

Form V-2: Mitigation Measures - Range of Changes in Damage

Modeling Organization: AIR Worldwide
 Model Name & Version Number: AIR Hurricane Model for the U.S. v16.1.0 as implemented in Touchstone v6.2.0
 Model Release Date: 7/17/2017

| INDIVIDUAL MITIGATION MEASURES | | PERCENTAGE CHANGES IN DAMAGE ((REFERENCE DAMAGE RATE - MITIGATED DAMAGE RATE) / REFERENCE DAMAGE RATE) * 100 | | | | | | | | | | | | | | | | | | | |
|---------------------------------|---|--|------|------|------|------|------------------|------|------|------|------|---|---|---|---|---|---|---|---|---|---|
| | | FRAME BUILDING | | | | | MASONRY BUILDING | | | | | | | | | | | | | | |
| | | WINDSPEED (MPH) | | | | | WINDSPEED (MPH) | | | | | | | | | | | | | | |
| | | 60 | 85 | 110 | 135 | 160 | 60 | 85 | 110 | 135 | 160 | | | | | | | | | | |
| REFERENCE BUILDING | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| ROOF-CEILING UPRAND N | BRACED GABLE ENDS | 10.1 | 13.6 | 13.2 | 9.9 | 6.3 | 9.7 | 13.5 | 13.2 | 9.8 | 6.1 | | | | | | | | | | |
| | HIP ROOF | 14.0 | 17.5 | 16.7 | 12.8 | 9.0 | 13.4 | 17.2 | 16.5 | 13.1 | 8.8 | | | | | | | | | | |
| ROOF COVERING | METAL | -4.5 | -2.6 | -1.2 | -0.5 | -0.5 | -4.3 | -2.5 | -1.1 | -0.5 | -0.5 | | | | | | | | | | |
| | ASTM D7158 CLASS H SHINGLES (150 MPH) | 0.6 | 0.5 | 0.3 | 0.1 | 0.1 | 0.6 | 0.5 | 0.3 | 0.2 | 0.1 | | | | | | | | | | |
| | MEMBRANE | 0.0 | 7.6 | 8.2 | 0.0 | 0.0 | 0.0 | 8.1 | 8.4 | 0.0 | 0.0 | | | | | | | | | | |
| | NAILING OF DECK ^{bd} | 12.8 | 22.8 | 24.2 | 17.8 | 10.2 | 12.3 | 22.2 | 23.7 | 18.1 | 10.0 | | | | | | | | | | |
| ROOF-WALL CONNECTION SYSTEM GTH | CLIPS | 1.7 | 5.1 | 10.7 | 11.6 | 7.6 | 1.7 | 5.4 | 10.8 | 11.8 | 7.4 | | | | | | | | | | |
| | STRAPS | 2.2 | 6.5 | 13.1 | 14.1 | 9.8 | 2.2 | 6.7 | 13.2 | 14.5 | 9.6 | | | | | | | | | | |
| WALL-STEEL STUD SYSTEM GTH | TIES OR CLIPS | 0.0 | 0.4 | 0.6 | 2.6 | 7.0 | 0.0 | 0.4 | 0.5 | 2.6 | 6.8 | | | | | | | | | | |
| | STRAPS | 0.0 | 0.8 | 2.2 | 6.1 | 12.7 | 0.0 | 0.9 | 2.1 | 6.1 | 12.3 | | | | | | | | | | |
| WALL-FOUNDATION STRENGTH | LARGER ANCHORS OR CLOSER SPACING | 0.0 | 0.4 | 0.6 | 2.6 | 7.0 | - | - | - | - | - | | | | | | | | | | |
| | STRAPS | 0.0 | 0.8 | 2.2 | 6.1 | 12.7 | - | - | - | - | - | | | | | | | | | | |
| WALL-FOUNDATION STRENGTH | VERTICAL REINFORCING | - | - | - | - | - | 0.0 | 1.1 | 2.2 | 6.9 | 15.0 | | | | | | | | | | |
| | WINDOW SHUTTERS | 9.4 | 13.2 | 12.5 | 10.0 | 8.2 | 8.8 | 12.9 | 12.2 | 9.7 | 7.9 | | | | | | | | | | |
| OPENING PROTECTION | METAL | 9.4 | 13.2 | 12.5 | 10.0 | 8.2 | 8.8 | 12.9 | 12.2 | 9.7 | 7.9 | | | | | | | | | | |
| | DOOR AND SKYLIGHT COVERS | 1.7 | 3.7 | 5.2 | 5.0 | 4.4 | 1.5 | 4.0 | 4.9 | 4.9 | 4.3 | | | | | | | | | | |
| WINDOW DOOR SKYLIGHT STRENGTH | WINDOWS IMPACT RATED | 13.6 | 19.8 | 19.3 | 16.1 | 13.9 | 12.7 | 18.9 | 18.6 | 16.1 | 13.5 | | | | | | | | | | |
| | ENTRY DOORS MEETS WINDBORNE DEBRIS REQUIREMENTS | 1.7 | 3.7 | 5.2 | 5.0 | 4.4 | 1.5 | 4.0 | 4.9 | 4.9 | 4.3 | | | | | | | | | | |
| | GARAGE DOORS MEETS WINDBORNE DEBRIS REQUIREMENTS | 2.6 | 4.0 | 3.7 | 2.1 | 1.4 | 2.8 | 4.7 | 3.9 | 2.3 | 1.4 | | | | | | | | | | |
| | SLIDING GLASS DOORS MEETS WINDBORNE DEBRIS REQUIREMENTS | -0.3 | -0.6 | -0.8 | -0.7 | -0.6 | -0.3 | -0.7 | -0.8 | -0.7 | -0.6 | | | | | | | | | | |
| | SKYLIGHT IMPACT RATED | 1.7 | 1.8 | 1.6 | 1.0 | 0.6 | 1.5 | 2.0 | 1.5 | 1.0 | 0.6 | | | | | | | | | | |
| | MITIGATION MEASURES IN COMBINATION | PERCENTAGE CHANGES IN DAMAGE ((REFERENCE DAMAGE RATE - MITIGATED DAMAGE RATE) / REFERENCE DAMAGE RATE) * 100 | | | | | | | | | | | | | | | | | | | |
| FRAME BUILDING | | WINDSPEED (MPH) | | | | | WINDSPEED (MPH) | | | | | | | | | | | | | | |
| | | 60 | 85 | 110 | 135 | 160 | 60 | 85 | 110 | 135 | 160 | | | | | | | | | | |
| | | 26.1 | 45.0 | 50.5 | 41.5 | 26.5 | 24.7 | 42.9 | 48.4 | 40.6 | 26.1 | | | | | | | | | | |

Percentage Difference Between Touchstone 6.2.0 Form V-2 and Touchstone 4.1.0 Form V-2

| Change in values: | No | No | No | No | No | No | No | No | No | No |
|-------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| MAX | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% |
| MIN | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% |

| INDIVIDUAL MITIGATION MEASURES | | PERCENTAGE CHANGES IN DAMAGE FROM TOUCHSTONE 4.1.0 TO TOUCHSTONE 6.2.0 ((REFERENCE DAMAGE RATE - MITIGATED DAMAGE RATE) / REFERENCE DAMAGE RATE) * 100 | | | | | | | | | | | | | | | | | | | |
|---------------------------------|---|--|--------|--------|--------|--------|------------------|--------|--------|--------|--------|---|---|---|---|---|---|---|---|---|---|
| | | FRAME BUILDING | | | | | MASONRY BUILDING | | | | | | | | | | | | | | |
| | | WINDSPEED (MPH) | | | | | WINDSPEED (MPH) | | | | | | | | | | | | | | |
| | | 60 | 85 | 110 | 135 | 160 | 60 | 85 | 110 | 135 | 160 | | | | | | | | | | |
| REFERENCE BUILDING | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| ROOF-CEILING UPRAND N | BRACED GABLE ENDS | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| | HIP ROOF | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| ROOF COVERING | METAL | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| | ASTM D7158 CLASS H SHINGLES (150 MPH) | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| | MEMBRANE | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| | NAILING OF DECK ^{bd} | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| ROOF-WALL CONNECTION SYSTEM GTH | CLIPS | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| | STRAPS | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| WALL-STEEL STUD SYSTEM GTH | TIES OR CLIPS | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| | STRAPS | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| WALL-FOUNDATION STRENGTH | LARGER ANCHORS OR CLOSER SPACING | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| | STRAPS | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| WALL-FOUNDATION STRENGTH | VERTICAL REINFORCING | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| | WINDOW SHUTTERS | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| OPENING PROTECTION | METAL | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| | DOOR AND SKYLIGHT COVERS | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| WINDOW DOOR SKYLIGHT STRENGTH | WINDOWS IMPACT RATED | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| | ENTRY DOORS MEETS WINDBORNE DEBRIS REQUIREMENTS | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| | GARAGE DOORS MEETS WINDBORNE DEBRIS REQUIREMENTS | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| | SLIDING GLASS DOORS MEETS WINDBORNE DEBRIS REQUIREMENTS | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| | SKYLIGHT IMPACT RATED | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |
| | MITIGATION MEASURES IN COMBINATION | PERCENTAGE CHANGES IN DAMAGE FROM TOUCHSTONE 4.1.0 TO TOUCHSTONE 6.2.0 ((REFERENCE DAMAGE RATE - MITIGATED DAMAGE RATE) / REFERENCE DAMAGE RATE) * 100 | | | | | | | | | | | | | | | | | | | |
| FRAME BUILDING | | WINDSPEED (MPH) | | | | | WINDSPEED (MPH) | | | | | | | | | | | | | | |
| | | 60 | 85 | 110 | 135 | 160 | 60 | 85 | 110 | 135 | 160 | | | | | | | | | | |
| | | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | | | | | | | | | |

Form V-2: Mitigation Measures - Range of Changes in Damage

Modeling Organization: AIR Worldwide
Model Name & Version Number: AIR Hurricane Model for the U.S. v16.0.0 as implemented in Touchstone v4.1.0
Model Release Date: 9/15/2016

| INDIVIDUAL MITIGATION MEASURES | | | PERCENTAGE CHANGES IN DAMAGE ((REFERENCE DAMAGE RATE - MITIGATED DAMAGE RATE) / REFERENCE DAMAGE RATE) * 100 | | | | | | | | | |
|---------------------------------------|---------------------------------------|------|--|------|------|------|------|------------------|------|------|------|-----|
| | | | FRAME BUILDING | | | | | MASONRY BUILDING | | | | |
| | | | WINDSPEED (MPH) | | | | | WINDSPEED (MPH) | | | | |
| | | | 60 | 85 | 110 | 135 | 160 | 60 | 85 | 110 | 135 | 160 |
| | REFERENCE BUILDING | - | - | - | - | - | - | - | - | - | - | |
| ROOF CONFIG URATIO N | BRACED GABLE ENDS | 10.1 | 13.6 | 13.2 | 9.9 | 6.3 | 9.7 | 13.5 | 13.2 | 9.8 | 6.1 | |
| | HIP ROOF | 14.0 | 17.5 | 16.7 | 12.8 | 9.0 | 13.4 | 17.2 | 16.5 | 13.1 | 8.8 | |
| ROOF COVERING | METAL | -4.5 | -2.6 | -1.2 | -0.5 | -0.5 | -4.3 | -2.5 | -1.1 | -0.5 | -0.5 | |
| | ASTM D7158 CLASS F SHINGLES (150 MPH) | 0.6 | 0.5 | 0.3 | 0.1 | 0.1 | 0.6 | 0.5 | 0.3 | 0.2 | 0.1 | |
| | MEMBRANE | 0.0 | 7.6 | 8.2 | 0.0 | 0.0 | 0.0 | 8.1 | 8.4 | 0.0 | 0.0 | |
| | NAILING OF DECK | 12.8 | 22.8 | 24.2 | 17.8 | 10.2 | 12.3 | 22.2 | 23.7 | 18.1 | 10.0 | |
| ROOF- WALL STRENGTH | CLIPS | 1.7 | 5.1 | 10.7 | 11.6 | 7.6 | 1.7 | 5.4 | 10.8 | 11.8 | 7.4 | |
| | STRAPS | 2.2 | 6.5 | 13.1 | 14.1 | 9.8 | 2.2 | 6.7 | 13.2 | 14.5 | 9.6 | |
| WALL- FLOOR STRENGTH | TIES OR CLIPS | 0.0 | 0.4 | 0.6 | 2.6 | 7.0 | 0.0 | 0.4 | 0.5 | 2.6 | 6.8 | |
| | STRAPS | 0.0 | 0.8 | 2.2 | 6.1 | 12.7 | 0.0 | 0.9 | 2.1 | 6.1 | 12.3 | |
| WALL- FOUNDATION STRENGTH | LARGER ANCHORS OR CLOSER SPACING | 0.0 | 0.4 | 0.6 | 2.6 | 7.0 | - | - | - | - | - | |
| | STRAPS | 0.0 | 0.8 | 2.2 | 6.1 | 12.7 | - | - | - | - | - | |
| | VERTICAL REINFORCING | - | - | - | - | - | 0.0 | 1.1 | 2.2 | 6.9 | 15.0 | |
| OPENING PROTECTION | WINDOW SHUTTERS | 9.4 | 13.2 | 12.5 | 10.0 | 8.2 | 8.8 | 12.9 | 12.2 | 9.7 | 7.9 | |
| | | 9.4 | 13.2 | 12.5 | 10.0 | 8.2 | 8.8 | 12.9 | 12.2 | 9.7 | 7.9 | |
| | DOOR AND SKYLIGHT COVERS | 1.7 | 3.7 | 5.2 | 5.0 | 4.4 | 1.5 | 4.0 | 4.9 | 4.9 | 4.3 | |
| WINDOW, DOOR, SKYLIGHT STRENGTH | WINDOWS | 13.6 | 19.8 | 19.3 | 16.1 | 13.9 | 12.7 | 18.9 | 18.6 | 16.1 | 13.5 | |
| | ENTRY DOORS | 1.7 | 3.7 | 5.2 | 5.0 | 4.4 | 1.5 | 4.0 | 4.9 | 4.9 | 4.3 | |
| | GARAGE DOORS | 2.6 | 4.0 | 3.7 | 2.1 | 1.4 | 2.8 | 4.7 | 3.9 | 2.3 | 1.4 | |
| | SLIDING GLASS DOORS | -0.3 | -0.6 | -0.8 | -0.7 | -0.6 | -0.3 | -0.7 | -0.8 | -0.7 | -0.6 | |
| | SKYLIGHT | 1.7 | 1.8 | 1.6 | 1.0 | 0.6 | 1.5 | 2.0 | 1.5 | 1.0 | 0.6 | |
| MITIGATION MEASURES IN COMBINATION | | | PERCENTAGE CHANGES IN DAMAGE ((REFERENCE DAMAGE RATE - MITIGATED DAMAGE RATE) / REFERENCE DAMAGE RATE)*100 | | | | | | | | | |
| | | | FRAME BUILDING | | | | | MASONRY BUILDING | | | | |
| | | | WINDSPEED (MPH) | | | | | WINDSPEED (MPH) | | | | |
| | | | 60 | 85 | 110 | 135 | 160 | 60 | 85 | 110 | 135 | 160 |
| BUIL LDI NG | MITIGATED BUILDING | 26.1 | 45.0 | 50.5 | 41.5 | 26.5 | 24.7 | 42.9 | 48.4 | 40.6 | 26.1 | |