JEFF G. HOOPER

6127 WINDING LAKE DRIVE
JUPITER, FL 33458
561-307-1327
CGC057376
BN03806

HOW TO READ GLASS ETCHINGS:

RE: ***GLASS ETCHING AND IMPACT GLASS***

FOR: ***THE FLORIDA ASSOCIATION OF BUILDING INSPECTORS***

The following should give one a fair idea of how to read the etchings present on Impact Glass. While this is not a complete list of either the etchings, or all of the definitions, it can be useful in determining the impact rating and type of glass in a door or window. This will guide you through the etchings and give you the ability to find the resources you will need to determine the status of glass.

Just because a home was permitted in say, January of 2008, does not mean that the windows and doors are impact rated, not even in the HVHZ as defined by the FBC. You may indicate that a home was built to the 2002 FBC on an 1802 form; however, Non-Impact glass and Non Missile Impact glass is allowed per the FBC.

A seller, or builder, may even provide you with documentation, like a permit which clearly defines the requirement for Impact Protection windows to be installed. All that means is that Impact Protection was required. That does not mean it had to be in the form of the glass as Non-Impact rated windows can be installed with approved shutters, or other approved systems. Many NOA’s, (Notice of Acceptance), are available for Non-Impact rated windows.

Do not rely on a tap or knuckle banging test as all safety glass, laminated glass and some tempered glass will sound just like impact glass. Only a fool would rely on this primitive unscientific method that proves absolutely nothing, other than eliminating the presence of single pane plate glass and possibly bruising your knuckles, or smudging the glass.

In the photo above, and below, the house was permitted in 2006 in the HVHZ of Broward County Florida. The permit plans, and NOA's for the project required Impact protection. Not one, but four, Wind Mitigation Inspections, (1802), have been performed by three different companies on this structure. All four indicated that the glass was Impact rated Large Missile. All four included pictures of the permits, NOA list, and Manufacturers cover pages. Not a single one of the Wind

Mitigation Inspectors bothered to obtain a NOA for the windows that were installed. Had they done so, they would have realized, if they knew how to read them, that these windows were only approved if hurricane panels were installed over them. On March of 2014 the credits for protection were lost when it was discovered that none of the windows are Impact Glass. This is insurance fraud, as for 8 years the insurance industry was not being paid the proper premium, in this case almost $56,000.00 was owed. Insurance Fraud is a felony in this amount. Above I noted that you can mark that a building conforms to the FBC; however, there is a caveat. That is that “if” the shutters had been installed “then” that would have been a true statement.

In this case the inspectors***, all four of the inspectors,*** marked that the house met the 2002 FBC under “A”. This was not true in that in order for the windows to be installed in accordance with the FBC, and the permits, the NOA’s must be followed and a separate NOA and installation of Storm Shutters had to be followed. The windows were not impact rated and no shutters were installed. This house should have been marked “C” as it does not meet the FBC or conditions of its permit in the first section.

In this case the inspectors***, all four of the inspectors,*** marked that the house had windows that complied with the Large Missile Impact testing. All four Inspectors indicated that the Opening Protection was for Large Missile and marked “A” again under the Opening Protection. Again they were wrong because the glass was tempered and ***NOT*** impact rated and ***REQUIRED*** to have shutters. These should have been indicated as an “X” on the chart for NO Windborne Protection and below also “X”.

The 1802 form specifically states “***An individual or entity who knowingly or through gross negligence provides a false or fraudulent mitigation verification form is subject to investigation by the Florida Division of Insurance Fraud and may be subject to administrative action by the appropriate licensing agency or to criminal prosecution.”***

All four of these inspectors were in violation per the language on the form and may be prosecuted due to their ***negligence*****.** It would not be fraud as they did not do it intentionally; but rather, they are supposed to know, have the ability to check, and did not do their due diligence, and therefore are negligent.

To help all inspectors, at all levels, to avoid a situation like the above I have provided for you some insight on how to correctly and properly identify impact

glass through reading the etchings on the glass. It is important to note that not all etchings are in the same order, and not all etchings contain all the required elements. In any event, a Non Etched glass pane is NOT impact glass as ALL impact glass is required to be etched. Even in the event that it was, you cannot be certain without the etching. All glass that is Safety or Impact is REQUIRED to be etched.

In the box immediately below is an example of an etching that appeared on a window. I will identify what each line and each item in the etching means or stands for below. Read and understand what each means and what it pertains to. The following was marked by the required etching of the glass in one of the lower corners as follows;

TECNOGLASS S.A.
Heat Strengthened
ANSI Z97.1-2004
16 CFR 1201 II
SGCC 26D1 5/16 UA
MDCA Dupont LSG
5 06 TAMF

THIS WAS THE ETCHING

This is how to read the above label located on the glass.

1. **TECNOGLASS S.A** in the first line is the glass manufacturer.

   The Laminating Glass Manufacturer is who supplied glass for the installations that have this marking. There are many manufacturers and not all will have this line in the etching; however, if there is a manufacturer noted I strongly urge you go to their website and review the information as you may find that their products are only valid for certain types of structures or certain impacts or installations. When researching this manufacturer this is what I found:

   TECNOGLASS S A
   Avenida Circunvalar a 100 mts. De La Vía 40, Barrio Las Flores
   Barranquilla – Colombia – S.A
   Phone 57 373 4000
   FAX 57 373 4090
   www.tecnoglass.com
   Info@tecnoglass.com

2. **Heat Strengthened** in the second line down is how the two individual panes of glass were treated that make up the laminate, or type of treatment, if any, that was applied to the glass. The one in the above etching was Not annealed, Not Tempered, but rather Heat Treated in this installation. The glass could be any of these treatments and meet the requirements.

3. **ANSI Z97.1-2004** in the third line down is the American National Standard Institute standard in which the glass specification was established and tested. This is NOT the impact rating you are looking for, but it should be present.

   The principal differences between the CPSC's 16 CFR 1201 standard and the ANSI Z97.1-2004 standard relate to their scope and function. The CPSC standard is not only a test method and a procedure for determining the safety performance of architectural glazing, but also a federal standard that mandates where and when safety glazing materials must be used in architectural applications and preempts any non-identical state or local standard. In contrast, ANSI Z97.1 is only a voluntary safety performance specification and test method. It does not attempt to declare

when and where safety glazing materials must be used, leaving those determinations up to the building codes and to glass and fenestration specifiers.

TABLE 2406.2(1)
MINIMUM CATEGORY CLASSIFICATION OF GLAZING USING CPSC 16 CFR 1201

EXPOSED SURFACE AREA OF ONE SIDE OF ONE LITE	GLAZING IN STORM OR COMBINATION DOORS (Category class)	GLAZING IN DOORS (Category class)	GLAZED PANELS REGULATED BY ITEM 7 OF SECTION 2406.4 (Category class)	GLAZED PANELS REGULATED BY ITEM 6 OF SECTION 2406.4 (Category class)	DOORS AND ENCLOSURES REGULATED BY ITEM 5 OF SECTION 2406.4 (Category class)	SLIDING GLASS DOORS PATIO TYPE (Category class)
9 square feet or less	I	I	No requirement	I	II	II
More than 9 square feet	II	II	II	II	II	II

For SI: 1 square foot = 0.0929 m^2.

TABLE 2406.2(2)
MINIMUM CATEGORY CLASSIFICATION OF GLAZING USING ANSI Z97.1

EXPOSED SURFACE AREA OF ONE SIDE OF ONE LITE	GLAZED PANELS REGULATED BY ITEM 7 OF SECTION 2406.4 (Category class)	GLAZED PANELS REGULATED BY ITEM 6 OF SECTION 2406.4 (Category class)	DOORS AND ENCLOSURES REGULATED BY ITEM 5 OF SECTION 2406.4[a] (Category class)
9 square feet or less	No requirement	B	A
More than 9 square feet	A	A	A

For SI: 1 square foot = 0.0929 m^2.
a. Use is only permitted by the exception to Section 2406.2.

4. **16 CFR 1201 II** in the fourth line down is the Safety Standard for Architectural Glazing Materials. The last two characters (II) at the end of 16 CFR 1201 stands for all glass sizes. If the designation was just (I) the glass size would be limited to 9 square feet in size as tested. This is important as I have found glass larger than 9 square feet in one window that was marked **16 CFR 1201 I** which is not approved and was miss labeled. The window manufacturer had forgotten to cut the glass down and shipped it larger where a window manufacturer installed it in their frame. Only once, in thousands of windows I have inspected, did I find this condition. This designation must be on all Safety Glass that is installed in doors, shower doors, pool enclosures, stairways, and other areas defined by the FBC or Building Codes as hazardous locations. The only time you will not see this etched on glass is when it is decorative glass in a hazardous location.

5. **SGCC** in the fifth line down is for Impact Testing (Safety Glazing Certification Council), which is associated with the CPSC, Consumer Product Safety Commission and ANSI. Do not confuse this with “Impact Testing for Impact Glass”. They are two entirely different tests. Impact resistant openings are tested as a unit including the frame. This is a test for glass only. This is a drop test, not an impact test.

6. **26D1** in the fifth line down is the Safety Glazing Certification Council testing designation. This indicates which drop test was used.

7. **5/16** in the fifth line down is for the glass thickness. I am not aware of any glass less than 5/16” thick that is Large Missile Impact Rated.

8. **UA** in the fifth line down is where U indicates the test size and the A indicates the drop height. This is the ANSI drop test. Glass A is the equivalent of SGCC type II. This is a 48” drop test.

9. **MDCA** in the sixth line down is Miami Dade County Approval. Older, (pre 2002), and even some newer glass may only be marked **DCA**, Dade County Approval. See the two photos below for what each look like.

This Photo shows the MDCA and the NOA # 03-0827.08. Go to the Miami Dade website, http://www.miamidade.gov/building/pc-search_app.asp, and enter these numbers in the field, “Search by file, and the NOA will be found. The NOA will tell you on the first or second page whether the glass is:

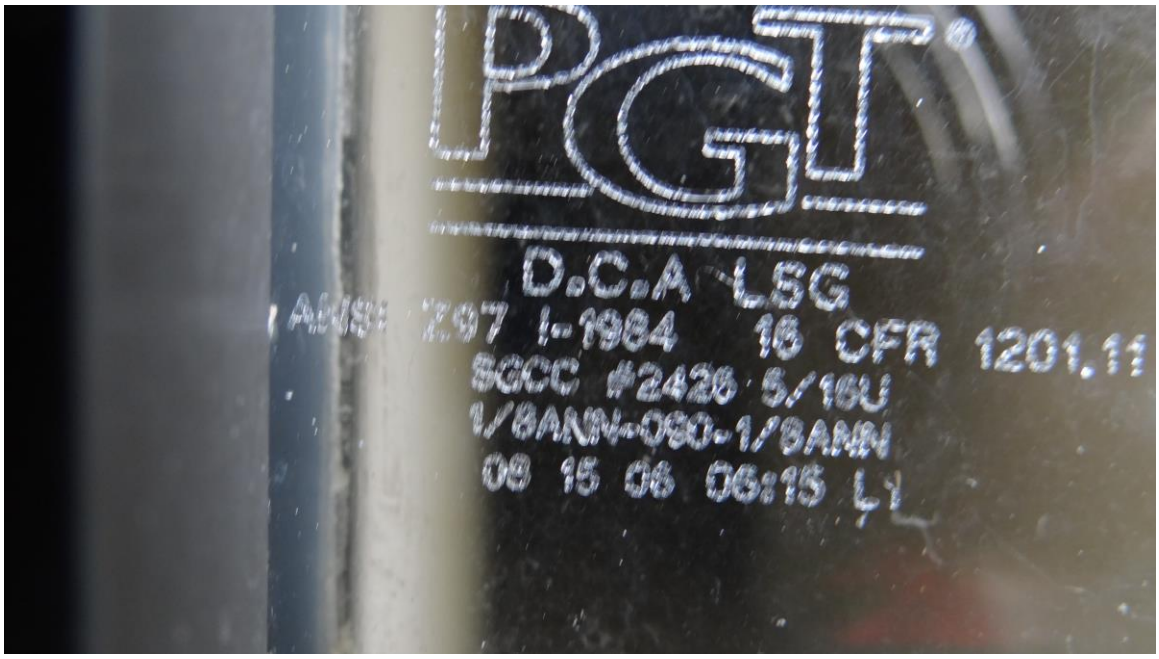
Large Missile Impact Rated

Large and Small Missile Impact Rated

Small Missile Impact Rated

Non Missile Impact Rated

Bomb Blast Rated



This photo is a typical PGT etching. You will note that instead of a MDCA number you see a D.C.A followed by LSG. I will address LSG below. This glass is 1/8” Annealed, not Heat Treated like the example we are discussing. The line that states 1/8ANN-090-1/8ANN stands for; 1/8” Annealed Glass with a .09 thick interlayer with a 1/8” Annealed Glass. That will add up to a thickness of one one hundredth of an inch less than 5/16”.

10. **DuPont** in the sixth line down is the manufacturer of the interlayer of Butacite. The Butacite is what DuPont uses for an interlayer which is Ionoplast. You have to do your research to find this out as you will see below. You may find any of these others as an interlayer and they are usually indicated by the letters before their names:

Generic Interlayer Categories:

(b) Poly Vinyl Butral
(ip) Ionoplast
(lc) Liquid Resin-Multi Component
(lu) Liquid Resin – UV Cure
(p) Polyethylene Terephthalate
(f) Fluorinated Ethylene Propylene
(u) Polyurethane
(ev) Ethylene-vinyl Acetate

11. **LSG** in the sixth line down is for Laminated Safety Glass. Meaning there are two panes of glass with one of the approved interlayers. If you pull or look at the specifications for the interlayers you will find that they are made in different thicknesses. This thickness is what determines whether glass is Large Missile, Small Missile impact rated and at what wind speeds. You will note that in the other photos this appears at different locations.

12. **5 06** in the last line is the manufacturer date. In this case, May 2006.

Note that all Hurricane Impact Resistant Glass is required to be labeled **LSG** per the NOA. Or must fully state Laminated Safety Glass. Safety Glass can be heat treated, annealed, or tempered. Not all laminated glass is safety glass and not all safety glass is impact glass. Note that the PGT photo was annealed, not heat.

The only way you will really know for sure, is if you actually read the NOA for the windows and follow the chain of information that corresponds with that NOA. These Authoritative Documents will direct you to a type of glass, or sometimes several types of glass that can be used. If the NOA states it is Large Missile Impact Resistant, or Approved, this only means that when the correct glass is used, that is specified by the NOA, it is approved. You, the inspector, have to read the glass to make that determination. By the way, any window that has an approved NOA MUST be installed per that NOA. So you need to be checking for excessive shim space? Missing required screws? Distance from the face of the wall for the screws? Embedment of the screws? If you are not, it does not matter what the permit date is, it does not matter if it has a permit, and it does not matter what the rating is, if it was not installed exactly as specified by the NOA then it is NOT FBC compliant and box "A" cannot be checked in either section.

In the etching we started with the interlayer of the laminated glass that was used by Tecnoglass S. A. was manufactured by DuPont as indicated in the etching. In reviewing the specifications from Dupont I found the following.

DuPont™ SentryGlas® **ionoplast** interlayers **start at 0.035 in. (0.90 mm) for general safety glass and hurricane-rated glass**; 0.060 in. (1.56 mm) for architectural glazing such as canopies, railings and facades; and **up to .090 in. (2.28 mm) and above for large missile impact an high security bomb blast systems.** The typical thicknesses of Butacite® PVB are 0.030 in. (0.78 mm) for general-purpose safety glazing, .060 in. (1.56 mm) for burglar resistance, bomb blast resistance, and overhead glazing laminates made with heat-treated glasses; **and .090 in. (2.28 mm) for hurricane-rated systems**.

To recap:

The NOA 00-1212.0403 for the windows where the initial etching was found approves the products of both the .030 thickness of DuPont Butacite and .090 thickness of DuPont Butacite. These are the only two thicknesses that were identified and tested in these NOA's. One thing that was concerning in reviewing the NOA for Dupont Butacite and comparing it with DuPonts specifications is that the .030 thickness of DuPont Butacite that was used for the NOA is not identified by DuPont as a hurricane rated system. And the NOA does not include the .035 thickness of DuPont Butacite as noted for Hurricane Rated Systems by DuPont or the .060 thickness by DuPont Butacite. Since no substitution may be made for the NOA to be valid, only .030 or .090 inch thick Butacite can be used. Since DuPont starts their Hurricane Rating at .035 inch thick Butacite, the .030 inch thick noted in the NOA would not be approved as it is not approved by DuPont. That means that only the .090 inch thick would be an approved product absent an NOA to the contrary as it is the only thickness that is approved by both the NOA and DuPont. DuPont identifies their .030 inch thick Butacite as general purpose safety glazing. General purpose safety glazing is not the same as impact rating as tested for by NOA.

NOA's are approvals for both rated and nonrated systems. All products installed are required to have a NOA; however, a window that is not hurricane rated, or a window that is only large missile or small missile impact protected will have NOA's specifically identifying whether the system is rated or not. If it is not, then shutters have to be used.

For the example I used this was the window and NOA 04-0608.02 HR 100 Aluminum Horizontal Rolling Window- L. M. I. RC ALUMINUM INDUSTRIES INC.

NOA	04-0608.02
File Classification	High velocity hurricane zone
Category	Windows
Subcategory	Horizontal Slider
Material	Aluminum
Applicant	R. C. Aluminum Industries Inc.
File Status	**File Expired**
Expiration_Date	August/5/2009
Impact_Rate	Large and Small Missile Impact
Maximum_Design_Pressure_Positive	80
Maximum_Design_Pressure_Negative	80
Description	Series HR100 Aluminum Horizontal Rolling Window

Signed Electronically,

_____date SEPTEMBER 6TH, 2014

JEFF G. HOOPER,

STATE OF FLORIDA CERTIFIED GENERAL CONTRACTOR	CGC	#057376
STATE OF FLORIDA CERTIFIED BUILDING INSPECTOR	BN	#003806
ICC CERTIFIED BUILDING INSPECTOR	CI	#5186339-B5
ICC CERTIFIED MECHANICAL AND GAS INSPECTOR	CI	#5186339-M5
ICC CERTIFIED PLUMBING INSPECTOR	CI	#5186339-P5
SBCCI CERTIFIED BUILDING INSPECTOR	CI	#7254
SBCCI CERTIFIED MECHANICAL AND GAS INSPECTOR	CI	#2226
SBCCI CERTIFIED PLUMBING INSPECTOR	CI	#3317
FABI REGISTERED PROFESSIONAL INSPECTOR	RPI	#0138

ADDENDUM

RE: ***GLASS ETCHING AND IMPACT GLASS***

FOR: ***THE FLORIDA ASSOCIATION OF BUILDING INSPECTORS***

When inspecting and marking that a building meets the Florida Building Code, (FBC), there are instances in the Code and the Wind Borne Debris Regions of the map that is located in the Building Codes where Impact Glass is not required and the building is still in compliance with the FBC and may be marked as such.

These are:

All windows and doors located 6 stories above ground, (60 feet), do not require any impact protection to meet the FBC.

All windows and doors located 3 to 5 stories above ground, (between 30 feet and 60 feet), only require small missile impact protection to meet the FBC.

All windows and doors located 3 stories and less above ground, (less than 30 feet), require large missile impact protection to meet the FBC.

Any building or structure located outside the Wind Borne Debris Regions and certain counties in the pan handle of Florida.

These are further defined as:

WIND-BORNE DEBRIS REGION.

1. Areas within one mile (1.6 km) of the coastal mean high water line where the basic wind speed is 110 mph (49 m/s) or greater.

2. Areas where the basic wind speed is 120 mph (53 m/s) or greater except from the eastern border of Franklin County to the Florida-Alabama line where the region includes areas only within 1 mile of the coast.

ADDENDUM

RE: ***GLASS ETCHING AND IMPACT GLASS***

FOR: ***THE FLORIDA ASSOCIATION OF BUILDING INSPECTORS***

Wind Speed Map