



**OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT  
FACILITIES DEVELOPMENT DIVISION**

APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION  
PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: **OSP – 0406 – 10**

**OSHPD Special Seismic Certification Preapproval (OSP)**

Type:  New  Renewal

**Manufacturer Information**

Manufacturer: Carrier Corporation

Manufacturer's Technical Representative: Anthony Molavi

Mailing Address: 9701 Old Statesville Road, Charlotte, NC 28269

Telephone: (704) 921-3976

Email: [Anthony.Molavi@carrier.utc.com](mailto:Anthony.Molavi@carrier.utc.com)

**Product Information**

Product Name: Carrier AquaEdge Chillers

Product Type: High Efficiency Screw Chillers

Product Model Number: 23XRV Frame 2,3,4 (50-450 tons)

(List all unique product identification numbers and/or part numbers)

General Description: High efficiency speed screw chillers. OSP is valid only for hard mounted configurations.

Mounting Description: Rigid floor mounted installations.

**Applicant Information**

Applicant Company Name: Carrier Corporation

Contact Person: Anthony Molavi

Mailing Address: 9701 Old Statesville Road, Charlotte, NC 28269

Telephone: (704) 921-3976

Email: [Anthony.Molavi@carrier.utc.com](mailto:Anthony.Molavi@carrier.utc.com)

I hereby agree to reimburse the Office of Statewide Health Planning and Development review fees in accordance with the California Administrative Code, 2013.

Signature of Applicant: Anthony Molavi Date: 07/15/14

Title: Engineering Manager – Chillers Company Name: Carrier Corporation

"Access to Safe, Quality Healthcare Environments that Meet California's Diverse and Dvnamic Needs"





**OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT  
FACILITIES DEVELOPMENT DIVISION**

**California Licensed Structural Engineer Responsible for the Engineering and Test Report(s)**

Company Name: Buehler & Buehler Structural Engineers Inc.

Name: Scott R. Hooker California License Number: 3937 / Structural

Mailing Address: 600 Q Street, Suite 200, Sacramento CA 95811

Telephone: (916)443-0303 Email: [shooker@bbse.com](mailto:shooker@bbse.com)

**Supports and Attachments Preapproval**

- Supports and attachments are preapproved under OPM- \_\_\_\_\_  
(Separate application for OSHPD Preapproval of Manufacturer's Certification (OPM) of Supports and attachments is required)
- Supports and attachments are not preapproved

**Certification Method**

- Testing in accordance with:  ICC-ES AC156
- Other (Please Specify): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Testing Laboratory**

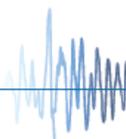
Company Name: University at Buffalo, Dept. of Civil, Structural and Environmental Engineering

Contact Name: Mark C. Pitman

Mailing Address: 212 Ketter Hall, North Campus, Buffalo NY 14260

Telephone: (716)645-4377 Email: [mpitman@buffalo.edu](mailto:mpitman@buffalo.edu)

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**Seismic Parameters**

Design in accordance with ASCE 7-10 Chapter 13:  Yes  No

Design Basis of Equipment or Components ( $F_p/W_p$ ) = 1.44

$S_{DS}$  (Design spectral response acceleration at short period, g) = 2.0

$a_p$  (In-structure equipment or component amplification factor) = 1.0

$R_p$  (Equipment or component response modification factor) = 2.5

$\Omega_0$  (System overstrength factor) = 2.5

$I_p$  (Importance factor) = 1.5

$z/h$  (Height factor ratio) = 1.0

Equipment or Component Natural Frequencies (Hz) = See Table 3

Overall dimensions and weight (or range thereof) = See Table 1

Equipment or Components @ grade designed in accordance with ASCE 7-10 Chapter 15:  Yes  No

Design Basis of Equipment or Components ( $V/W$ ) = \_\_\_\_\_

$S_{DS}$  (Design spectral response acceleration at short period, g) = \_\_\_\_\_

$S_{D1}$  (Design spectral response acceleration at 1 second period, g) = \_\_\_\_\_

$R$  (Response modification coefficient) = \_\_\_\_\_

$\Omega_0$  (System overstrength factor) = \_\_\_\_\_

$C_d$  (Deflection amplification factor) = \_\_\_\_\_

$I_p$  (Importance factor) = 1.5

Height to Center of Gravity above base = \_\_\_\_\_

Equipment or Component Natural Frequencies (Hz) = \_\_\_\_\_

Overall dimensions and weight (or range thereof) = \_\_\_\_\_

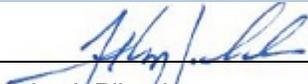
Tank(s) designed in accordance with ASME BPVC, 2010:  Yes  No

**List of Attachments Supporting Special Seismic Certification**

Test Report(s)  Drawings  Calculations  Manufacturer's Catalog

Other(s) (Please Specify): Operability Test Letter

**OSHDP Approval (For Office Use Only) – Approval Expires on December 31, 2019**

Signature:  Date: 10/30/2014

Print Name: Timothy J. Piland Title: SSE

Special Seismic Certification Valid Up to :  $S_{DS}$  (g) = 2.0  $z/h$  = 1

Condition of Approval (if applicable): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_





Special Seismic Certification  
 OSHPD Preapproval  
 Carrier 23XRV Product Line



**Table 1. Certified Product Table 23XRV\*\***

Carrier 23XRV Chillers

Model Number	Nominal Tons	Length (ft)	Heat Exchangers	Capacity Range (Tons)	Tested/ Interpolated	Length (in)	Width (in)	Height (in)	Max Operating Weight (lbs)
2	300	12	A1	90 - 300	Extrapolated	15' - 9"	3' - 9"	7' - 4-1/4"	14,495
	300	12	A2	90 - 300	Extrapolated	15' - 9"	3' - 9"	7' - 4-1/4"	14,769
	300	12	A3	90 - 300	Extrapolated	15' - 9"	3' - 9"	7' - 4-1/4"	15,096
	300	12	A5	90 - 300	Extrapolated	15' - 9"	3' - 9"	7' - 4-1/4"	15,490
	300	12	A5	90 - 300	Extrapolated	15' - 9"	3' - 9"	7' - 4-1/4"	15,812
	300	12	A6	90 - 300	Extrapolated	15' - 9"	3' - 9"	7' - 4-1/4"	16,255
	300	14	B1	90 - 300	Extrapolated	17' - 5"	3' - 9"	7' - 4-1/4"	15,244
	300	14	B2	90 - 300	Extrapolated	17' - 5"	3' - 9"	7' - 4-1/4"	15,552
	300	14	B3	90 - 300	Extrapolated	17' - 5"	3' - 9"	7' - 4-1/4"	15,934
	300	14	B4	90 - 300	Extrapolated	17' - 5"	3' - 9"	7' - 4-1/4"	16,266
	300	14	B5	90 - 300	Extrapolated	17' - 5"	3' - 9"	7' - 4-1/4"	16,765
	<b>300</b>	<b>14</b>	<b>B6</b>	<b>90 - 300</b>	<b>UUT-1</b>	<b>17' - 5"</b>	<b>3' - 9"</b>	<b>7' - 4-1/4"</b>	<b>13,370</b>
3	350	12	30	50 - 525	Interpolated	16' - 4-3/4"	6' - 4"	7' - 4-1/4"	18,247
	350	12	31	50 - 525	Interpolated	16' - 4-3/4"	6' - 4"	7' - 4-1/4"	18,776
	350	12	32	50 - 525	Interpolated	16' - 4-3/4"	6' - 4"	7' - 4-1/4"	19,321
	350	14	35	50 - 525	Interpolated	18' - 1-1/4"	6' - 4"	7' - 4-1/4"	19,636
	350	14	36	50 - 525	Interpolated	18' - 1-1/4"	6' - 4"	7' - 4-1/4"	20,238
	350	14	37	50 - 525	Interpolated	18' - 1-1/4"	6' - 4"	7' - 4-1/4"	20,860
4	450	12	40	50 - 550	Interpolated	16' - 3-1/4"	6' - 6"	7' - 4-1/4"	21,402
	450	12	41	50 - 550	Interpolated	16' - 3-1/4"	6' - 6"	7' - 4-1/4"	21,912
	450	12	42	50 - 550	Interpolated	18' - 4-3/4"	6' - 6"	7' - 4-1/4"	22,391
	450	14	45	50 - 550	Interpolated	18' - 4-3/4"	6' - 6"	7' - 4-1/4"	22,693
	450	14	46	50 - 550	Interpolated	18' - 4-3/4"	6' - 6"	7' - 4-1/4"	23,277
		<b>450</b>	<b>14</b>	<b>47</b>	<b>50 - 550</b>	<b>UUT-2</b>	<b>18' - 4-3/4"</b>	<b>6' - 6"</b>	<b>7' - 4-1/4"</b>

\* UUT-1 configured for the lightest possible configuration



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**Table 2. Certified Product Sub-Component Table 23XRV**  
 Carrier 23XRV Chillers

Heat Exchanger (Cooler / Condenser)								
Frame	Cooler	Cooler Weight (lbs)	Condenser	Condenser Weight (lbs)	Material	Manufacturer	Interpolated / Tested	
2	A1	3904	A1	5068	Carbon-Steel/Copper	Carrier	Extrapolated	
	A2	4009	A2	5237	Carbon-Steel/Copper	Carrier	Extrapolated	
	A3	4182	A3	5391	Carbon-Steel/Copper	Carrier	Extrapolated	
	A4	4315	A4	5652	Carbon-Steel/Copper	Carrier	Extrapolated	
	A5	4520	A5	5769	Carbon-Steel/Copper	Carrier	Extrapolated	
	A6	4725	A6	6007	Carbon-Steel/Copper	Carrier	Extrapolated	
	B1	4236	B1	5485	Carbon-Steel/Copper	Carrier	Extrapolated	
	B2	4352	B2	5677	Carbon-Steel/Copper	Carrier	Extrapolated	
	B3	4558	B3	5853	Carbon-Steel/Copper	Carrier	Extrapolated	
	B4	4706	B4	6037	Carbon-Steel/Copper	Carrier	Extrapolated	
	B5	4946	B5	6296	Carbon-Steel/Copper	Carrier	Extrapolated	
	<b>B6</b>	<b>5177</b>	<b>B6</b>	<b>6558</b>	<b>Carbon-Steel/Copper</b>	<b>Carrier</b>	<b>UUT-1</b>	
3	30	5012	30	4481	Carbon-Steel/Copper	Carrier	Interpolated	
	31	5261	31	4761	Carbon-Steel/Copper	Carrier	Interpolated	
	32	5523	32	5044	Carbon-Steel/Copper	Carrier	Interpolated	
	35	5385	35	5497	Carbon-Steel/Copper	Carrier	Interpolated	
	36	5669	36	5815	Carbon-Steel/Copper	Carrier	Interpolated	
	37	5967	37	6139	Carbon-Steel/Copper	Carrier	Interpolated	
	40	6321	40	6327	Carbon-Steel/Copper	Carrier	Interpolated	
4	41	6558	41	6600	Carbon-Steel/Copper	Carrier	Interpolated	
	42	6766	42	6871	Carbon-Steel/Copper	Carrier	Interpolated	
	45	6909	45	7031	Carbon-Steel/Copper	Carrier	Interpolated	
	46	7181	46	7343	Carbon-Steel/Copper	Carrier	Interpolated	
	47	7421	47	7654	Carbon-Steel/Copper	Carrier	Interpolated	
								<b>UUT-2</b>

Cooler and Condenser Weights also include Refrigerant and Water.

Waterbox (Cooler / Condenser)					
Frame	Cooler/Condenser	Waterbox Type (NIH or MWB)	Material	Manufacturer	Interpolated / Tested
2	A1	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Extrapolated
	A2	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Extrapolated
	A3	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Extrapolated
	A4	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Extrapolated
	A5	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Extrapolated
	A6	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Extrapolated
	B1	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Extrapolated
	B2	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Extrapolated
	B3	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Extrapolated
	B4	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Extrapolated
	B5	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Extrapolated
	<b>B6</b>	<b>Nozzle In Head (NIH)</b>	<b>Carbon-Steel</b>	<b>Macor</b>	<b>UUT-1</b>
3	30	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Interpolated
	31	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Interpolated
	32	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Interpolated
	35	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Interpolated
	36	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Interpolated
	37	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Interpolated
4	40	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Interpolated
	41	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Interpolated
	42	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Interpolated
	45	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Interpolated
	46	Nozzle In Head (NIH) and Marine Water Box (MWB)	Carbon-Steel	Macor	Interpolated
	47	<b>Nozzle In Head (NIH)</b>	<b>Carbon-Steel</b>	<b>Macor</b>	<b>UUT-2</b>

Compressor and Motor*								
Frame	Motor Type	Motor Weight (lbs)	Voltage/Hertz	Compressor Weight (lbs)	Horsepower Range (hp)	Material	Manufacturer	Interpolated / Tested
2	H	277	230/380-575/3/50-60	2759	50 -300	Carbon-Steel	Baldor/Carrier	Extrapolated
	J	277	<b>230/380-575/3/50-60</b>	<b>2759</b>	<b>50 -300</b>	<b>Carbon-Steel</b>	<b>Baldor/Carrier</b>	<b>UUT-1</b>
3,4	V	602	230/380-575/3/50-60	3488	50 - 400	Carbon-Steel	Baldor/Carrier	Interpolated
3, 4,	P	716	230/380-575/3/50-60	4150	50 - 400	Carbon-Steel	Baldor/Carrier	Interpolated
	Q	716	230/380-575/3/50-60	4150	50 - 400	Carbon-Steel	Baldor/Carrier	Interpolated
	R	716	230/380-575/3/50-60	4150	50 - 400	Carbon-Steel	Baldor/Carrier	Interpolated
	S	716	230/380-575/3/50-60	4150	50 - 400	Carbon-Steel	Baldor/Carrier	Interpolated
	T	716	230/380-575/3/50-60	4150	50 - 400	Carbon-Steel	Baldor/Carrier	Interpolated
	U	716	230/380-575/3/50-60	4150	50 - 400	Carbon-Steel	Baldor/Carrier	Interpolated
	V	<b>716</b>	<b>230/380-575/3/50-60</b>	<b>4150</b>	<b>50 - 400</b>	<b>Carbon-Steel</b>	<b>Baldor/Carrier</b>	<b>UUT-2</b>

Compressor weight includes all casting and hardware.



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**Table 2. Certified Product Sub-Component Table 23XRV**

Carrier 23XRV Chillers

Oil Vaporizer & Sump						
Compressor Frame Size	Capacity (tons)	Vaporizer & Sump Weight	Model #	Material	Manufacturer	Interpolated / Tested
2	50-300	693	TP	Carbon-Steel	Carrier	UUT-1
3	50-550	693	TQ	Carbon-Steel	Carrier	Interpolated
	50-600	693	TR	Carbon-Steel	Carrier	Interpolated
4	50-550	693	TQ	Carbon-Steel	Carrier	Interpolated
	50-600	693	TR	Carbon-Steel	Carrier	UUT-2

Oil Pump							
Compressor Frame Size	Capacity (GPH)	Oil Pump Weight (lbs)	Voltage	Horsepower (hp)	Material	Manufacturer	Interpolated / Tested
2, 3, 4	0.25	7	115/1/60	1/20	Carbon-Steel	Tuthill	UUT-1, UUT-2

VFD/Control Panel							
Compressor Frame Size	Part No.	VFD Drive Amperage (A)		Weight (lbs)	Material	Manufacturer	Interpolated / Tested
2	23XR033500FA	335 in	335 out	1029	Carbon-Steel	Rockwell/Whitepath	UUT-1
	23XR033500FB	230 in	230 out	1029	Carbon-Steel	Rockwell/Whitepath	Interpolated
3	23XR04021301	230 in	230 out	1650	Carbon-Steel	Rockwell/Whitepath	Interpolated
	23XR04001304	440 in	442 out	1650	Carbon-Steel	Rockwell/Whitepath	Interpolated
	23XR04001305	520 in	442 out	1650	Carbon-Steel	Rockwell/Whitepath	Interpolated
	23XR04001301	389 in	389 out	1029	Carbon-Steel	Rockwell/Whitepath	Interpolated
	23XR04001306	445 in	445 out	1650	Carbon-Steel	Rockwell/Whitepath	Interpolated
	23XR04021303	469 in	469 out	1029	Carbon-Steel	Rockwell/Whitepath	Interpolated
4	23XR04001307	600 in	600 out	1650	Carbon-Steel	Rockwell/Whitepath	Interpolated
	23XR04021301	230 in	230 out	1029	Carbon-Steel	Rockwell/Whitepath	Interpolated
	23XR04001304	440 in	442 out	1650	Carbon-Steel	Rockwell/Whitepath	Interpolated
	23XR04001305	520 in	442 out	1650	Carbon-Steel	Rockwell/Whitepath	Interpolated
	23XR04001301	445 in	445 out	1029	Carbon-Steel	Rockwell/Whitepath	Interpolated
	23XR04001306	389 in	389 out	1650	Carbon-Steel	Rockwell/Whitepath	Interpolated
	23XR04021303	469 in	469 out	1029	Carbon-Steel	Rockwell/Whitepath	Interpolated
	23XR04001307	600 in	600 out	1650	Carbon-Steel	Rockwell/Whitepath	Interpolated
	23XR04001304	440 in	442 out	1650	Carbon-Steel	Rockwell/Whitepath	UUT-2

\* Whitepath manufactures low-voltage components. Rockwell manufactures high-voltage components.

Muffler (including discharge pipe)						
Frame	Part No.	Weight #	Material	Manufacturer	Interpolated / Tested	
2	23XR14006301	584	Carbon-Steel	Carrier	UUT-1	
3, 4	23XR34006901	597	Carbon-Steel	Carrier	UUT-2	
3, 4	23XR54009301	747	Carbon-Steel	Carrier	extrapolated	

Economizer						
Frame	Part No.	Weight #	Material	Manufacturer	Interpolated / Tested	
2	23XR24002101	174	Carbon-Steel	Carrier	UUT-1	
3, 4	23XR54002101	542	Carbon-Steel	Carrier	UUT-2	



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**Table 3. UUT Summary Table 23XRV<sup>1,4,5,6</sup>**

Carrier 23XRV Chillers

Model Number	Tonnage	UUT Mark	Mounting	Excitation Direction <sup>2</sup>	Frequency <sup>3</sup> (Hz)	Length (in)	Width (in)	Height (in)	Operating Weight (lbs) <sup>7</sup>	Notes
23XRVB6B6EPJR35*	300	UUT-1	Base - Hard Mount	X	15	181.75	46.4	89	13,770	with Economizer
				Y	8.8					
				Z	21					
23XRV4747ERVAA50	550	UUT-2	Base - Hard Mount	X	6.8	175.25	83.75	90.75	20,370	with Economizer
				Y	10.8					
				Z	22.4					

**Notes:**

- Units were tested at Univ. at Buffalo 7/2/14 Report No: UB CSEE/SEESL-2014-12
- Excitation Direction: X = front to back; Y = side to side; Z = vertical
- Unit frequencies were measured prior to AC156 testing.
- All units were tested, retained structural integrity and satisfied the operability tests before and after the shake table tests.
- Units were tested full of content.
- All units were pressurized and charged prior to AC156 testing.
- Weight as tested

**Test Parameters for all units**

$S_{DS} = 2.0$

$z/h = 1.0$  for all units

$A_{FLEX-H} = 3.20$  (g)

$A_{FLEX-V} = 1.33$  (g)

$A_{RIG-H} = 2.40$  (g)

$A_{RIG-V} = 0.53$  (g)

**Test Setup Photos**

Carrier 23XRV Chillers



**Figure 1:** UUT-1 Frame 2 Chiller on shake table  
**Attachment:** Unit base plates were bolted to the fixture w/ (4) 3/4" dia Grade 8 bolts / leg (16 total)



**Figure 2:** UUT-2 Frame 4 Chiller on steel fixture  
**Attachment:** Unit base plates were bolted to the fixture w/ (4) 3/4" dia Grade 8 bolts / leg (16 total)



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**Table 4. UUT Sub-Component Table 23XRV**  
 23XRV Chillers

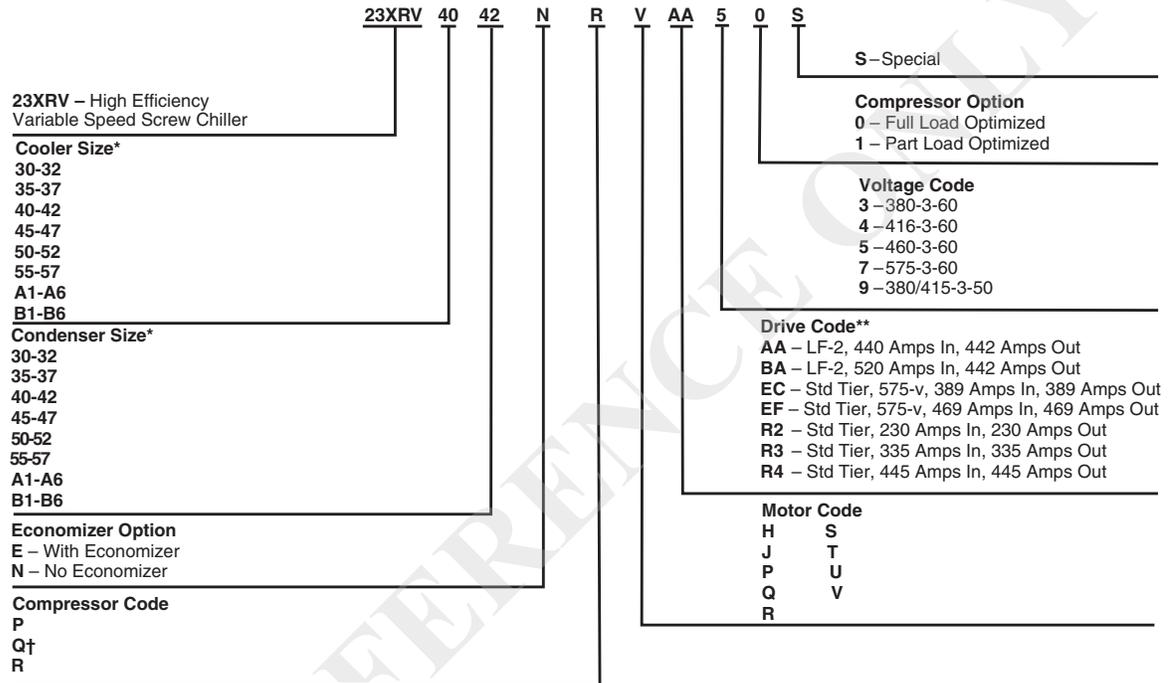
UUT-1			
<i>Sub-Component</i>	<i>Part Number</i>	<i>Manufacturer</i>	<i>Material</i>
Heat Exchanger (condenser & cooler)	09XR24003402 & 10XR24045002	Carrier	Carbon-Steel/Copper
Compressor and Motor	TP0JR*2AD	Carrier	Carbon-Steel
Motor	JR*2AD	Baldor	Carbon-Steel
Oil Vaporizer & Sump	23XR04018301	Carrier	Carbon-Steel
Oil Pump	23XR05003201	Tuthill	Carbon-Steel
Control Box	23XR04019902	Whitepath	Carbon-Steel
VFD	23XVR033500500FA	Rockwell	Carbon-Steel
Muffler	23XR14006301	Carrier	Carbon-Steel
Economizer	23XR24002101	Carrier	Carbon-Steel

UUT-2			
<i>Sub-Component</i>	<i>Part Number</i>	<i>Manufacturer</i>	<i>Material</i>
Heat Exchanger (condenser & cooler)	09XR45010001 & 10XR45000701 (6)	Carrier	Carbon-Steel/Copper
Compressor	0TQ3001 & 0TR3001	Carrier	Carbon-Steel
Motor	0TQ & 0TR	Baldor	Carbon-Steel
Oil Vaporizer & Sump	23XR04010601	Carrier	Carbon-Steel
Oil Pump	23XR05003201	Tuthill	Carbon-Steel
Control Box	23XR4001703	Whitepath	Carbon-Steel
VFD	23XR4001703	Rockwell	Carbon-Steel
Muffler	23XR54009301	Carrier	Carbon-Steel
Economizer Muffler	23XR04010001	Carrier	Carbon-Steel
Economizer	23XR54002101	Carrier	Carbon-Steel



**23XRV Model Number Nomenclature**

# Model number nomenclature



\* First number denotes frame size.

† Only type V motors are used with Q compressors.

\*\*Maximum limits only. Additional application limits apply that may reduce these ampacities.



ASME  
'U' Stamp



AHRI (Air Conditioning, Heating and Refrigeration Institute)  
Performance Certified

**Quality Assurance**

Certified to ISO 9001

**SEISMICOMPLIANT\***

\* Meets IBC 2006, ASCE-7-05, CBC 2007, and OSHPD seismic requirements.