

Structural Glazing Façade Inspection Guidelines

Structural Sealant Glazing (SSG) is popular because of its unique method of retaining glass or other panels in smooth exterior walls. The first SSG in commercial construction dates to 1971 on a Detroit, Michigan building. SSG has increased in popularity over the years, but the sealant industry remains concerned over the potential failures due to the increasing number of buildings containing structural glazing that are aging; unknown structural sealant durability; and the level of understanding of the principles of SSG by glazers.

Silicone structural glazing is a method utilizing a silicone adhesive to attach glass, metal, or other panel material to the structure of a building. Wind load and other impact loads on the façade are transferred from the glass or panel, through the structural silicone sealant to the structure of the building. The silicone sealant must maintain adhesive and cohesive integrity as the façade is subjected to wind load and thermal stresses.

The Florida Building Code Section 2415.5.2.2 indicates that only approved silicone elastomer adhesives and sealants shall be used for fastening glass lights and other panels to curtain wall framing. Such adhesives and sealants shall be of a polymer that is 100-percent silicone.

SSG installations are mostly performed at the manufacture's facility under controlled conditions. While on-site installations are possible, especially when repairing broken panels, controlled conditions become more critical and higher quality control practices and precautions must be taken by the glazer.

Industry manufacturer literature generally indicates that SSG does not require maintenance, as silicone sealants are generally resistant to many environmental conditions such as resistance to ultra-violet light, moisture, ozone, and acid rain, to name a few. However, manufactures agree that periodic inspections using an independent third party are recommended, whether as a routine matter or when locally required.

Methods of inspections may consist of visual examination of structural glazing system and structural silicone sealants by observing any indication of sealant adhesion loss or sealant physical property change. The methods include using hand pressure on accessible sealant joints to verify sealant adhesion or using a formal structural glazing inspection procedure such as the one referenced in these guidelines using the ASTM C1394 Standard Guide for In-Situ Structural Silicone Glazing Evaluation. Physically tested loads must not exceed design values used for the building at time of construction.

These guidelines have adopted the three-level evaluation approach described in ASTM C1394 in addition to the procedures established herein.

- (1) **Overall Outline of Structural Glazing Façade Inspection (see detailed procedures below)**
 - (a) Create an Inspection Plan
 - (b) Perform General Examination of Building
 - (i) Level 1
 1. Basic examination, inspected from the interior and cursory visual assessment from the exterior from ground, roof and balconies, as available.
 2. Identify repairs on building map.
 3. Classify building *“safe”, “safe but repair or maintenance is required”, or “unsafe”*.
 - (ii) Level 2
 1. Examination from the outside at selected stories
 2. Identify repairs on building map.
 3. Classify building *“safe”, “safe but repair or maintenance is required”, or “unsafe”*.
 - (c) Testing when necessary
 - (i) Level 3
 1. Examination from the outside at selected stories
 2. Perform testing as per ASTM C1392 or ASTM E330 using a TAS 301 certified laboratory.
 3. Identify test panels on building map.
 4. Provide reports.
 5. Classify building *“safe”, “safe but repair or maintenance is required”, or “unsafe”*.
 - (d) Generate Report
 - (i) Use report template *“Structural Glazing Façade Inspection Report”*.
 - (ii) Provide building façade mapping (See Structural Glazing Building Map sample)
 - (e) Repair or Minor Maintenance
 - (i) Permit not required.
 - (f) Unsafe Conditions requiring replacement or extensive repairs.
 - (i) Permit required by qualified contractor.
 - (g) File Report
 - (i) Provide initial report with SSG classification of *“safe”, “safe but repair or maintenance is required”, or “unsafe”*.
 - (ii) Provide amended report for *“safe but repair or maintenance is required”, or “unsafe”* to a *“safe”* building classification, if necessary.
 - (iii) Structural glazing is recertified for the next 5-years.

- (2) **Periodic evaluations.** In addition to the recertification required by FBC 2415.7.4, periodic evaluations have been established by local requirement, as follows:
- (a) After 5 years from the year-built date as published by the Property Appraiser, **Level 1**;
 - (b) After 10 years, **Level 2**;
 - (c) After 15 years, **Level 1** (if Level 2 was performed as recommended after 10 years);
and
 - (d) After 20 years, and each successive 5 years, **Level 2** or if prevalent distress is found, **Level 3**.
- (3) **Definitions**
- (a) **Acceptable report.** A technical examination report filed by the qualified licensed professional that meets the requirements of the Florida Building Code, Miami-Dade Code of Ordinances, and these guidelines as established by the Board of Rules and Appeals.
 - (b) **Amended report.** A technical examination report filed by the qualified licensed professional who certifies that the “*safe but repair or maintenance required*” or “*unsafe conditions*” reported in the initial report have been repaired and that no unsafe conditions exist at the building.
 - (c) **Close-up examination.** A detailed close-up physical examination was conducted to review one (1) story within every six (6) stories or portion thereof of the exterior of a building.
 - (d) **Filed report.** A report shall be deemed filed with the Building Official when it has been received and accepted by the Building Official. The filed report must be completed in accordance with the provisions of these guidelines.
 - (e) **Filing window.** The ninety (90) day period during which a report for a particular building may be filed.
 - (f) **General examination.** An inspection of the entire building façade’s structural glazing components to determine the building’s overall classification as either “*safe*”, “*safe but repair or maintenance required*” or “*unsafe*” and whether, in the judgment of the qualified licensed professional, they require remedial work.
 - (g) **Level 1 evaluation.** Perform all the following evaluation procedures:
 - (i) Review project documentation, including original design drawings, shop drawings, mock-up testing report, and previous evaluation reports. Review original SSG design calculations, or if not available, perform calculations to determine stress on sealant from thermal and wind loading (and, where appropriate, seismic loading).
 - (ii) Interview building management and maintenance personnel and tenants regarding breakage history of lites and other distress. Map findings on elevation drawings, and assess whether a pattern exists; and

- (iii) Perform a cursory visual assessment from the interior, and from the exterior ground, roofs, and balconies.
- (h) **Level 2 evaluation.** Perform the following, plus all the procedures of Level 1 (unless a Level 1 evaluation has been performed previously and the documentation recommended to be kept by the owner is available.):
 - (i) Perform a close-up visual evaluation from the interior.
 - (ii) Observe weather seal joints and structural joints from the exterior. Document distress and assess whether a pattern exists. Utilize high-powered optical tools to assist in observing from remote viewing areas, or from suspended scaffolding. Choose scaffold “drops” to represent the entire building, including different wind zones, elevations, exposures, details, and construction times; and
 - (iii) Qualitatively measure the sealant adhesion by pressing in with a thumb. Alternatively, semi-quantitative adhesion strength data can be obtained using a Chatillon spring load indicator or pulling cut tabs to failure and measuring the elongation.
- (i) **Level 3 evaluation.** Perform all the following procedures under the field supervision of a qualified licensed professional and a TAS301 Certified Laboratory, plus the procedures of Levels 1 and 2 (except that Level 1 may be eliminated if it has been performed previously and the documentation recommended to be kept by the owner is available).
 - (i) Consider whether the existing conditions indicate that evaluation of all lites is warranted. If not, develop a rational approach for evaluating a representative sample of the total lites. There is a trade-off between accuracy and the cost of the study. For quantitative tests and measurements, it is recommended that the number of specimens or test be selected to ensure achieving at least a 90% confidence interval with a maximum 20% margin of error. Different levels of study may require stricter parameters; and
 - (ii) Have a TAS 301 certified laboratory perform in-situ load testing on selected lites, either by uniform load (air pressure) or point load (suctions cups). One applicable test method is described in ASTM C1392. (See Fig. 1 & 2)

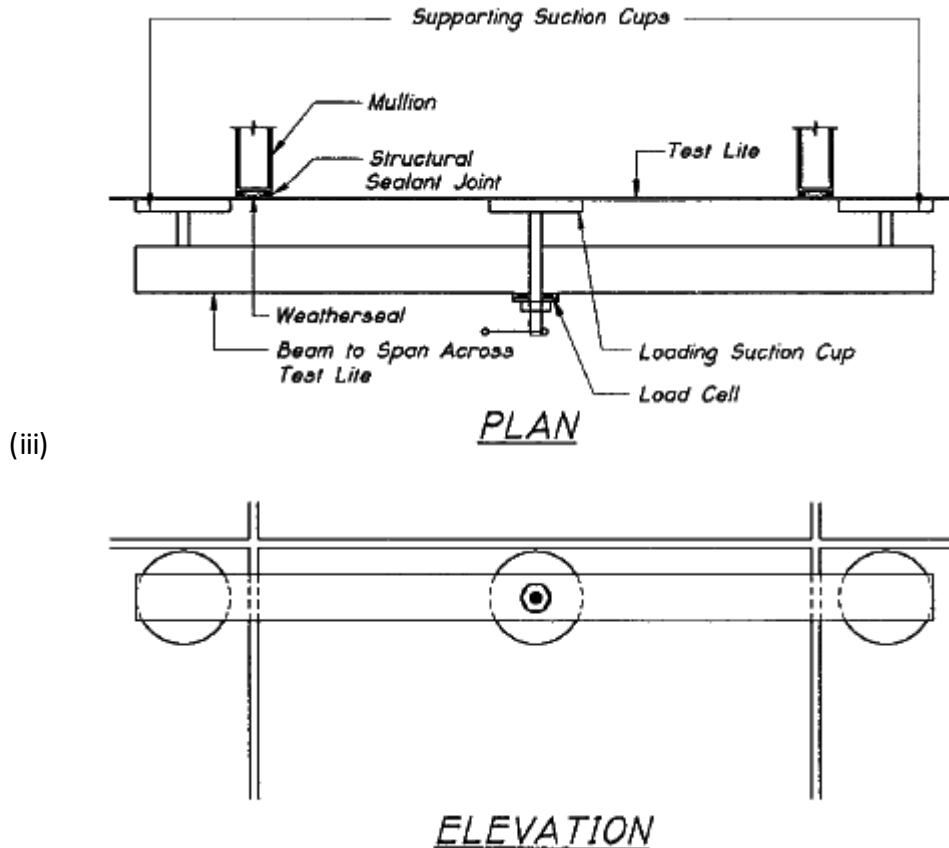


FIG. 1 Schematic of Field Loading Device

(iv)

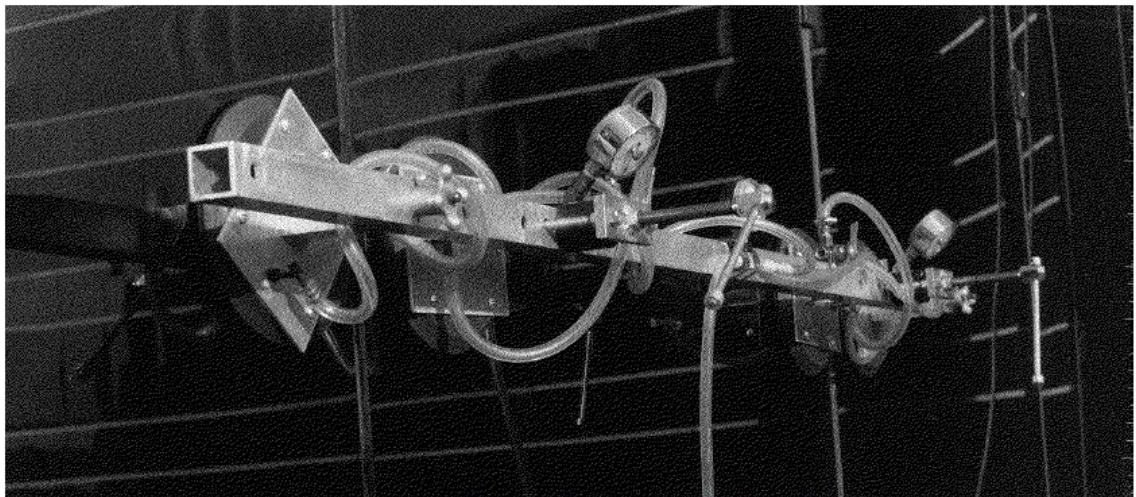


FIG. 2 Example of a Field Loading Device Mounted on a Wall

(v)

- (j) **Pedestrian way.** As used in this section, is any area that can be traversed by the public or building occupants within the property, including courtyards and atriums containing structural glazing, that can become falling debris.

- (k) **Public right-of-way.** A public street, avenue, sidewalk, roadway or any other public place or public way.
 - (l) **Qualified Licensed Professional.** A Florida licensed architect or professional engineer demonstrating experience with specifying and inspecting structural glazing suitable to the building façade being inspected. The qualified professional must also be certified by the State of Florida as a Special Inspector for threshold buildings pursuant to F.S. 553.79(5)(c).
 - (m) **Report filing cycle.** The five (5) year time interval established by Section 2415.7 Florida Building Code and Miami-Dade County Code of Ordinances Section 8-11(f)(v) commencing from the year-built date published by the Property Appraiser.
 - (n) **Safe but repair or maintenance required.** A condition of the structural glazing that is safe at the time of inspection but requires repair or maintenance to prevent further deterioration from developing into an unsafe condition. This type of repair must be completed within 180 days from the date of the notification for required structural glazing inspection.
 - (o) **Safe condition.** A condition of the structural glazing does not require repair or maintenance to sustain the structural integrity of the exterior of the building and that will not become unsafe during the next five years.
 - (p) **Structural glazing.** A continuous system of bonding exterior glass to an aluminum frame using silicone sealants that must be designed and constructed in accordance with the requirements of FBC Section 2415.
 - (q) **Threshold Building.** In accordance with Florida Statute, any building which is greater than 3 stories or 50 feet in height, or which has an assembly occupancy classification that exceeds 5,000 square feet in area and an occupant content of greater than 500 persons.
 - (r) **Unsafe condition.** A condition of the structural glazing that is hazardous to persons or property and requires immediate repair. Pedestrian protection must be put in place within 24 hours of discovery.
- (4) **Responsibilities of the qualified licensed professional.**
- (a) The qualified licensed professional must conduct the glazing façade inspection and file reports in accordance with the FBC Section 2415.7.4, the Miami-Dade County Code of Ordinances Section 8-11(f)(v), and these guidelines.
 - (b) The qualified licensed professional must maintain records of inspections and tests for at least six years and must make such records available upon request.
- (5) **General examination.**
- (a) Periodic inspection requirements. In order to maintain a building's structural glazing in a safe condition, and in accordance with Section 2415.7.4 of the Florida Building Code and Section 8-11(f)(v) of the Miami-Dade County Code of Ordinances, an examination of the building façade's structural glazing of all existing buildings meeting the definition of

- a threshold building, except those exterior walls that are less than twelve (12) inches from the exterior wall of an adjacent building, must be conducted at least every 5-years.
- (b) Depending on the age of the installation and whether a previous structural glazing evaluation has been conducted, follow the three-level evaluation as described herein and in ASTM C1394.
- (c) Classify the building's initial overall condition as to *"safe"*, *"safe but repair or maintenance required"* or *"unsafe"*, accordingly.
- (i) Any instances of a *"safe but repair or maintenance required"* or *"unsafe"* classifies the entire building façade as either *"safe but repair or maintenance required"* or *"unsafe"* until instance(s) is/are resolved.
- (d) Close-up Examination applicable to Level 2 and Level 3 evaluations.
- (i) Applicability. A Close-up Examination from the exterior is applicable to one story within every 6-story or portion thereof of the building and optional if only a Level 1 evaluation is required.
- (ii) Methods. A Close-up Examination from the exterior must utilize scaffolding or other hoisting means for an up-close physical examination of the selected story of a building's façade.
- (6) Inspection procedures.**
- (a) Before any structural glazing for any building is examined, the qualified licensed professional retained by or on behalf of the owner of the building must carefully review the most recent report and any available previous reports. Previously filed reports may be obtained from the local jurisdiction by filing a public information request.
- (b) Examination of a building's structural glazing pursuant to Section 2415.7 Florida Building Code and Section 8-11(f)(v) Miami-Dade County Code of Ordinances must be performed by or under the direct supervision of the qualified licensed professional retained by the owner of the building. Authorized representatives under the supervision of the qualified licensed professional must meet the qualifications of Florida Administrative Rule 61G15-35.004: "Common Requirements to All Engineers Providing Threshold Building Inspection Services as Special Inspectors".
- (c) The qualified licensed professional must design an inspection plan for the specific building to be examined, which must include, but not limited to, the methods to be employed in the general examination for the type of building and the selected story for close-up examination, for levels two (2) and three (3) evaluation. The inspection plan must coordinate with previous inspection reports to stagger the close-up examination between previously examined stories.
- (d) The methods described in the inspection plan to examine the building's façade must permit for a complete inspection around the entire facade of the building, except where façade is 12 inches or less from an adjacent building. Except for the close-up examination story, the qualified licensed professional may use scaffolding, suspended

platform, or any other methods to generally examine the façade of the building. Close-up examinations must be made from scaffolding or observation platform of one (1) story within every six (6) story interval or portion thereof. All examinations shall occur along a path from grade to top of a façade wall fronting each public right-of-way or pedestrian way, including all exterior wall setbacks, using at least one scaffold drop or other observation platform configuration. The use of drones, high resolution photography, or other similar methods does not eliminate the requirement for close-up examinations, when required.

- (e) Photographs must be taken during the general and close-up examinations to properly document the location of all conditions observed that are unsafe or where repairs or maintenance is required.
- (f) Upon the discovery of any unsafe condition, the qualified license professional must notify the Building Official and the owner of the building within 24 hours. The qualified licensed professional must identify the location of any unsafe condition, advise the owner on the appropriate protective measures to be taken, and include the recommended type and location of pedestrian protection in accordance with Section 3306 Florida Building Code in the notification to the Building Official.

(7) Testing

- (a) If a Level 3 evaluation is applicable, follow the procedures outlined in ASTM C1392 using a TAS301 certified laboratory.
- (b) Identify the locations for sampling as indicated in Section 7 of ASTM C1392.
- (c) Provide testing report indicated in Section 10 of ASTM C1392.

(8) Report requirements.

- (a) The qualified licensed professional must file with the Building Official a written report describing the result of the facade inspection, clearly documenting all conditions noted during the examination and stating that the inspection was performed and completed in accordance with Section 2415.7.4, 2415.7.5 Florida Building Code and these guidelines. A separate report must be prepared and filed for each building. The qualified licensed professional must submit a copy of the report to the owner of the building.
- (b) Technical information from the façade inspection must be provided using the reporting template forms provided within these guidelines, proprietary forms are not acceptable.
- (c) If an unsafe condition exists, the report must specify the type and location of pedestrian protection installed.
- (d) All photographs must be color, clearly focused, dated, and high resolution.
- (e) Attach a copy of the inspection plan generated by (6)(c) & (d) herein.
- (f) Dated photo of the qualified licensed professional and/or his or her employees performing the physical close-up examination, when applicable, while on scaffolding or suspended platform is required.
- (g) Mapping the building façade.

- (i) A drawing of each building elevation must be provided numbering each story and showing a representation of the façade components and any special features such as spandrels, wall setbacks, balconies, signs, etc.
 - (ii) Provide a site key map of the property with the location and orientation of the building.
 - (iii) Color photos of each building elevation and ground area directly in front of the elevation.
 - (iv) Provide a description, classification, and mapping of each significant condition observed on the building façade.
 - (v) Locate and identify any *“safe but repair or maintenance required”* or *“unsafe”* conditions found, document with color photos, indexed, and describe conditions.
 - (vi) Each story that underwent a close-up physical examination must be identified, when required.
 - (vii) Each tested component must be identified to its exact location within the façade, numbered, and referenced in the test report, when required.
 - (h) All documents must be physically signed and sealed or electronically submitted as a single portable document format (PDF) file using a verifiable digital signature.
- (9) **Repair or maintenance required condition.**
- (a) Remedial action taken without removing the glazing panel.
 - (b) Minor work performed without the need to obtain a permit.
 - (c) Once the repairs have been completed, the qualified licensed professional must re-inspect the façade and complete an amended report indicating an updated condition of *“safe”*.
- (10) **Unsafe conditions.**
- (a) Upon filing a report of an unsafe condition with the Building Official, the owner of the building, his or her agent, or the person in charge of the building must immediately commence transactions to affect such repairs and within 24-hours install appropriate measures such as pedestrian protection, fences and/or safety netting as may be required to secure the safety of the public and building occupants.
 - (b) Prior to commencing repairs, the owner of the building must hire a qualified contractor to secure a permit from the Building Official for the appropriate repairs.
 - (c) Once the repairs have been completed, the qualified licensed professional must re-inspect the façade and complete an amended report indicating an updated condition of *“safe”*.
- (11) **Report filing requirements.**
- (a) The requirement for structural glazing façade inspections applies to all threshold buildings as defined herein. The *“Year-built”* data field found in the Property Appraiser’s record for the building will establish the reference point from where to initiate the

inspection cycles. All walls containing structural glazing will be subject to façade inspection.

- (b) Buildings required to file a report must do so every five (5) years from the “Year-built” shown on the Property Appraiser’s building record.
- (c) An acceptable report must be filed within the 90-day window after the Notice of Required Structural Glazing Recertification is provided.
- (d) The report must be submitted to the Building Official along with a filing fee as specified in the Department’s Fee Schedule.
- (e) If the report is not acceptable and is rejected by the Building Official, a revised report must be filed within thirty (30) days of the date of the Building Official’s rejection.