

# Review of RemRate Software Submission for 2010 FL Code Accreditation

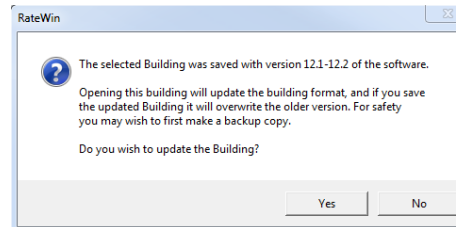
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## Purpose

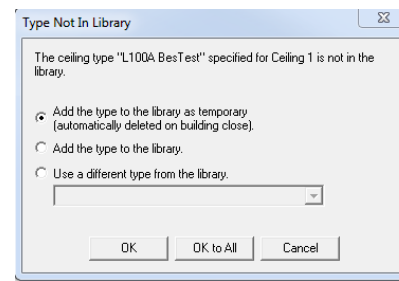
A verification of the 2010 FL Code submission was performed using the test building files and the test data included in the submission. This report provides the results of this verification. The sections titled “submitted results” are those included with the submission. The sections titled “March 20, 2014 Test Results” are those results displayed in the software when performing calculations with the building files provided in the submission. Any software output differences between “submitted” and “March 20, 2014 Test Results” are displayed in red.

## Opening BLG files

Upon opening each LBG file the following message was displayed at which time “Yes” was selected.



Followed by this message and “OK to All” was selected.



## Florida DHW Test

Differences between the submitted test reports and actual test reports are in red.

### Submitted Test Results

#### RESNET DHW Test Results:

**Software Name:** REM/Rate v14.5

User input data fields indicated by pale yellow  
 Test result fields indicated by pale green

Test Case	Energy Use	% Change	Range Min	Range Max	Pass/Fail
DHW-MN-56-2	20.3	base case	n/a	n/a	n/a
DHW-MN-56-4	26.2	29.1%	28.1%	30.5%	pass
DHW-MN-62-2	18.4	-9.4%	-10.4%	-8.3%	pass
DHW-FL-56-2	13.1	base case	n/a	n/a	n/a
DHW-FL-56-4	16.5	26.0%	22.0%	26.2%	pass
DHW-FL-62-2	11.5	-12.2%	-16.0%	-11.1%	pass

March 20, 2014 Test Results

RESNET DHW Test Results:

Software Name: REM/Rate v14.5

User input data fields indicated by pale yellow  
 Test result fields indicated by pale green

Test Case	Energy Use	% Change	Range Min	Range Max	Pass/Fail
DHW-MN-56-2	20.7	base case	n/a	n/a	n/a
DHW-MN-56-4	25.9	25.1%	28.1%	30.5%	fail
DHW-MN-62-2	18.8	-9.2%	-10.4%	-8.3%	pass
DHW-FL-56-2	13.1	base case	n/a	n/a	n/a
DHW-FL-56-4	16	22.1%	22.0%	26.2%	pass
DHW-FL-62-2	11.5	-12.2%	-16.0%	-11.1%	pass

## Florida Duct Test

Differences between the submitted test reports and actual test reports are in red. The software does not display fan power and for this reason the Duct (DSE) Test Suite could not be fully verified.

### Submitted Test Results

#### DSE Test Suite Results

Software Name: REM/Rate v14.5

User input data fields indicated by pale yellow
Test result fields indicated by pale green

#### Results:

Base Cases	Heat/cool	Fan	Total	% change	
HVAC-3a	73.6		7.36	---	base for cases 3b - 3d
HVAC-3e	22.6		22.6	---	base for cases 3f - 3h

#### Criteria:

Test Cases	Heat/cool	Fan	Total	% change	max	avg	min	Pass/Fail
HVAC-3b	89.7		8.97	21.9%	31.4%	26.4%	21.4%	pass
HVAC-3c	77.5		7.75	5.3%	12.5%	7.5%	2.5%	pass
HVAC-3d	86.8		8.68	17.9%	25.0%	20.0%	15.0%	pass
HVAC-3f	28.9		28.9	27.9%	36.2%	31.2%	26.2%	pass
HVAC-3g	24.5		24.5	8.4%	16.5%	11.5%	6.5%	pass
HVAC-3h	27.7		27.7	22.6%	31.1%	26.1%	21.1%	pass

March 20, 2014 Test Results

DSE Test Suite Results

Software Name: REM/Rate v14.5

User input data fields indicated by pale yellow  
 Test result fields indicated by pale green

Results:

Base Cases	Heat/cool	Fan	Total	% change	
HVAC-3a	73.8		7.38	---	base for cases 3b - 3d
HVAC-3e	22.7		22.7	---	base for cases 3f - 3h

Test Cases	Heat/cool	Fan	Total	% change	Criteria:			Pass/Fail
					max	avg	min	
HVAC-3b	89.9		8.99	21.8%	31.4%	26.4%	21.4%	pass
HVAC-3c	77.6		7.76	5.1%	12.5%	7.5%	2.5%	pass
HVAC-3d	86.9		8.69	17.8%	25.0%	20.0%	15.0%	pass
HVAC-3f	29		29	27.8%	36.2%	31.2%	26.2%	pass
HVAC-3g	24.6		24.6	8.4%	16.5%	11.5%	6.5%	pass
HVAC-3h	27.8		27.8	22.5%	31.1%	26.1%	21.1%	pass

## Florida HERS BESTEST

Differences between the submitted test reports and actual test reports are in red.

### Submitted Test Results

Florida HERS BESTEST results for:

Software Name: REM/Rate v14.5

User input data fields indicated by pale yellow	
Test result fields indicated by pale green	

#### Annual Heating Loads: Orlando

Heating	range max	range min	Result	pass/fail
L100AO	10.56	1.54	7.40	pass
L110AO	14.71	5.54	10.30	pass
L120AO	8.57	-0.44	6.40	pass
L130AO	7.86	-0.48	4.40	pass
L140AO	8.34	-0.05	3.50	pass
L150AO	9.55	0.37	7.40	pass
L155AO	9.95	0.78	7.40	pass
L160AO	10.71	1.74	7.40	pass
L170AO	14.37	4.78	10.40	pass
L200AO	25.55	13.41	16.60	pass
L202AO	26.24	13.87	17.20	pass
L302XO	12.09	-0.04	9.30	pass

#### Annual Heating Load deltas: Orlando

Heating	range max	range min	Result	pass/fail
L110AO-				
L100AO	8.15	-0.05	2.90	pass
L120AO-				
L100AO	2.39	-5.99	-1.00	pass
L130AO-				
L100AO	2.15	-6.70	-3.00	pass
L140AO-				
L100AO	2.52	-6.22	-3.90	pass
L150AO-				
L100AO	3.20	-5.17	0.00	pass
L155AO-				
L100AO	4.41	-3.69	0.00	pass
L160AO-				
L100AO	4.28	-3.85	0.00	pass
L170AO-				
L100AO	8.11	-0.81	3.00	pass
L200AO-				
L100AO	18.99	7.81	9.20	pass
L202AO-				
L200AO	4.82	-3.53	0.60	pass
L302XO-				
L100AO	5.60	-6.60	1.90	pass
L302XO-				
L302XO	5.73	-3.18	1.10	pass

L304XO	10.36	-0.97	8.20	pass
L322XO	14.82	-0.25	9.60	pass
L324XO	10.15	-1.87	6.80	pass

L304XO				
L322XO-				
L100AO	8.26	-6.12	2.20	pass
L322XO-				
L324XO	8.67	-2.65	2.80	pass

**Annual Cooling Loads: Orlando**

Cooling	range max	range min	Result	pass/fail
L100AO	55.15	39.34	48.70	pass
L110AO	55.65	39.61	53.00	pass
L120AO	51.57	38.11	46.50	pass
L130AO	38.46	25.10	34.50	pass
L140AO	24.75	12.55	20.80	pass
L150AO	65.62	46.54	52.40	pass
L155AO	53.20	39.53	41.60	pass
L160AO	58.90	42.65	53.00	pass
L170AO	40.63	28.95	34.80	pass
L200AO	63.08	40.81	56.50	pass
L202AO	53.11	36.51	52.40	pass

**Annual Cooling Load deltas: Orlando**

Cooling	range max	range min	Result	pass/fail
L110AO-				
L100AO	4.49	-3.73	4.30	pass
L120AO-				
L100AO	2.77	-6.89	-2.20	pass
L130AO-				
L100AO	-10.24	-20.76	-14.20	pass
L140AO-				
L100AO	-22.79	-34.56	-27.90	pass
L150AO-				
L100AO	13.53	3.61	3.70	pass
L155AO-				
L150AO	-3.42	-16.21	-10.80	pass
L160AO-				
L100AO	7.68	-0.69	4.30	pass
L170AO-				
L100AO	-6.39	-17.76	-13.90	pass
L200AO-				
L100AO	10.77	-1.59	7.80	pass
L202AO-				
L200AO	13.49	1.06	4.10	pass

March 20, 2014 Test Results

Florida HERS BESTEST results for:

Software Name: REM/Rate v14.5

User input data fields indicated by pale yellow	
Test result fields indicated by pale green	

Annual Heating Loads: Orlando

Heating	range max	range min	Result	pass/fail
L100AO	10.56	1.54	7.40	pass
L110AO	14.71	5.54	10.30	pass
L120AO	8.57	-0.44	6.40	pass
L130AO	7.86	-0.48	4.40	pass
L140AO	8.34	-0.05	3.50	pass
L150AO	9.55	0.37	7.40	pass
L155AO	9.95	0.78	7.40	pass
L160AO	10.71	1.74	7.40	pass
L170AO	14.37	4.78	10.40	pass
L200AO	25.55	13.41	16.60	pass
L202AO	26.24	13.87	17.20	pass
L302XO	12.09	-0.04	9.30	pass
L304XO	10.36	-0.97	8.20	pass
L322XO	14.82	-0.25	9.60	pass

Annual Heating Load deltas: Orlando

Heating	range max	range min	Result	pass/fail
L110AO-				
L100AO	8.15	-0.05	2.90	pass
L120AO-				
L100AO	2.39	-5.99	-1.00	pass
L130AO-				
L100AO	2.15	-6.70	-3.00	pass
L140AO-				
L100AO	2.52	-6.22	-3.90	pass
L150AO-				
L100AO	3.20	-5.17	0.00	pass
L155AO-				
L100AO	4.41	-3.69	0.00	pass
L160AO-				
L100AO	4.28	-3.85	0.00	pass
L170AO-				
L100AO	8.11	-0.81	3.00	pass
L200AO-				
L100AO	18.99	7.81	9.20	pass
L202AO-				
L200AO	4.82	-3.53	0.60	pass
L302XO-				
L100AO	5.60	-6.60	1.90	pass
L302XO-				
L304XO	5.73	-3.18	1.10	pass
L322XO-				
L100AO	8.26	-6.12	2.20	pass
L322XO-				
L100AO	8.67	-2.65	2.80	pass



L324XO	10.15	-1.87	6.80	pass
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L324XO	
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**Annual Cooling Loads: Orlando**

Cooling	range max	range min	Result	pass/fail
L100AO	55.15	39.34	48.80	pass
L110AO	55.65	39.61	54.20	pass
L120AO	51.57	38.11	46.80	pass
L130AO	38.46	25.10	35.40	pass
L140AO	24.75	12.55	22.30	pass
L150AO	65.62	46.54	50.40	pass
L155AO	53.20	39.53	40.80	pass
L160AO	58.90	42.65	53.80	pass
L170AO	40.63	28.95	34.20	pass
L200AO	63.08	40.81	57.40	pass
L202AO	53.11	36.51	53.40	fail

**Annual Cooling Load deltas: Orlando**

Cooling	range max	range min	Result	pass/fail
L110AO-				
L100AO	4.49	-3.73	5.40	fail
L120AO-				
L100AO	2.77	-6.89	-2.00	pass
L130AO-				
L100AO	-10.24	-20.76	-13.40	pass
L140AO-				
L100AO	-22.79	-34.56	-26.50	pass
L150AO-				
L100AO	13.53	3.61	1.60	fail
L155AO-				
L150AO	-3.42	-16.21	-9.60	pass
L160AO-				
L100AO	7.68	-0.69	5.00	pass
L170AO-				
L100AO	-6.39	-17.76	-14.60	pass
L200AO-				
L100AO	10.77	-1.59	8.60	pass
L202AO-				
L200AO	13.49	1.06	4.00	pass

## Florida HVAC Test

Differences between the submitted test reports and actual test reports are in red. The software does not display fan power and for this reason the HVAC Test Suite could not be fully verified.

### Submitted Test Results

#### RESNET HVAC Test Suite Results:

Software Name: REM/Rate v14.5

User input data fields indicated by pale yellow	
Test result fields indicated by pale green	

#### Results

##### Cooling tests:

Case	Cooling		Cool Tot	% change	Criteria		
	Cool	Cool Fan			min	max	
HVAC-1a	24.4		24.4	---			
HVAC-1b	19.6		19.6	19.67%	-21.24%	-17.38%	pass

##### Heating tests:

Case	Heating		Heat Tot	% change	Criteria		
	Heat	Heat Fan			min	max	
HVAC-2a	89.3		8.93	---			
HVAC-2b	77.7		7.77	12.99%	-13.30%	-11.57%	pass
HVAC-2c	42.5		42.5	---			
HVAC-2d	33		33	23.53%	-29.03%	-16.73%	pass
HVAC-2e	70.2		70.2	65.18%	41.81%	80.81%	pass

March 20, 2014 Test Results

RESNET HVAC Test Suite Results:

Software Name: REM/Rate v14.5

User input data fields indicated by pale yellow	
Test result fields indicated by pale green	

Results

Cooling tests:

Case	Cool	Cool Fan	Cool Tot	% change	Criteria min	Criteria max	
HVAC-1a	23.7		23.7	---			
HVAC-1b	19		19	19.83%	-21.24%	-17.38%	pass

Heating tests:

Case	Heat	Heat Fan	Heat Tot	% change	Criteria min	Criteria max	
HVAC-2a	89		8.90	---			
HVAC-2b	77.5		7.75	12.92%	-13.30%	-11.57%	pass
HVAC-2c	42.4		42.4	---			
HVAC-2d	32		32	23.58%	-29.03%	-16.73%	pass
HVAC-2e	70		70	65.09%	41.81%	80.81%	pass

## Florida Reference Home Test

The software does not display the auto-generated reference home so this could not be verified. This should be verifiable and displayed in the software.

### Submitted Test Results

Florida Auto Generation Test Results:

Software Name:

REM/Rate v14.5

User input data fields indicated by pale yellow

Reference Home Building Component	Test 1	Results	Test 2	Results	Test 3	Results	Test 4	Results
Above-grade walls ( $U_o$ )	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082
Above-grade wall solar absorptance ( $\alpha$ )	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Above-grade wall infrared emittance ( $\epsilon$ )	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Basement walls ( $U_o$ )	n/a	n/a	n/a	n/a	n/a	n/a	0.36	0.36
Above-grade floors ( $U_o$ )	0.064	0.064	0.064	0.064	n/a	n/a	n/a	n/a
Slab insulation R-Value	n/a	n/a	n/a	n/a	0	0	0	0
Ceilings ( $U_o$ )	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035
Roof solar absorptance ( $\alpha$ )	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Roof infrared emittance ( $\epsilon$ )	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Attic vent area* ( $\text{ft}^2$ )	5.13	5.13	5.13	5.13	5.13	5.13	5.13	5.13
Crawlspace vent area* ( $\text{ft}^2$ )	n/a	n/a	10.26	10.26	n/a	n/a	n/a	n/a
Exposed masonry floor area * ( $\text{ft}^2$ )	n/a	n/a	n/a	n/a	307.8	307.8	307.8	307.8
Carpet & pad R-Value	n/a	n/a	n/a	n/a	2.0	2.0	2.0	2.0
Door Area ( $\text{ft}^2$ )	40	40	40	40	40	40	40	40
Door U-Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
North window area* ( $\text{ft}^2$ )	69.26	69.25	69.26	69.25	69.26	69.25	102.63	102.63
South window area* ( $\text{ft}^2$ )	69.26	69.25	69.26	69.25	69.26	69.25	102.63	102.63
East window area* ( $\text{ft}^2$ )	69.26	69.25	69.26	69.25	69.26	69.25	102.63	102.63

West window area* (ft <sup>2</sup> )	69.26	69.25	69.26	69.25	69.26	69.25	102.63	102.63
Window U-Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Window SHGC <sub>o</sub> (heating)	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340
Window SHGC <sub>o</sub> (cooling)	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280
SLA <sub>o</sub> * (ft <sup>2</sup> /ft <sup>2</sup> )	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036
Internal gains* (Btu/day)	71,167	71,167	71,167	71,167	62,605	62,605	103,014	103,014
Labeled heating system rating	AFUE = 78%	AFUE = 78%	HSPF = 7.7	HSPF = 7.7	HSPF = 7.7	HSPF = 7.7	AFUE = 78%	AFUE = 78%
Labeled cooling system rating	SEER = 13	SEER = 13	SEER = 13	SEER = 13	SEER = 13	SEER = 13	SEER = 13	SEER = 13
Air Distribution System Efficiency	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Thermostat Type	Manual	Manual	Manual	Manual	Manual	Manual	Manual	Manual
Heating thermostat settings	68 F (all hours)	68 F	68 F (all hours)	68 F	68 F (all hours)	68 F	68 F (all hours)	68 F
Cooling thermostat settings	78 F (all hours)	78 F	78 F (all hours)	78 F	78 F (all hours)	78 F	78 F (all hours)	78 F
e-Ratio	1.00	N/A	1.00	N/A	1.00	N/A	1.00	N/A

## RESNET BESTEST

Differences between the submitted test reports and actual test reports are in red.

### Submitted Test Results

HERS BESTEST Tier 1 Results for  
REM/Rate v14.5

Max Min Ranges Adjusted for  
Seasons

Test Performed:

3/6/2014

Performed By:

Robert Salcido

	Test Case	Heating Loads Colorado Springs, Colorado Season: 10/6- 5/14			Out of Rang e	Cooling Loads Las Vegas, Nevada Season: 4/20- 10/21			Out of Ran ge	vent ed	not vent ed
		Refere nce Minimu m	REM/R ate	Refere nce Maxim um		Refere nce Minimu m	REM/R ate	Refere nce Maxim um			
Base	L100A	45.56	69.90	74.07		45.52	55.20	58.50		55.1	58.0
High Inf	L110A	66.14	91.10	95.88		49.41	57.80	63.00		57.7	61.2
Well Insulated Roof & Walls	L120A	35.81	58.10	60.49		42.17	51.30	54.20		51.4	53.5
Dbf Loe/Wood Windows	L130A	39.08	49.40	51.22		30.67	37.10	41.97		37	38.8
Zero Window Area	L140A	40.41	49.40	53.25		18.96	21.60	29.73		21.4	22.8
South Oriented Windows	L150A	37.87	60.50	66.02		47.83	57.60	61.27		57.5	60.5
South Windows w/Overhang East & West Oriented Windows	L155A L160A	39.71 45.80	64.90 71.20	68.49 76.04		38.93 53.28	49.50 64.50	51.97 66.49		46.6 64.4	49.4 67.5
No Internal Loads	L170A	55.58	79.30	84.39		38.15	45.80	49.97		45.6	47.4
Energy Inefficient	L200A	95.05	149.90	167.42		55.65	67.80	78.40		67.1	72.2
Energy Inefficient-Low Abs Sol	L202A	99.44	151.60	170.84		48.88	65.30	72.80		64.5	69.5
Slab-on-grade	L302A	53.41	75.40	80.44							
Ins slab-on-grade	L304A	44.10	65.90	68.24							
Cond Basement	L322A	71.19	93.30	103.28							
Ins Cond Basement	L324A	45.35	70.10	72.89							

<i>Delta</i>	<i>Reference Minimum</i>	<i>REM/R ate</i>	<i>Reference Maximum</i>	<i>Out of Range</i>	<i>Reference Minimum</i>	<i>REM/R ate</i>	<i>Reference Maximum</i>	<i>Out of Range</i>
L110A - L100A	16.72	21.2	25.44		-0.11	2.6	8.50	
L120A - L100A	-17.02	-11.8	-6.47		-8.41	-3.9	0.64	
L130A - L100A	-24.84	-20.5	-5.53		-21.71	-18.1	-10.85	
L140A - L100A	-22.43	-20.5	-4.30		-34.40	-33.6	-22.56	
L150A - L100A	-12.39	-9.4	-2.96		-2.01	2.4	6.77	
L155A - L150A	-1.97	4.4	6.36		-16.07	-8.1	-4.62	
L160A - L100A	-3.45	1.3	5.48		3.76	9.3	12.18	
L170A - L100A	5.01	9.4	15.01		-13.28	-9.4	-3.37	
L200A - L100A	48.46	80	89.25		8.12	12.6	22.15	
L202A - L200A	-0.99	1.7	9.15		-12.36	-2.5	-0.99	
L302A - L100A	-1.41	5.5	12.96					
L302A - L304A	5.03	9.5	16.20					
L322A - L100A	16.79	23.4	35.80					
L322A - L324A	18.98	23.2	34.39					

March 20, 2014 Test Results

HERS BESTEST Tier 1 Results for  
REM/Rate v14.5

Max Min Ranges Adjusted for  
Seasons

Test Performed: 3/6/2014  
Performed By: Robert Salcido

	Test Case	Heating Loads Colorado Springs, Colorado Season: 10/6- 5/14			Out of Rang e	Cooling Loads Las Vegas, Nevada Season: 4/20- 10/21			vent ed	not vent ed	
		Refere nce Minimu m	REM/R ate	Refere nce Maxim um		Refere nce Minimu m	REM/R ate	Refere nce Maxim um			Out of Rang e
Base	L100A	45.56	69.90	74.07		45.52	60.50	58.50	X	55.1	58.0
High Inf	L110A	66.14	91.10	95.88		49.41	63.40	63.00	X	57.7	61.2
Well Insulated Roof & Walls	L120A	35.81	58.10	60.49		42.17	56.20	54.20	X	51.4	53.5
Dbf Loe/Wood Windows	L130A	39.08	49.40	51.22		30.67	40.70	41.97		37	38.8
Zero Window Area	L140A	40.41	49.40	53.25		18.96	23.70	29.73		21.4	22.8
South Oriented Windows	L150A	37.87	60.50	66.02		47.83	63.20	61.27	X	57.5	60.5
South Windows w/Overhang East & West Oriented Windows	L155A	39.71	64.90	68.49		38.93	54.10	51.97	X	46.6	49.4
No Internal Loads	L160A	45.80	71.20	76.04		53.28	70.70	66.49	X	64.4	67.5
Energy Inefficient	L170A	55.58	79.30	84.39		38.15	50.50	49.97	X	45.6	47.4
Energy Inefficient-Low Abs Sol	L200A	95.05	149.90	167.42		55.65	74.20	78.40		67.1	72.2
Slab-on-grade	L202A	99.44	151.60	170.84		48.88	71.50	72.80		64.5	69.5
Ins slab-on-grade	L302A	53.41	75.40	80.44							
Cond Basement	L304A	44.10	65.90	68.24							
Ins Cond Basement	L322A	71.19	93.30	103.28							
	L324A	45.35	70.10	72.89							



<i>Delta</i>	<i>Reference Minimum</i>	<i>REM/R ate</i>	<i>Reference Maximum</i>	<i>Out of Range</i>	<i>Reference Minimum</i>	<i>REM/R ate</i>	<i>Reference Maximum</i>	<i>Out of Range</i>
L110A - L100A	16.72	21.2	25.44		-0.11	2.9	8.50	
L120A - L100A	-17.02	-11.8	-6.47		-8.41	-4.3	0.64	
L130A - L100A	-24.84	-20.5	-5.53		-21.71	-19.8	-10.85	
L140A - L100A	-22.43	-20.5	-4.30		-34.40	-36.8	-22.56	X
L150A - L100A	-12.39	-9.4	-2.96		-2.01	2.7	6.77	
L155A - L150A	-1.97	4.4	6.36		-16.07	-9.1	-4.62	
L160A - L100A	-3.45	1.3	5.48		3.76	10.2	12.18	
L170A - L100A	5.01	9.4	15.01		-13.28	-10.0	-3.37	
L200A - L100A	48.46	80	89.25		8.12	13.7	22.15	
L202A - L200A	-0.99	1.7	9.15		-12.36	-2.7	-0.99	
L302A - L100A	-1.41	5.5	12.96					
L302A - L304A	5.03	9.5	16.20					
L322A - L100A	16.79	23.4	35.80					
L322A - L324A	18.98	23.2	34.39					