

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 v5.1.6 TLS
 Model Release Date: 7/17/2017

Percentage Difference Between Touchstone 5.1.6 TLS 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 (REFERENCE DAMAGE RATE - MITIGATED DAMAGE RATE) / REFERENCE DAMAGE RATE * 100																			
		FRAME BUILDING					MASONRY BUILDING														
		WINDSPEED (MPH)																			
		60	85	110	135	160	60	85	110	135	160										
ROOF CLIPPING UPRATED	REFERENCE BUILDING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ROOF COVERING	BRACED GABLE ENDS	10.1	13.6	13.2	9.9	6.3	9.7	13.5	13.2	9.8	6.1	14.0	17.5	16.7	12.8	9.0	13.4	17.2	16.5	13.1	8.8
	HIP ROOF	-4.5	-2.6	-1.2	-0.5	-0.5	-4.3	-2.5	-1.1	-0.5	-0.5	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
ROOF-ROCK STRENGTH TH	METAL	0.6	0.5	0.3	0.1	0.1	0.6	0.5	0.3	0.2	0.1	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)	0.0	7.6	8.2	0.0	0.0	0.0	8.1	8.4	0.0	0.0	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	MEMBRANE	12.8	22.8	24.2	17.8	10.2	12.3	22.2	23.7	18.1	10.0	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
WALL-ROCK STRENGTH TH	NAILING OF DECK	1.7	5.1	10.7	11.6	7.6	1.7	5.4	10.8	11.8	7.4	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	CLIPS	2.2	6.5	13.1	14.1	9.8	2.2	6.7	13.2	14.5	9.6	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
WALL-FORMATION STRENGTH TH	STRAPS	0.0	0.4	0.6	2.6	7.0	0.0	0.4	0.5	2.6	6.8	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	TIES OR CLIPS	0.0	0.8	2.2	6.1	12.7	0.0	0.9	2.1	6.1	12.3	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
WALL-FORMATION STRENGTH TH	STRAPS	0.0	0.4	0.6	2.6	7.0	-	-	-	-	-	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	LARGER ANCHORS OR CLOSER SPACING	0.0	0.8	2.2	6.1	12.7	-	-	-	-	-	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
WALL-FORMATION STRENGTH TH	STRAPS	-	-	-	-	-	0.0	1.1	2.2	6.9	15.0	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	VERTICAL REINFORCING	9.4	13.2	12.5	10.0	8.2	8.8	12.9	12.2	9.7	7.9	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
OPENING PROTECTION	WINDOW SHUTTERS	9.4	13.2	12.5	10.0	8.2	8.8	12.9	12.2	9.7	7.9	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	STRUCTURAL WOOD PANEL	1.7	3.7	5.2	5.0	4.4	1.5	4.0	4.9	4.9	4.3	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
OPENING PROTECTION	METAL	13.6	19.8	19.3	16.1	13.9	12.7	18.9	18.6	16.1	13.5	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	DOOR AND SKYLIGHT COVERS	1.7	3.7	5.2	5.0	4.4	1.5	4.0	4.9	4.9	4.3	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	13.6	19.8	19.3	16.1	13.9	12.7	18.9	18.6	16.1	13.5	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	IMPACT RATED	1.7	3.7	5.2	5.0	4.4	1.5	4.0	4.9	4.9	4.3	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
WINDOW DOOR SKYLIGHT STRENGTH	ENTRY DOORS	2.6	4.0	3.7	2.1	1.4	2.8	4.7	3.9	2.3	1.4	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	MEETS WINDBORNE DEBRIS	-0.3	-0.6	-0.8	-0.7	-0.6	-0.3	-0.7	-0.8	-0.7	-0.6	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
WINDOW DOOR SKYLIGHT STRENGTH	GARAGE DOORS	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	MEETS WINDBORNE DEBRIS	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
WINDOW DOOR SKYLIGHT STRENGTH	SLIDING GLASS DOORS	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	MEETS WINDBORNE DEBRIS REQUIREMENTS	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
WINDOW DOOR SKYLIGHT STRENGTH	REQUIREMENTS	1.7	1.8	1.6	1.0	0.6	1.5	2.0	1.5	1.0	0.6	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	IMPACT RATED	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	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 (REFERENCE DAMAGE RATE - MITIGATED DAMAGE RATE) / REFERENCE DAMAGE RATE * 100																				
	FRAME BUILDING					MASONRY BUILDING															
	WINDSPEED (MPH)																				
	60	85	110	135	160	60	85	110	135	160											
BUILDING	MITIGATED BUILDING	26.1	45.0	50.5	41.5	26.5	24.7	42.9	48.4	40.6	26.1	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 5.1.6 TLS (REFERENCE DAMAGE RATE - MITIGATED DAMAGE RATE) / REFERENCE DAMAGE RATE * 100																			
		FRAME BUILDING					MASONRY BUILDING														
		WINDSPEED (MPH)																			
		60	85	110	135	160	60	85	110	135	160										
ROOF CLIPPING UPRATED	REFERENCE BUILDING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ROOF COVERING	BRACED GABLE ENDS	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	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%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
ROOF-ROCK STRENGTH TH	METAL	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	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%	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%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
WALL-ROCK STRENGTH TH	NAILING OF DECK	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	CLIPS	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
WALL-FORMATION STRENGTH TH	STRAPS	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	TIES OR CLIPS	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
WALL-FORMATION STRENGTH TH	STRAPS	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	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%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
WALL-FORMATION STRENGTH TH	STRAPS	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	VERTICAL REINFORCING	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
OPENING PROTECTION	WINDOW SHUTTERS	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	STRUCTURAL WOOD PANEL	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	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%	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%	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	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	IMPACT RATED	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
WINDOW DOOR SKYLIGHT STRENGTH	ENTRY DOORS	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	MEETS WINDBORNE DEBRIS	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
WINDOW DOOR SKYLIGHT STRENGTH	GARAGE DOORS																				

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 CONFIGURATION	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	8d	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	STRUCTURAL WOOD PANEL	9.4	13.2	12.5	10.0	8.2	8.8	12.9	12.2	9.7	7.9
		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					MASONRY BUILDING					
		WINDSPEED (MPH)					WINDSPEED (MPH)					
		60	85	110	135	160	60	85	110	135	160	
BUILDING	MITIGATED BUILDING	26.1	45.0	50.5	41.5	26.5	24.7	42.9	48.4	40.6	26.1	