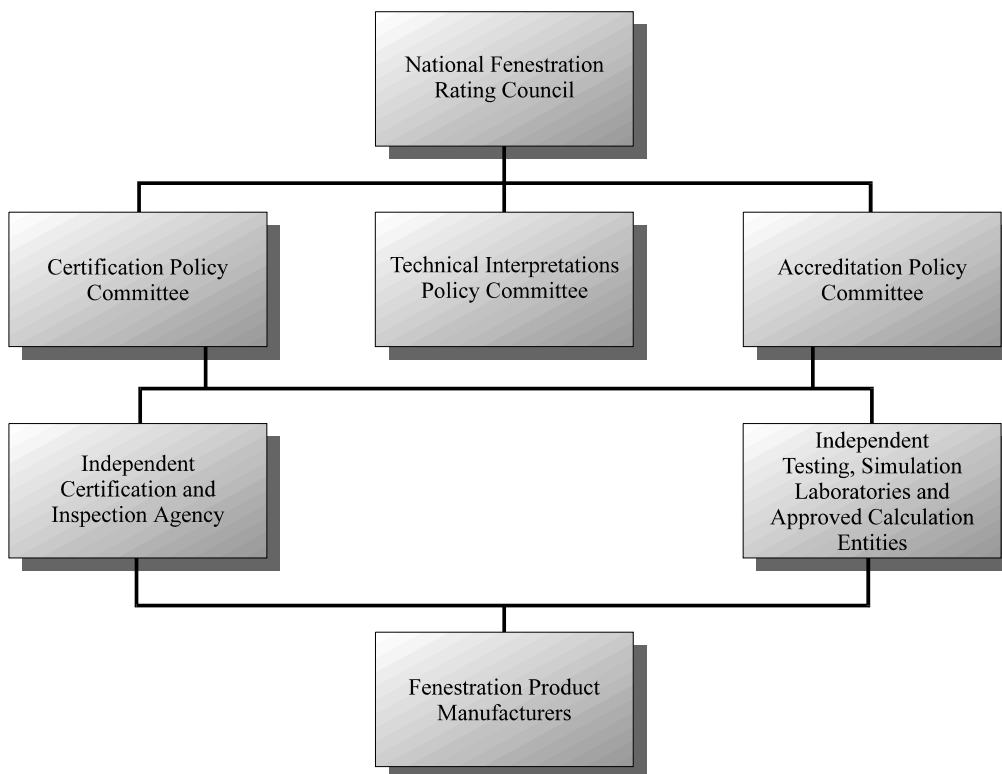
Ratings for products that are labeled with the NFRC Temporary and Permanent Label, or products that are listed on an NFRC Label Certificate, in accordance with NFRC requirements, are considered to be NFRC-certified. NFRC maintains a Certified Products Directory (CPD), listing product lines and individual products selected by the manufacturer/responsible party for which certification authorization has been granted.

NFRC manages the Rating System and regulates the Product Certification Program (PCP), Laboratory Accreditation Program (LAP) and Certification Agency Program (CAP) in accordance with the NFRC 700 (PCP), the NFRC 701 (LAP), the NFRC 702 (CAP), the NFRC 705 (CMA-PCP), and the NFRC 708 (CEAP) procedures, and conducts compliance activities under all these programs as well as the NFRC 707 Compliance and Monitoring Program (CAMP). NFRC continues to develop the Rating System and each of the programs.

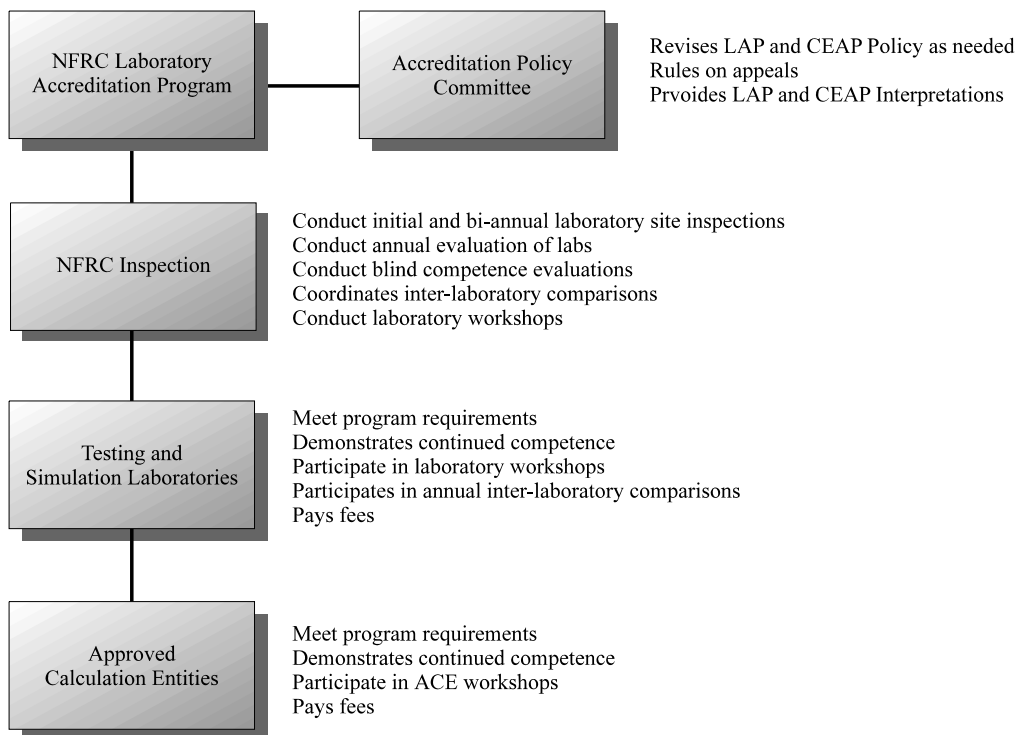
NFRC owns all rights in and to each of the NFRC 700, NFRC 701, NFRC 702, NFRC 705, NFRC 707, NFRC 708 and each procedure, which is a component of the Rating System, as well as each of its registration marks, trade names, and other intellectual property.

The structure of the NFRC program and relationships among participants are shown in Figure 1, Figure 2, and Figure 3. For additional information on the roles of the IAs and laboratories and operation of the IA Program and Accreditation Program, see the NFRC 700 (PCP), NFRC 701 (LAP), and NFRC 702 (CAP) respectively.

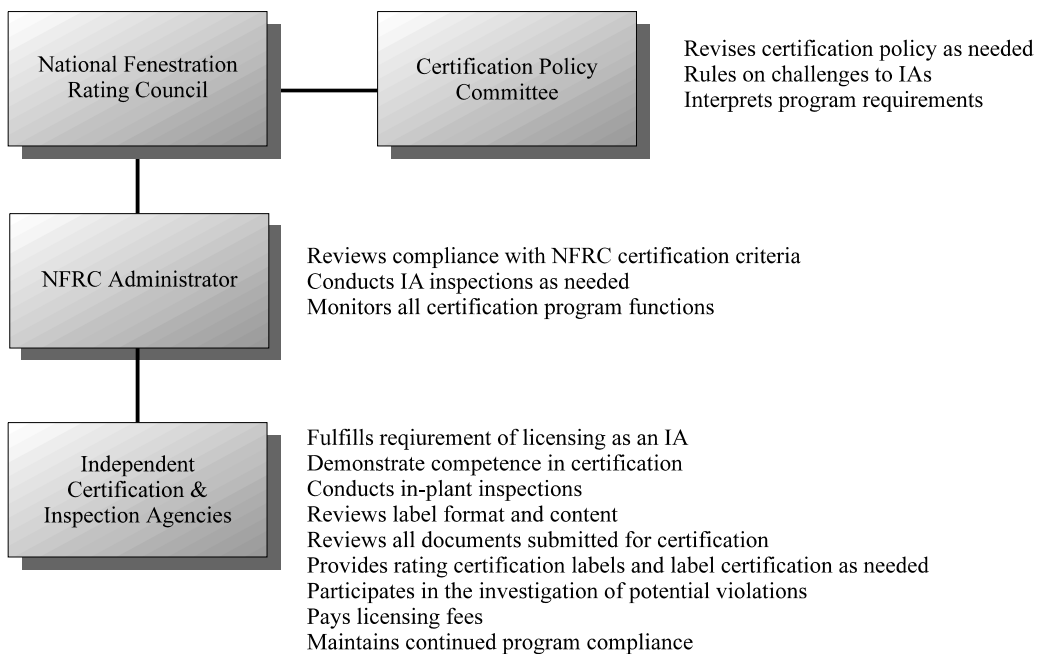
**Figure 1**



**Figure 2**



**Figure 3**



Questions on the use of this procedure should be addressed to:

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### ***DISCLAIMER***

NFRC certification is the authorized act of a manufacturer/responsible party in: (a) labeling a fenestration or related attachment product with an NFRC Permanent Label and NFRC Temporary Label, or (b) generating a site built or CMA label certificate, either of which bears one or more energy performance ratings reported by NFRC-accredited simulation and testing laboratories and authorized for certification by an NFRC-licensed IA. Each of these participants acts independently to report, authorize certification, and certify the energy-related ratings of fenestration and related attachment products.

NFRC does not certify a product and certification does not constitute a warranty of NFRC regarding any characteristic of a fenestration or fenestration-related attachment product. Certification is not an endorsement of or recommendation for any product or product line or any attribute of a product or product line. NFRC is not a merchant in the business of selling fenestration products or fenestration-related products, and therefore cannot warrant products as to their merchantability or fitness for a particular use.

NFRC THEREFORE DISCLAIMS ANY AND ALL LIABILITY THAT MAY ARISE FROM OR IN CONNECTION WITH SERVICES PROVIDED BY, DECISIONS MADE BY OR REPORTS OR CERTIFICATIONS ISSUED OR GRANTED BY ANY NFRC-ACCREDITED LABORATORY, NFRC-LICENSED IA OR ANY PRODUCT MANUFACTURER/ RESPONSIBLE PARTY; RELIANCE ON ANY NFRC PRODUCT DESCRIPTION, SPECIFICATION, RATING, TEST OR CERTIFICATION, WHETHER APPEARING IN A REPORT, A PRODUCT CERTIFICATION AUTHORIZATION OR A PRINTED OR ELECTRONIC DIRECTORY, OR ON A LABEL, OR ON A LABEL CERTIFICATE; OR THE SALE OR USE OF ANY NFRC-RATED OR CERTIFIED PRODUCT OR PRODUCT LINE; INCLUDING BUT NOT LIMITED TO DAMAGES FOR PERSONAL OR OTHER INJURY, LOST PROFITS, LOST SAVINGS OR OTHER CONSEQUENTIAL OR INCIDENTAL DAMAGES.

NFRC program participants are required to indemnify NFRC from and against such liability.



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[**Note 1:** Current NFRC operating policies permit requests for funding to be made directly to the Board of Directors. Refer to the Operating Policies Manual for situations where it is necessary to have funding approved in a shorter period than is presented in this manual.]

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## **1. Submitting and Approving the Request for Proposals (RFP) [or research project request]**

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- 1.1. The proponent(s) shall initially prepare a Request for Proposals (RFP) Summary Page, hereafter referred to as *Summary Page*, and submit it to the NFRC Research Subcommittee Chair thirty days prior to a regularly scheduled NFRC Research Subcommittee meeting so that it can be included in the information packet for that meeting. The Summary Page shall be made an agenda item for that meeting. See Appendix B for an example of a Summary Page.
- 1.2. If the Summary Page has not been received by the Research Subcommittee Chair 30 days prior to a regularly scheduled meeting, then whether the Summary Page is made an agenda item for that meeting shall be at the Research Subcommittee Chair's discretion. If the Research Subcommittee Chair makes the Summary Page an agenda item for that meeting, then the proponent(s) shall be responsible for providing overhead transparencies and a minimum of thirty-five copies of the Summary Page for the meeting. In this case, however, the proponent(s) should be advised that the Research Subcommittee members may not have sufficient opportunity to review the Summary Page prior to the meeting and may postpone ruling on the Summary Page until the next regularly scheduled meeting.
- 1.3. The Summary Page shall contain, as a minimum, the following information:
  - 1.3.1. Title of the research project
  - 1.3.2. Name(s) of the proponent(s)
  - 1.3.3. Date of submittal
  - 1.3.4. Background information
  - 1.3.5. Statement of the objective(s) of the research project
  - 1.3.6. Statement of the benefit this research project will provide to NFRC.
  - 1.3.7. Estimated cost range (minimum to maximum).
  - 1.3.8. Estimated duration
  - 1.3.9. Potential cosponsors.
  - 1.3.10. Statement as to whether the project is or is not sole sourced, and an explanation as to why it must be sole sourced, if applicable.

[**Note 2:** Although the Summary Page shall include the above information, it is not the intent that the Summary Page must include specific, final details of the project. Rather, it is intended that the Summary Page be a "first draft" presentation to the Research Subcommittee, with the intent of communicating the concept of the proposed project.]

- 1.4. The NFRC L2RPG (Long Range Research Planning Group) shall convene to review the Summary Page and set its relative priority in light of the current prioritized list of desired research initiatives. The findings of this group shall be presented during the discussion of the Summary Page at the next Research Subcommittee meeting so that the membership may include the L2RPG's findings as they weigh the approval of the Summary Page.
- 1.5. The Summary Page shall be presented by the proponent(s) at the Research Subcommittee meeting along with the findings of the L2RPG as to the relative priority of this proposed research in light of the current prioritized list of desired research initiatives. The membership shall discuss, and if necessary vote on, the details of the Summary Page and the importance of the research project to NFRC. The comments received at the meeting should guide the proponent(s) in the development of the Draft Request for Proposals. If the membership considers the proposed research to be of low priority, the proponent(s) may choose not to develop it further.
- 1.6. If the Research Subcommittee approves the Summary Page, the proponent(s) shall make the necessary revisions to convert the Summary Page into a Draft Request for Proposals, hereafter referred to as "draft RFP." The Research Subcommittee Chair and/or NFRC Staff may assist in preparing the Draft RFP if necessary. If the Research Subcommittee does not approve the Summary Page, the proponent should consider the proposed research, as presented, not to be of sufficient value to NFRC to receive support.
- 1.7. If the Research Subcommittee approves the Summary Page, it is assigned a unique *Project Number* that will stay with it for the life of the project along with a two-digit designator that describes the current state of the project. The number shall be designated with the following format: XX-YYY-\*\*. XX shall denote the last two digits of the current calendar year at the time the summary page is approved. YYY shall denote a sequential three-digit number that starts with 101 for every calendar year. Every new project shall get the next available sequential number for that calendar year. The Research Subcommittee chair and the NFRC Staff Technical Director shall maintain the list of projects (at all stages). The \*\* shall denote the various states that a project goes through in its lifecycle. The following chart will define the two digit codes. When these designators get changed is defined throughout the various steps in this document.

***AS - Approved summary page:*** After a summary page is approved by the Research Subcommittee

***DR# - Draft RFP:*** (The number will denote the current version of the draft RFP) After the Draft RFP that will be discussed in Research Subcommittee is handed into the Research Subcommittee chair. If, at any point in time during the Draft RFP review and approval process, the Draft RFP is modified, a new version number shall be sequenced after the status designator. For example, a modification made on the original draft RFP shall reflect that change with a modified status designator to DR2.

***AR - Approved RFP:*** After Board approval of the Draft RFP

***RP - Research Project:*** This designation lets all interested parties know that a bid has been accepted for the project and all awardees and NFRC have signed the necessary contract to begin the work.

***CP – Completed Project***

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## **2. Preparing and Approving the Draft RFP**

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2.1. The proponent(s) shall prepare a Draft RFP(s) that shall contain, as a minimum, the following information. See Appendix C for an example of a Draft RFP:

2.1.1. Title of the research project

2.1.2. The Project Number that was assigned during the summary page phase with the status designator changed to DR#

2.1.3. Name(s) of the proponent(s)

2.1.4. Date of submittal.

2.1.5. Background information

2.1.6. Statement of the objective(s) of the research project

2.1.7. Required deliverables of the research project

NOTE: All NFRC supported research projects are required to deliver a final report as well as a slide presentation at the conclusion of the research. The report will be archived on the NFRC website and the slide presentation will be given at the next Research Subcommittee meeting.

2.1.8. Detailed statement of the scope and desired approach of the research project in accomplishing the stated objectives

2.1.9. Estimated cost range (minimum to maximum). The Material cost and Labor cost shall be listed separately.

2.1.10. Estimated duration

2.1.11. References/Bibliography

2.1.12. Statement of resources expected to be requested from NFRC, such as but not limited to:

2.1.12.1. Direct funding, including funding necessary to publish a peer reviewed research paper or papers, if applicable

2.1.12.2. Staff or membership labor

2.1.12.3. Facilities or equipment

2.1.12.4. Test specimens

2.1.12.5. Other

2.1.13. Statement of resources expected to be sought from sources other than NFRC.

- 2.2. Although not mandatory, it is recommended that the Draft RFP also contain the following:
  - 2.2.1. An expected partial payment schedule
  - 2.2.2. A list of potential bidders. NOTE: NFRC Staff shall maintain a list of potential bidders that shall receive all RFPs approved by NFRC. This list shall be periodically evaluated and updated, as necessary.
- 2.3. When the Draft RFP is acceptable to the proponent(s) and the Research Subcommittee Chair, it shall be made an agenda item for the next Research Subcommittee meeting. The Draft RFP shall be submitted to NFRC Staff no less than 30 days prior to the next scheduled meeting so that it can be included in the information packet for that meeting.
- 2.4. The proponent(s) shall make a formal presentation of the Draft RFP at the Research Subcommittee meeting. The purpose of this presentation is to communicate the intent and concept of the research project to the Research Subcommittee membership, and address any questions or concerns the members might have. If not previously addressed, a presentation from a representative of the L2RPG shall be made to the Research Subcommittee to discuss how the proposed research aligns with the current priority list of desired research initiatives.
- 2.5. At this meeting, the Research Subcommittee membership shall choose one of two possible actions:
  - 2.5.1. Approve the Draft RFP (possibly with editorial changes agreed to by the proponent(s)), and direct the Research Subcommittee Chair to take the Draft RFP forward to the next NFRC Research and Technology Committee meeting;
  - 2.5.2. Reject the Draft RFP, with either an explanation of:
    - 2.5.2.1. why this is not the type of research that NFRC is willing to consider or,
    - 2.5.2.2. specific recommendations for significant revisions to the Draft RFP to be incorporated before submitting the Draft RFP to the next Research Subcommittee meeting for additional consideration;
- 2.6. If the Research Subcommittee approves the Draft RFP, the Research Subcommittee Chair shall create a *Bid Review Task Group (BRTG)* for the project. The BRTG shall be made up of three to five members with one member acting as the BRTG Chair. An NFRC Staff member shall also be assigned to every BRTG to provide operational assistance as required. The BRTG shall be responsible for thoroughly reviewing all bid proposals received for the project, and for making a recommendation to the Research Subcommittee at its next scheduled meeting as to whom the bid should be awarded.

[*Note 1.*: The BRTG is formed at this time because the BRTG members will have to review all the bids prior to the next NFRC Research Subcommittee meeting. After the Board of Directors approves the Draft RFP, it will be converted into the actual RFP and be sent out to prospective bidders by NFRC Staff shortly after the Board meeting. The prospective bidders usually must respond within 45 days. When NFRC Staff receives these bid proposals, they will be quickly forwarded to the members of the BRTG for review and evaluation. The members of the BRTG

should be made aware of the significant time and effort that will be expected of them, and the short time period until the next Research Subcommittee meeting.]

- 2.7. The Research Subcommittee Chair shall present the approved Draft RFP to the Research and Technology Committee at its next regularly scheduled meeting. The proponent(s) of the project shall be present at the Research and Technology Committee meeting to address any questions or concerns raised by the members.
- 2.8. If the Research and Technology Committee rejects the Draft RFP, then depending on specific instructions from the Research and Technology Committee, either the Draft RFP shall be further revised and then resubmitted to the Research and Technology Committee at their next regularly scheduled meeting or the Research and Technology Committee shall direct the Research Subcommittee how to proceed with the research proposal.
- 2.9. If the Research and Technology Committee approves the Draft RFP (possibly with editorial changes agreed to by the proponent(s)), the Research and Technology Committee Chair shall present it to the Board of Directors at its next regularly scheduled meeting. Although it is not mandatory, it is recommended that the proponent(s) of the project be present at the Board of Directors meeting to address any questions or concerns raised by the directors.
- 2.10. The Board of Directors shall either approve or reject the Draft RFP. If rejected, the Draft RFP shall be returned to the Research and Technology Committee with specific instructions from the Board as to the handling of the proposed RFP

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### **3. Preparing the Final RFP and Soliciting Bids**

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- 3.1. Once the Board of Directors approves the Draft RFP, the proponent(s) shall create an RFP based on the Draft RFP. The Research Subcommittee Chair and/or NFRC Staff shall assist/participate in preparing the RFP if necessary. The RFP shall be completed within forty-five days following approval of the Draft RFP by the Board of Directors. The final RFP shall include the NFRC agreement requirements (see Appendix G.) and other necessary and helpful documents to assist any potential bidders.
- 3.2. Once the RFP is complete, it will immediately have its status designator changed to AR. After this point, there shall not be any modifications made to the RFP as it will be used to request bids. In addition, it shall be announced (by posting on the NFRC web site and other means) and NFRC Staff shall mail, or email, it out to any interested parties as well as to all entrants on the NFRC standing RFP recipient list. The standing RFP recipient list shall be maintained by the staff liaison to the Research Subcommittee. The proponent(s) may also recommend potential bidders.
- 3.3. RFP packages shall be sent with instructions that two copies of all bid proposals must be received by NFRC by the deadline specified (generally within forty-five days of the notification date). To aid potential bidders, the NFRC document *Guide to Proposal Preparation* will be made available to these bidders via mail, email, or on the NFRC web site.

- 3.4. NFRC Staff shall mail or scan and email all bids received by the specified deadline to the Research Subcommittee Chair and to each member of the BRTG. Each member of the BRTG shall review and evaluate each proposal using the evaluation form presented in Appendix D. The BRTG shall meet before the Research Subcommittee meeting to review their individual findings, compile their results, and come to a consensus as to whom the bid should be awarded. The BRTG meeting may be convened via conference call if necessary.
- 3.5. The findings and recommendation of the BRTG shall be presented at the next Research Subcommittee meeting. The Research Subcommittee members shall consider the recommendations of the BRTG and vote as to whom the bid should be awarded.
  - 3.5.1. It shall be permitted to expedite awarding of the bid for any given project, under the following conditions:
    - 3.5.1.1. The total project amount is no more than \$7,500.
    - 3.5.1.2. The project proponent(s) submit a written request to expedite to the BRTG chair.
    - 3.5.1.3. Both the BRTG and the Research Subcommittee chair approve the request to expedite.
  - 3.5.2. If all three above conditions are met, then the BRTG chair shall send an email notification to the entire membership of the Research Subcommittee and the Research and Technology Committee. NFRC Staff shall also post the notification on the NFRC web site. If, within twenty-one days after sending and posting said notification, no objections are received, the BRTG recommendations shall be submitted directly to the Board of Directors for their consideration at their earliest convenience.

If the Board of Directors approves the BRTG recommendations, the bid shall be immediately so awarded and execution of the project shall commence as specified in section 5 of this manual. In addition, the BRTG shall immediately assume the responsibilities of the Project Monitoring Task Group (PMTG), as specified in paragraph 3.7.

- 3.5.3. If the Board of Directors rejects the BRTG recommendation, the Board of Directors shall provide direction to the Research Subcommittee as to future action regarding the project.
- 3.6. If the Research Subcommittee approves a bid, the Chair of the Research Subcommittee shall create a *Project Monitoring Task Group (PMTG)* for the project and shall present the bid to the Research and Technology Committee at their next meeting.
- 3.7. The PMTG shall be made up of three to five members with one member acting as the PMTG Chair. An NFRC Staff member shall also be assigned to every PMTG to provide operational assistance as required. The PMTG shall be responsible for:
  - 3.7.1. Overseeing all aspects of the project
  - 3.7.2. Ensuring that the work described in the *accepted bid* is being done. (Unless the original RFP is revised to coincide with the accepted bid.)
  - 3.7.3. Reviewing all data collected during the research work.

- 3.7.4. Recommending to the proponent(s) any improvements or revisions necessary to the project.
- 3.7.5. Providing status reports at each Research Subcommittee meeting
- 3.7.6. Reviewing and evaluating the final project report, using the “NFRC Research Project Evaluation Form.” (See Appendix E).
- 3.7.7. Making a final recommendation to the Research Subcommittee when the PMTG members achieve consensus that the project has been completed.
- 3.8. The Research and Technology Committee shall consider the bid approval recommendation from the Research Subcommittee and then either:
  - 3.8.1. Approve the recommendation and take it forward to the Board of Directors;
  - 3.8.2. Reject the recommendation, and take their own recommendation forward to the Board of Directors;
  - 3.8.3. Reject the recommendation and send the issue back to the Research Subcommittee with instructions
- 3.9. Once approved by the Research and Technology Committee, the Board of Directors shall consider the recommendation and make a final ruling as to whom the bid shall be awarded or send it back down to Research Subcommittee with instructions as to its handling

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#### **4. Preparing Research Bid**

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- 4.1. When preparing a research bid in response to an RFP sent out by NFRC it is important to mind the deadlines and guidelines sent along with the bid package.
- 4.2. It is important that the bid response address EVERY section of the RFP
- 4.3. Bids received must abide by all requirements as listed in the bid solicitation package that will include items such as the NFRC Agreement and may include governmental forms, such as Section K forms. These are sometimes required because of NFRC’s use of government funds for research projects.
- 4.4. A document titled *NFRC Guide to Research Bid Preparation* is made available to all RFP recipients and should be reviewed thoroughly before submitting a bid to NFRC.

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#### **5. Project Execution, Monitoring, and Completion**

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- 5.1. The Research Subcommittee Chair and NFRC Staff shall notify all those who submitted bids of the final ruling from the Board of Directors. Those awarded the bids shall sign the requisite contracts along with a counter signature from the NFRC Executive Director. After this point, the project number status designator shall be changed to RP designating that the project has been awarded, contracts are signed and work may commence. The NFRC Staff member assigned to the PMTG shall notify the Research & Technology Committee chair, the Research Subcommittee Chair, and all PMTG

members once the contracts have been signed. The Research Subcommittee Chair and the PMTG shall work closely with those awarded the bid.

- 5.2. Staff shall make periodic contact with the project contractor advising them of upcoming deliverable due dates to ensure on time submissions. The staff and PMTG Chair shall closely follow the deliverable schedule and notify the PMTG and Principle Investigator of any delinquency. Staff and the Principle Investigator shall maintain the budget and closely monitor all payments associated with the research project. The Staff may make payment change recommendations to the PMTG chair if deliverable delinquency is observed.
- 5.3. The PMTG shall have the authority to instruct staff to issue interim payments per the contract schedule as acceptable deliverables are received.
- 5.4. The PMTG may authorize a 5% payment deferral of a specific deliverable's payment if that deliverable is deemed by Staff and the PMTG to be late. Any deferred payments shall be included in the final project payment.
- 5.5. PMTG shall meet as needed. At a minimum, monthly meetings are recommended.
- 5.6. To assist the PMTG in evaluating the final research project report, each member of the PMTG shall complete the *NFRC Research Project Evaluation Form*. Instructions for the use of this form are also provided. (See Appendix E).
- 5.7. When the PMTG has achieved consensus that the project is satisfactorily completed, they shall report at the next Research Subcommittee meeting their final recommendation for approval.
- 5.8. The Research Subcommittee members shall consider the recommendation from the PMTG and then:
  - 5.8.1. Approve the recommendation from the PMTG, and take it forward to the Research and Technology Committee, or;
  - 5.8.2. Reject the recommendation from the PMTG, and provide specific direction to the PMTG as to necessary revisions or corrections.
- 5.9. Steps 5.2 through 5.4 shall be repeated as necessary until the Research Subcommittee approves the project report.
- 5.10. Once the project report is approved, the Research Subcommittee Chair shall take the report forward to the next Research and Technology Committee meeting for consideration.
- 5.11. If the Research and Technology Committee rejects the project report, it shall return the report to the Research Subcommittee and provide specific instructions, as necessary, for further work and revisions until both the Research Subcommittee and the Research and Technology Committee approve the report.
- 5.12. If the Research and Technology Committee approves the project report, the Research and Technology Committee Chair shall take the report forward to the next Board of Directors meeting for consideration.

- 5.13. If the Board of Directors rejects the project report, it shall return the report to the Research and Technology Committee with instructions as to its handling.
- 5.14. Once approved by the Board of Directors, the project shall be considered complete, and the project number status designator shall be changed to CP.
- 5.15. Prior to final completion and approval of a project, the NFRC Research Subcommittee Chair may request that the Board of Directors approve partial progress payments.

[**Note 2.:** Generally, NFRC will follow a payment schedule as follows: Partial progress payments will not exceed the percentage of the work completed and approved, but in no case shall the total of all partial progress payments exceed 80% of the total contract amount. Final payment will be made when the project deliverables have been approved and all peer reviewed papers, if applicable, have been delivered and approved. The bidder(s) should indicate a request for consideration of partial progress payments in their project submittal.]

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## **6. Delinquent Projects**

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- 6.1. The PMTG chair shall alert the Research Subcommittee Chair and the contractors when two consecutive agreed upon timeline goals have been missed. The PMTG shall also forward along with this notification a recommendation for future action.
- 6.2. The fact that two goals have been missed shall be raised during the project status review part of the Research Subcommittee meeting. This notification is mandatory.
- 6.3. At this point, the Research Subcommittee shall take action on the PMTG's recommendation
- 6.4. From here forward, this project's progress shall be reviewed at every Research Subcommittee meeting with recommended action from the PMTG.

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## **7. Ownership and Distribution**

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- 7.1. NFRC shall own the exclusive rights, including but not limited to, all research data, reports and other materials associated with any approved research proposal. If at any time the Board of Directors approves a cosponsored research project with another entity, the ownership rights shall be determined pursuant to contract.
  - 7.1.1. Researchers interested in submissions of peer reviewed papers shall seek approval by the PMTG, Research Subcommittee, Research and Technology Committee, and Board of Directors prior to submission if not already included in the contract.
- 7.2. All completed NFRC research projects shall be archived on the NFRC website in an easy to use format to make all NFRC research available for public consumption.
- 7.3. Any NFRC member may receive a copy of a report upon submitting a written request to NFRC Executive Director and upon approval from the NFRC Executive Director or the

NFRC Board of Directors if necessary the report will be provided to the requester. See Appendix F for an NFRC Project Report Request Form.

- 7.4. If an NFRC member requests a single copy of a report, the copy shall be provided free of charge. If multiple copies are requested, NFRC Staff may, at their discretion, charge a nominal fee for the copies.
- 7.5. Any individual or company who is not a member of NFRC may request a copy or copies of a report by submitting a written request to NFRC Executive Director. See Appendix F for an NFRC Project Report Request Form.
- 7.6. The NFRC Executive Director shall have the authority to rule on a request from a non-member, or may defer the request to the NFRC Board of Directors for their consideration. NFRC Staff shall inform the Board of Directors of any decisions they make regarding requests from a non-member.
- 7.7. If either the NFRC Executive Director or the Board of Directors approves a request from a non-member, then regardless of the number of copies requested, either NFRC Staff and/or the Board of Directors may charge a nominal fee for the copies.
- 7.8. If a request from a non-member is not approved, then the NFRC Executive Director shall respond in writing to the requestor with an explanation as to why the request was not approved.
- 7.9. Any requests deemed not to need a ruling from the Board of Directors shall be fully processed by NFRC Staff within thirty days of receipt of the request.
- 7.10. Any requests deemed to need a ruling from the Board of Directors shall be ruled upon by the Board of Directors at their next regularly scheduled meeting after the request is received, provided the Board of Directors meeting is thirty days or more after the request is received. The request shall be fully processed by NFRC Staff within fifteen days following the Board of Directors meeting where the request was ruled.

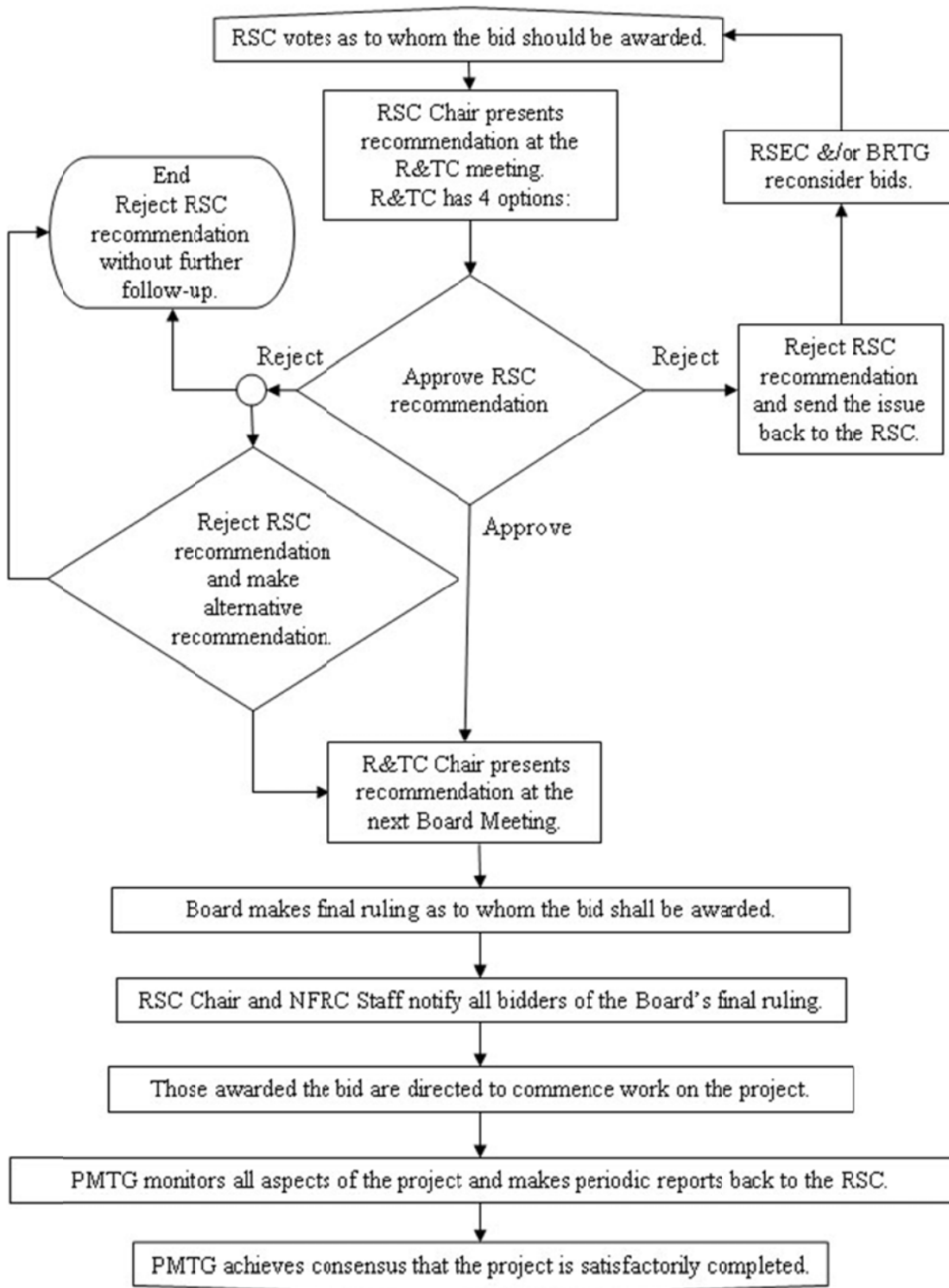
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## **APPENDIX A.: FLOWCHART SUMMARY**

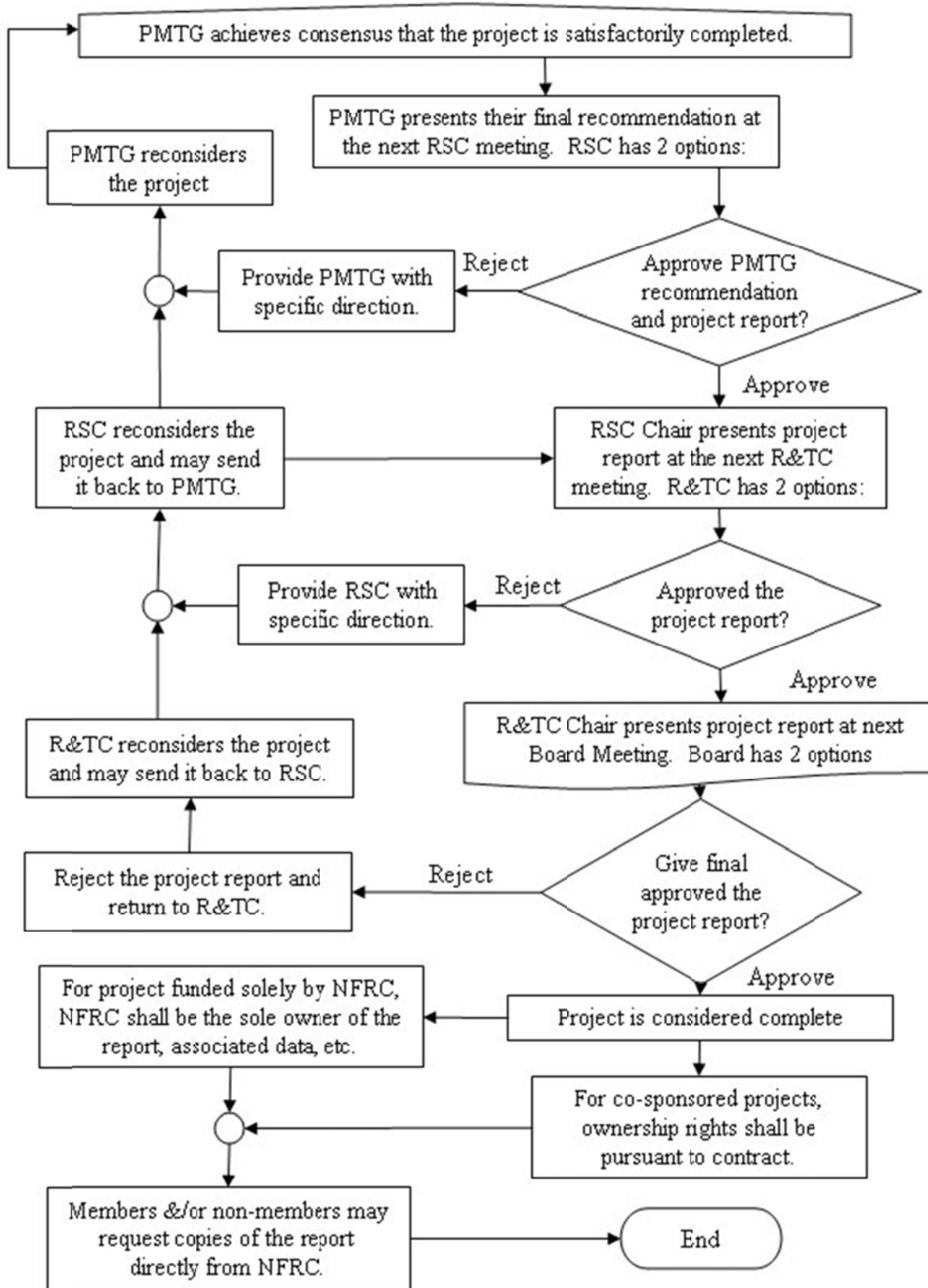
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[*Note:* This flowchart is offered as a summary of the steps and procedures outlined in this manual. Refer to the main body of this manual for complete details.]





continued...



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## APPENDIX B.: EXAMPLE OF A REQUEST FOR PROPOSALS SUMMARY PAGE

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### REQUEST FOR PROPOSALS SUMMARY PAGE– 05-131-DR1

**TITLE:**

Effect of Surface Heat Transfer Coefficients on U-Factors for Projecting and Poorly Performing Fenestration Products

**PROPONENT:** John Toeman, XYZ Research Company

**DATE:** 1/29/99

**BACKGROUND:**

Fenestration products for which the ratio of projected to developed (wetted) area is smaller than 0.75, which are also called “projecting fenestration products”, due to significant amount of areas that project in the dimension perpendicular to the plane of glazing unit, show poor agreement between computational results and measured results. This disagreement is believed to be caused by the unrealistic surface heat transfer coefficient applied in computational models, which treats entire wetted surface as equivalent plane surface. One of the remedies suggested is to correct measured results using modified surface heat transfer coefficient corrected by projected to wetted area ratios, thus lowering surface heat transfer coefficients that is measured by the test lab, and increasing standardized U-factor (duPont 1997, ASTM 1997). This method produces better agreement between measured and simulated U-factors, but it has a disadvantage that it assumes simulated results to be the correct ones, and in essence validates measured results based on simulated results, while the opposite should be true.

**OBJECTIVES:**

The objectives of this project are to determine the exact cause of disagreement between measured and simulated results, and to develop more realistic surface heat transfer coefficients that would be used in 2-D computer programs, used for the computation of frame and edge of glass U-factors.

**BENEFITS:**

This research project will provide necessary data for the development of a library of convective surface heat transfer coefficient for all fenestration products, and particularly for projecting products. The new data and library have a potential to significantly improve accuracy and consistency of an NFRC program.

**ESTIMATED COST RANGE:**

\$45,000 to \$60,000

**ESTIMATED DURATION:**

One year

**POTENTIAL CO-SPONSORS:**

U.S. DOE, ASHRAE

**SOLE SOURCING:**

This project need not be sole sourced.

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## **APPENDIX C.: EXAMPLE OF A DRAFT REQUEST FOR PROPOSALS:**

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### **DRAFT REQUEST FOR PROPOSALS (RFP) – 05-131-DR1**

#### **TITLE:**

Effect of Surface Heat Transfer Coefficients on U-Factors for Projecting and Highly Conducting Fenestration Products

**PROPONENT(S):** John Toeman, XYZ Research Company

**DATE:** 9/20/99

#### **BACKGROUND:**

Fenestration products for which the ratio of the projected area to the total (wetted) area is smaller than 0.80 can show poor agreement between computational results and measured results. These products (i.e., curb-mounted skylights and garden windows) are also called “projecting fenestration products” due to significant amount of areas that project out in the dimension perpendicular to the plane of primary glazing unit. In addition, test and simulation results can show poor agreement on fenestration products with U-factors greater than 0.80. These disagreements are believed to be caused by the unrealistic surface heat transfer coefficient applied in computational models. These computer models assume that the standard surface heat transfer coefficients (NFRC 1997a) for projecting products have the same values as the coefficients applied to planar products.

Currently ASTM and NFRC (NFRC 1997b, duPont 1997, ASTM 1997) have addressed this issue by correcting the measured test results by applying the standardized surface heat transfer coefficients to total surface area of the test specimen, which is the identical methodology that the NFRC computer model procedure uses. This method produces better agreement between measured and simulated U-factors, but it has a disadvantage that it assumes simulated results to be the correct ones, and in essence validates measured results based on simulated results, while the opposite should be true.

Presently, there is very limited amount of data available on the convective heat transfer component of the surface heat transfer coefficient for products with a complex cross sectional geometry. An ongoing NFRC research project is looking into the measurement issues associated with testing projecting products, like effects of orientation (i.e., vertical vs. sloped), hot box calibration using projecting CTS, etc., and two laboratories (ITS and ORNL) will be testing the same test specimens at similar conditions. Limited numerical modeling results are available, are primarily applicable to textbook cases, like the flow over backward facing step (condition similar to projecting CTS’s). Curcija and Goss (1994) investigated effects of natural convection heat transfer on fenestration surfaces of a wood picture window. ASHRAE is planning to undertake research project, which will investigate local convective surface heat transfer coefficients on indoor fenestration boundaries. U.S. DOE is funding continued research into the effects of convection heat transfer on thermal performance of fenestration systems.

New generation of computer modeling tools (LBNL 1998) now offer accurate way of determining the radiation heat transfer on fenestration boundaries and frame cavities. It had been shown that application of detailed radiation model on indoor fenestration boundary dramatically improves the accuracy of results for projecting products (Arasteh et al. 1998, Curcija, et al. 1998). If the improved convection heat transfer correlations are developed, in combination with the existing detailed radiation model, these new computer models would provide even more accurate means for calculating thermal performance of projecting products as well.

#### **OBJECTIVES:**

The objectives of this project are to determine the exact cause of disagreement between measured and simulated results for projecting and poorly performing fenestration systems, and to develop more realistic convection surface heat transfer coefficients as well as recommendations and guidelines for the use of detailed radiation model on boundaries that would be used in 2-D fenestration computer programs. In addition, guidelines for the upgrade of measurement standards (ASTM 1998, NFRC 1997) should be provided.

#### **SCOPE:**

This research project will consist of 4 tasks:

**Task 1:** Selection of representative projecting products and poorly performing products. This selection at the minimum should include extreme projecting products, like garden house windows, fabricated of both thermally conductive materials (i.e., Aluminum) and less conductive materials (i.e., PVC, wood, composites, etc.); different designs of skylights; thermally unbroken Aluminum windows, and any other product that fits under this description.

**Task 2:** Computer modeling of representative projecting and poorly performing products using several sets of boundary conditions:

- A. Currently used surface heat transfer coefficients,
- B. Detailed radiation model based on gray body radiation exchange between window surfaces (self viewing) and window surfaces to the baffle, and standard convection surface heat transfer coefficient, as given by NFRC 100,
- C. Detailed radiation model based on gray body radiation exchange between window surfaces (self viewing) and window surfaces to the baffle, and improved convection surface heat transfer coefficient, as suggested by available research work,
- D. Any other boundary condition combination that may be appropriate to obtain better agreement between measured and simulated results.

**Task 3:** Determination of the exact cause of disagreement between careful measurement results and computer modeling, as per current NFRC standard. By comparing results with the set of detailed measurements, develop corrected convective boundary conditions for use in approved NFRC simulation program(s). Also, provide recommendation on when it is appropriate to use detailed radiation model. In developing this recommendation consider factors like projected to total area ratios, conductance of fenestration products, and any other appropriate criteria.

Detailed measurements done for the skylight research project can be used for comparison to simulation results, since they represent typical projecting products. Other credible measurement results of projecting products (e.g., foam garden window measured at LBL). Can be used as well.

**Task 4:** Based on the results and experiences from this research project, develop recommendations and guidelines for the future upgrade of ASTM and NFRC measurement standards, and especially how to standardize U-factors for projecting products.

#### **DELIVERABLES:**

Three months from the start of the project, present to the project monitoring task group a list of selected projecting and poorly performing products (Task 1) for approval. Duration: 3 months.

Six months after the list of products is approved, present results of computer modeling using different sets of boundary conditions, as specified in Task 2A to 2D. Duration: 6 months.

Nine Months after the list of products is approved, present the results of comparison between computer modeling results and measured results and recommend appropriate standard convective surface heat transfer coefficients for projecting and poorly performing fenestration products. Propose revised criteria for the use of detailed radiation model in NFRC certification process. (Task 3). Duration 3: months.

Twelve Months after the list of products is approved, present recommendations and guidelines for modifications of measurement standards (Task 4). Duration 3 months.

#### **ESTIMATED COST RANGE:**

Approximately \$45,000 to \$60,000.

#### **ESTIMATED DURATION:**

The total project period is expected to be 15 months, unless there is significant delay in approving list of representative products, outlined in Task 1. At the end of project period, and not later than 18 months from the start of the project, provide final technical report. In addition, within the 12 months of the delivery of final report, publish technical paper in one of the peer-reviewed publications (i.e., ASHRAE Transactions, Proceedings of Thermal Performance of Building Envelopes, etc.).

#### **SOLE SOURCING:**

This project need not be sole sourced.

#### **REFERENCES:**

Arasteh, D.; Finlayson, E.U.; Curcija, D.; Baker, J.; and Baker, J. 1998. "Guidelines for Modeling Projecting Fenestration Products." ASHRAE Transactions, Vol. 104, Pt. 1. January, 1998.

ASTM. 1997. "ASTM C1199: Standard Test Method for Measuring the Steady-State Thermal Transmittance of Fenestration Systems Using Hot Box Methods." American Society of Testing and Materials, West Conshohocken, PA.

Curcija, D.; Zhao, Y.; and Goss, W.P. 1998. "The Effect of Realistic Boundary Conditions in Computer Modeling of Condensation Resistance for Fenestration Systems." Thermal Performance of Building Envelopes VII, Clearwater, FL. December, 1998.

Griffith, B.; Curcija, D.; Turler, D.; and Arasteh, D. 1998. "Improving Computer Simulations of Heat Transfer For Projecting Fenestration Products: Using Radiation View Factor Models." ASHRAE Transactions, Vol. 104, Pt. 1. January, 1998.

DuPont, W. 1997. "Comparison of Methods to Standardize ASTM C1199 Thermal Transmittance Results." Insulation Materials: Testing and Applications, Third Volume. ASTM STP 1320, R.S. Graves and R.R. Zar, Eds. American Society for Testing and Materials, 1997.

NFRC. 1997a. "NFRC 100: Procedure for Determining Fenestration Products U-factors." National Fenestration Rating Council, Silver Spring, MD. April 1997.

NFRC. 1997b. "NFRC Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems." National Fenestration Rating Council, Silver Spring, MD. July 1997.

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## **APPENDIX D.: NFRC BID REVIEW EVALUATION INSTRUCTIONS**

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### **INSTRUCTIONS:**

Each member of the Bid Review Task Group (BRTG) shall review all of the bid proposals, and then individually fill out a separate Bid Review Evaluation Form for each bid proposal prior to the BRTG meeting.

Assign a weighting factor to each of the six categories. The total of all six weighting factors shall be 100%. The following weighting factors are recommended (but not required):

1.A.	15
1.B.	30
1.C.	25
1.D.	10
2.A	10
2.B	10

Assign a rating from 0 to 100 to each of the six categories based on the review of the bid proposal.

The BRTG shall then meet, and the BRTG members shall bring their completed forms to the meeting.

The BRTG members shall reach a consensus on the final weighting factors for each category, which shall be used by all BRTG members for all Bid Review Evaluation Forms in computing their final scores.

For each category, the rating shall be multiplied by the weighting factor to yield a score for that category.

The scores for all six categories shall be summed to yield a total score from each individual BRTG member for each bid proposal.

The total scores from all BRTG members for each bid proposal shall then be averaged.

The average score and the cost of the bid and the historical performance of the bidder shall be used by the BRTG to choose the recommended bid for the Request for Proposals (RFP).

If the scores of all bid proposals are less than 70, or all the bid proposals are deemed to be too expensive, then the BRTG may recommend that funding not be awarded at this time.

The BRTG shall compile a final report, including:

- i. Individual Bid Review Evaluation Forms
- ii. Average score of all Bid Review Evaluation Forms for each bid proposal
- iii. Recommendations for corrections, revisions, additional work, additional data if funding is denied
- iv. Any other pertinent miscellaneous findings or comments

The final report, except for the Individual Bid Review Evaluation Form, shall be presented to the NFRC Research Subcommittee. The Individual Bid Review Evaluation Forms shall be kept confidential.

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## NFRC BID REVIEW EVALUATION FORM

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Project Title: \_\_\_\_\_

Submitted by: \_\_\_\_\_

Criteria	Description	Weighting (%)	×	Rating	=	Score
<b>1.</b>	<b>General Evaluation Criteria</b>					
A.	Understanding of project goals, objectives, and research issues to be addressed.		×			
B.	Responsiveness of proposed research and documentation to meet project objectives as specified by the RFP.		×			
C.	Appropriateness and practicality of experimental design, computer modeling, or theoretical approach.		×			
D.	Proposed description of experimental apparatus, test methods, and test specimens and/or computer modeling methodology.		×			
<b>2.</b>	<b>Product Delivery Evaluation</b>					
A.	Proposed time-line and payment schedule.		×			
B.	Cost share benefits.		×			
<b>Totals</b>		<b>100%</b>				

**Note:** Rating is on a scale of 0 to 100.  
Please provide additional comments on separate paper or on the back of this form.

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## **APPENDIX E. NFRC RESEARCH PROJECT EVALUATION INSTRUCTIONS**

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### **INSTRUCTIONS:**

Each member of the Project Monitoring Task Group (PMTG) shall review the Statement of Work and the final report, and then individually fill out the Research Project Evaluation Form prior to the PMTG meeting.

Assign a weighting factor to each of the eight categories. The total of all eight weighting factors shall be 100%. The following weighting factors are recommended (but not required):

1.A.	25
1.B.	15
1.C.	5
1.D.	20
2.A.	10
2.B.	15
3.A.	5
3.B.	5

Assign a rating from 0 to 100 to each of the eight categories based on the review of the final report, and the original intent of the RFP.

The PMTG shall then meet, and the PMTG members shall bring their completed forms to the meeting.

The PMTG members shall reach a consensus on the final weighting factors for each category, which shall be used by all PMTG members in computing the final scores.

For each category, the rating shall be multiplied by the weighting factor to yield a score for that category.

The scores for all eight categories shall be summed to yield a total score from each individual PMTG member.

The total scores from all PMTG members shall then be averaged.

If the average is less than 70, then the PMTG shall provide specific recommendations as to how the researcher(s) can meet their expectations.

The PMTG shall compile a final report, including:

- i. The individual Research Project Evaluation Forms
- ii. The average score of all individual Research Project Evaluation Forms
- iii. Recommendations for corrections, revisions, additional work, additional data, etc.
- iv. Any other pertinent miscellaneous findings or comments

The final report, except for the individual Project Evaluation Forms, shall be presented to the NFRC Research Subcommittee. The individual Project Evaluation Forms shall be kept confidential.

# NFRC RESEARCH PROJECT EVALUATION FORM



Project Title: \_\_\_\_\_

Submitted by: \_\_\_\_\_

Criteria	Description	Weighting (%)	×	Rating	=	Score
<b>1.</b>	<b>General Evaluation Criteria</b>					
A.	Responsiveness of the final report to meet project objectives as specified by the RFP.					
B.	Completeness of the final report to meet project objectives as specified by the RFP.					
C.	Appropriateness and practicality of experimental design &/or computer modeling approach.					
D.	Completeness of data analysis procedures and algorithms including specification of algorithms, analytical tools and models.					
<b>2.</b>	<b>Data Collection and Analysis Evaluation</b>					
A.	Completeness of raw data collected from experimental apparatus &/or computer model.					
B.	Quality of raw data collected from experimental apparatus (consider instruments and data acquisition hardware) &/or computer model.					
<b>2.</b>	<b>Product Delivery Evaluation</b>					
A.	Description of experimental apparatus, test methods and test specimens &/or computer modeling methodology.					
B.	Description of data analysis, results and conclusions					
<b>Totals</b>		<b>100%</b>				

**Note:** Rating is on a scale of 0 to 100.  
 Passing score of 70 without mandatory revisions.  
 Please provide additional comments on separate paper or on the back of this form.

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## APPENDIX F.: NFRC PROJECT REPORT REQUEST FORM

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Dear Sir or Madam:

Thank you for your interest in \_\_\_\_\_. NFRC commissioned this Research Project in order to develop and improve a fair, accurate and credible rating program for energy efficient fenestration products. In order to process your request it is necessary that you complete and return this form to the NFRC offices.

The purpose of my request for \_\_\_\_\_ is (check all that apply):

1.  Personal use or better understanding of the subject.
2.  Development of a book, paper or other public distribution on this subject.
3.  Furtherance of a project which will generate revenues.
4.  Rebuttal of the conclusions in the report.
5.  Other.

Please explain briefly your intended use of the requested document(s).

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I agree to use the requested information as stated above and to protect the NFRC rights and copyright of the document. I also agree to credit NFRC in all publications and uses of the document as the sponsor of the document and to credit the author or researcher in a like manner. I further agree not to use the document solely for the generation of revenues, i.e., resale of the documents.

Applicant Name: \_\_\_\_\_

Company: \_\_\_\_\_

Date of Request: \_\_\_\_\_

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Reviewed by NFRC on \_\_\_\_\_. Permission for use of the NFRC Research Project documentation requested was  Granted;  Not Granted.

Comments: \_\_\_\_\_

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## APPENDIX G. NFRC AGREEMENT

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### AGREEMENT

THIS AGREEMENT is made and entered into as of \_\_\_\_\_, by and between the National Fenestration Rating Council, Incorporated (hereinafter called NFRC) located at 8484 Georgia Avenue Suite 320, Silver Spring Maryland 20910 and (\_\_\_\_\_).

Whereas, in consideration of the mutual promises contained herein, it is mutually agreed as follows:

1. Contractor shall provide technical research services to NFRC referenced in the Request for Proposal (“RFP”) titled “(\_\_\_\_\_ )”. The scope of the research services to be provided to NFRC (herein referred to as the “Scope of Work”) are defined by the proposal submitted by Contractor (the “Contractor Proposal”), a copy of which is attached hereto. The Scope of Work will proceed under the direction of the Project Monitoring Task Group and a designated NFRC staff member. The Scope of Work shall be performed in accordance with the schedule of deliverables referenced in the RFP.
- 2) NFRC shall pay Contractor an amount not to exceed \$ (Approved RFP amount) for the Scope of Work. Contractor may request monies not to exceed 1/3 of the total amount of this contract in advance to purchase required material or as a progress payment. The balance of \_\_\_% will be paid within 30 days after receipt of a final invoice submitted to NFRC, and acceptance of the Contractor work performed under this Agreement.
- 3) The work product created by Contractor under the Agreement shall be deemed a “work made for hire” for NFRC under the U.S. Copyright Act and all right, title, and interest in the research, data, reports and other intellectual property created by Contractor in the performance of the Scope of Work, including any rights to seek patent protection for such intellectual property, shall be owned by NFRC, and Contractor hereby assigns to NFRC any right, title, copyright or other interest that Contractor may have in such intellectual property. Contractor further agrees to execute any other assignment or other instrument required to effect the assignment of all rights in such intellectual property to NFRC. Notwithstanding the foregoing, if federal funds are used under this Agreement, the federal government shall retain any rights in such intellectual property as mandated under the applicable federal procurement regulations and other laws that govern the use of such funds.
- 4) A party may terminate this Agreement if the other party materially breaches its obligations under this Agreement and fails to cure that breach within 30 days after written notice thereof. At any time NFRC may terminate this Agreement without cause upon 10 days prior written notice to Contractor if in the event of such without cause termination, NFRC shall pay Contractor for the portion of the Scope of Work that it completed prior to the terminations as reasonably determined by NFRC.
- 5) Contractor shall indemnify and hold NFRC harmless from any and all claims, losses, damages and liabilities incurred by NFRC that result from Contractor’s breach of this Agreement or any negligent or wrongful act of Contractor.

- 6) The Contractor shall keep the terms of this Agreement in confidence and will not disclose those terms without the prior consent of NFRC or as required by applicable law.
- 7) This Agreement does not constitute or create a joint venture, partnership, agency relationship, or formal business organization of any kind, and the rights and obligations of the parties shall be only those of independent contractors. This Agreement, including the attachments hereto, reflects the complete agreement of the parties on the subject matter of this Agreement and supersedes any prior oral or written understanding between the parties on that subject matter.
- 8) This agreement is not assignable or delegable by the Contractor without NFRC's prior written approval.
- 9) Bidder shall sign and comply, if applicable, with any of the exhibits and appendices that are attached hereto and incorporated herein by reference.
- 10) This Agreement shall be governed by and construed according to the laws of the state of Maryland.
- 11) Contractor shall signify acceptance of the terms and conditions of Agreement by signing two copies thereof and returning one fully executed copy to NFRC.

NATIONAL FENESTRATION  
RATING COUNCIL INCORPORATED

Bidder \_\_\_\_\_  
(Please Print Organization Name)

By \_\_\_\_\_  
Authorized Signature

By \_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

Dated \_\_\_\_\_

Dated \_\_\_\_\_

