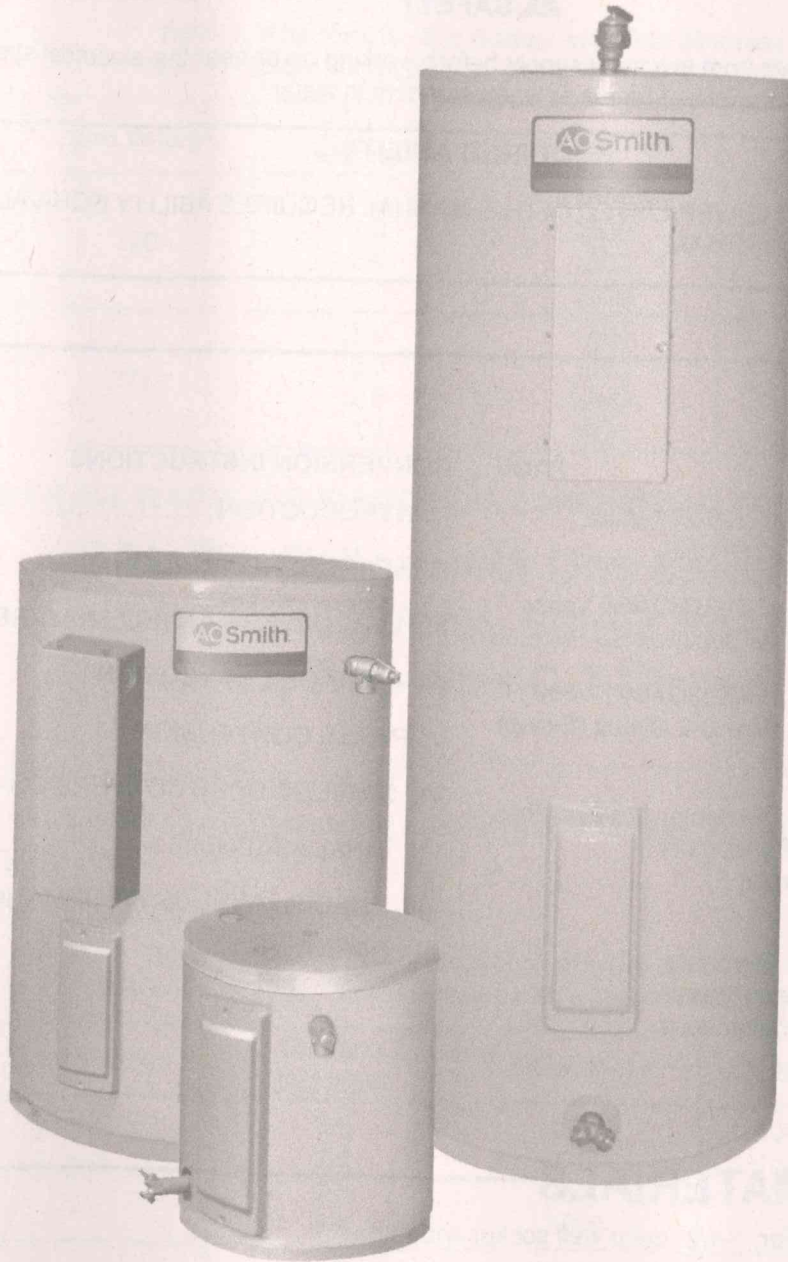


FOR INSTALLATION BY QUALIFIED SERVICE PERSONNEL ONLY

# CONVERSION KIT INSTRUCTIONS

for Models DEN & DEL 6 thru 120 GALLONS  
Commercial Electric Water Heaters



**⚠ CAUTION**

TEXT PRINTED OR OUTLINED IN RED CONTAINS INFORMATION RELATIVE TO YOUR SAFETY. PLEASE READ THOROUGHLY BEFORE ATTEMPTING ANY CONVERSION.

**AC Smith**

[www.aosmithwaterheaters.com](http://www.aosmithwaterheaters.com)



## FOREWORD

The purpose of this manual is to explain how to change the voltage and wattage of an A. O. Smith commercial electric water heater by changing the elements. This manual is not intended to explain the rebuilding of electric water heaters in the field.

Addition of heating elements or subtraction of heating elements in the field is not approved by Underwriters Laboratories, Inc., and therefore, should not be attempted.

The heater to be converted and the appropriate conversion for the heater must be found on the same page of this manual. Read the instructions contained on pages 7 thru 11 before attempting any conversion.

### SAFETY

Be sure to disconnect water heater from electrical supply before working on or near the electrical system of the heater. Never touch electrical components with wet hands or when standing in water.

#### REQUIRED ABILITY

CONVERSION OF ANY WATER HEATER LISTED IN THIS MANUAL REQUIRES ABILITY EQUIVALENT TO THAT OF A LICENSED ELECTRICAL TRADESMAN.

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## CONVERSION MATERIALS

1. Screw Plug Element Remover: 1-1/2" deep well socket and ratchet.
2. Screwdrivers: Two required, one #2 phillips and one slotted screwdriver.
3. Conversion kit: Includes conversion instructions, replacement electrical element(s), conversion kit label, caution label.

## DEL-Six Gallon with One Element, 120/277 Volts, Single Phase, Two-Wire C-2 Circuit

### INSTRUCTIONS

1. Find the voltage and KW of the required heater.
2. On the same line, move to the right until you are in the column of the kit number required.
3. Order the corresponding kit.

See pages 8 thru 11 for detailed instructions.

Table 1. Kits for DEL-Six Gallon with One Element, 120/277 Volts, Single Phase, and a Two-Wire C-2 Circuit

Total Voltage	Element KW Input	Kit Wattage	Number
120	1.5	1500	100109533
	2.0	2000	100109534
	2.5	2500	100109535
	3.0	3000	100109536
277	1.5	1500	100109537
	2.0	2000	100109538
	2.5	2500	100109539
	3.0	3000	100109540

CHECK ALL WATER AND ELECTRICAL CONNECTIONS FOR TIGHTNESS

## DEL-Six Gallon with One Element, 208/240/480 Volts, Single Phase, with a Two-Wire C-2 Circuit

### INSTRUCTIONS:

1. Find the voltage and KW of the required heater.
2. On the same line, move to the right until you are in the column of kit number required.
3. Order the corresponding kit.

See pages 8 thru 11 for detailed conversion instructions.

Table 2. Kits for DEL-Six Gallon with One Element, 208/240/480 Volts, Single Phase, with a Two-Wire C-2 Circuit

Total Voltage	Element KW Input	Kit Wattage	Number
208	1.5	1500	100109544
	2.0	2000	100109545
	2.5	2500	100109546
	3.0	3000	100109547
240	1.5	1500	100109553
	2.0	2000	100109554
	2.5	2500	100109555
480	3.0	3000	100109556
	2.5	2500	100109563
	3.0	3000	100109564

CHECK ALL WATER AND ELECTRICAL CONNECTIONS FOR TIGHTNESS



## DEL Models with One Element, 120/208/240/277/480 Volts, Single Phase, Two-Wire C-2 Circuit (Except DEL-6)

### INSTRUCTIONS

1. Find the voltage and KW of the required heater.
2. On the same line, move to the right until you are in the column of kit number required.
3. Order the corresponding kit.

See pages 8 thru 11 for detailed conversion instructions.

**Table 3. Kits for Single-Element DEL Models, 120/208/240/277/480 Volts, Single-Phase, with a Two-Wire C-2 Circuit**

Total Voltage	Element KW Input	Kit Wattage	Number
120	1.5	1500	100109533
	2.0	2000	100109534
	2.5	2500	100109535
	3.0	3000	100109536
277	1.5	1500	100109537
	2.0	2000	100109538
	2.5	2500	100109539
	3.0	3000	100109540
	4.0	4000	100109541
	4.5	4500	100109542
208	6.0	6000	100109543
	1.5	1500	100109544
	2.0	2000	100109545
	2.5	2500	100109546
	3.0	3000	100109547
	3.5	3500	100109548
	4.0	4000	100109549
	4.5	4500	100109550
	5.0	5000	100109551
	6.0	6000	100109552
240	1.5	1500	100109553
	2.0	2000	100109554
	2.5	2500	100109555
	3.0	3000	100109556
	3.5	3500	100109557
	4.0	4000	100109558
	4.5	4500	100109559
	5.0	5000	100109560
	5.5	5500	100109561
480	6.0	6000	100109562
	2.5	2500	100109563
	3.0	3000	100109564
	4.0	4000	100109565
	4.5	4500	100109566
	5.0	5000	100109567
	6.0	6000	100109568

**CHECK ALL WATER AND ELECTRICAL CONNECTIONS FOR TIGHTNESS**

## DEN and DEL Models with Two Elements, 120/277 Volts, Single-Phase, with a Non-Simultaneous or Simultaneous Four-Wire A-8 Circuit

### INSTRUCTIONS

1. Find the voltage and KW of the required heater.
2. On the same line, move to the right until you are in the column of kit number required.
3. Order the corresponding kit.

See pages 8 thru 11 for detailed conversion instructions.

**Table 4. Kits for DEN and DEL Models with Two Elements, 120/277 Volts, Single-Phase, with a Non-Simultaneous or Simultaneous Four-Wire A-8 Circuit**

Voltage	Total KW Input		Element Wattage	Kit Number
	Simultaneous Operation	Non-Simultaneous Operation		
120	3	1.5	1500	100109523
	4	2.0	2000	100109524
	5	2.5	2500	100109525
	*	3.0	3000	100109593
277	3	1.5	1500	100109526
	4	2.0	2000	100109527
	5	2.5	2500	100109528
	6	3.0	3000	100109529
	8	4.0	4000	100109530
	9	4.5	4500	100109531
	12	6.0	6000	100109532

\* Cannot convert to Simultaneous Operation Mode.

**CHECK ALL WATER AND ELECTRICAL CONNECTIONS FOR TIGHTNESS**



## DEN and DEL Models with Two Elements, 208/240/480 Volts, One- or Three-Phase, with a Simultaneous or Non-Simultaneous Four-Wire A-8 Circuit

### INSTRUCTIONS

1. Find the voltage and KW of the required heater.
2. On the same line, move to the right until you are in the column of kit number required.
3. Order the corresponding kit.

See pages 8 thru 11 for detailed conversion instructions.

**Table 5. Kits for Two-Element DEN and DEL Models,  
208/240/480 Volts One- or Three Phase, with a  
Simultaneous or Non-Simultaneous Four-Wire A-8 Circuit**

Voltage	Total KW Input	Element Wattage	Kit Number
208	2.0	1000	100109569
	3.0	1500	100109570
	4.0	2000	100109571
	5.0	2500	100109572
	6.0	3000	100109573
	7.0	3500	100109574
	8.0	4000	100109575
	9.0	4500	100109576
240	*10	5000	100109577
	3.0	1500	100109578
	4.0	2000	100109579
	5.0	2500	100109580
	6.0	3000	100109581
	7.0	3500	100109582
	8.0	4000	100109583
	9.0	4500	100109584
480	10.0	5000	100109585
	11.0	5500	100109586
	5.0	2500	100109587
	6.0	3000	100109588
	8.0	4000	100109589
	9.0	4500	100109590
	10.0	5000	100109591
	12.0	6000	100109592

\* Only available on 3Ph Simultaneous

**CHECK ALL WATER AND ELECTRICAL CONNECTIONS FOR TIGHTNESS**

## CONVERSION INSTRUCTIONS

### REQUIRED ABILITY

**CONVERSION OF ANY WATER HEATER LISTED IN THIS MANUAL REQUIRES ABILITY  
EQUIVALENT TO THAT OF A LICENSED ELECTRICAL TRADESMAN**

### I. INTRODUCTION

Satisfying a customer order for a DEN or DEL electric heater from inventory may require modification to the KW input, the voltage, or the phase. Conversions may involve revision to 1, 2, or all 3 of these electrical characteristics.

### II. HEATER PREPARATION

The heater should be placed in a well lit area. Complete removal of the shipping carton is not required. Locate front of carton (opposite side of heater identification label). Cut a 3-sided flap into front of carton, cut should be on top, bottom and right side approximately 4" from carton edges. Leave the left side of the flap as a hinge. Cuts made 4" from the edge of carton will permit proper reclosure when conversion is completed.

Remove the two control panel screws on the water heater door(s).

To expose elements, fold insulation from right to left. **DO NOT RIP INSULATION.** Remove the personnel protector(s). Take care not to damage protector.

### III. KW CONVERSION (ELEMENT REPLACEMENT)

- A. Remove wires from one element at a time.
- B. Remove element from heater using a 1-1/2" deep well socket and ratchet. Return the elements to appropriate bin.
- C. Open the appropriate conversion kit and remove the element(s). Check each element head to ensure correct voltage and wattage.
- D. Install the new element with a 1-1/2" socket wrench. A new "O" ring gasket should be installed on each element. Screw element into fitting until it seats. Tighten 1/2" to 3/4" turn with wrench.
- E. Rewire the element. Screw terminals must be snug, however, caution must be exercised. Overtightening may break the terminal block, requiring replacement of the element.
- F. Repeat steps A thru E for all other elements being replaced.

### IV. VOLTAGE CONVERSION

- A. DEN/DEL models merely require installation of the appropriate elements to accomplish a change in voltage. See KW conversion step III.
- B. **DO NOT CHANGE THE GROUND CONNECTIONS.**

### V. PHASE CONVERSION

- A. DEN/DEL THREE PHASE TO SINGLE PHASE
  1. Disconnect black wire from terminal L-3.
  2. Connect black wire to terminal L-2 (with blue wire).
  3. Incoming power will be connected to terminals L-1 and L-2 at job site.



## VI. SIMULTANEOUS CONVERSION

- Disconnect red wire from power terminal "J".
- Reconnect red wire to terminal L1, along with yellow wire on terminal block.

\*See diagram below. Note: Steps V and VI pertain only to conversions on page 7 of this manual.

### CAUTION

Recheck all terminals for tightness, proper wiring per schematic, and neatness of wiring. Heater should be no less than factory constructed quality and appearance.

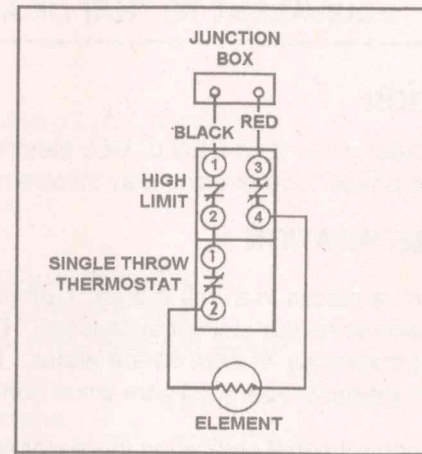


Figure 1. Two-Wire C-2 Circuit for Single-Element Heaters

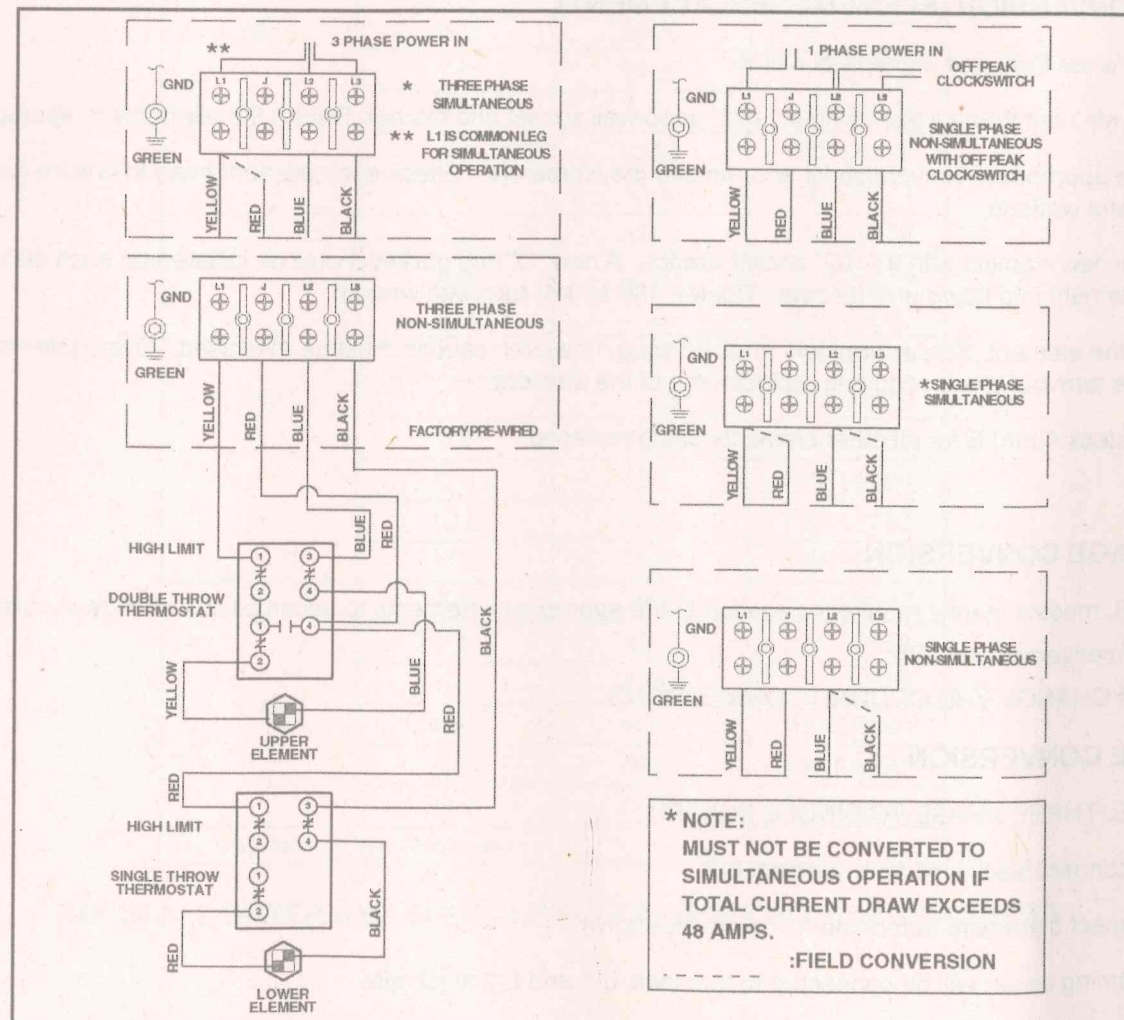


Figure 2. Four-Wire A-8 Circuit for Dual-Element Heater

## VII. FINAL ASSEMBLY

### A. CONTROL COVER(S).

Replace personnel protector(s). Unfold insulation blanket. Cover all elements and thermostats as originally constructed. Replace door and tighten the two screws.

### B. RATING PLATE MODIFICATION OF DUAL ELEMENTS ELECTRIC WATER HEATERS.

Following is an example of the standard rating plate supplied on the front of DEN/DEL dual elements commercial electric water heaters.

ELECTRIC WATER HEATER CHAUFFE-EAU ELECTRIQUE		UL LISTED 22U1	
MODEL NUMBER N° DE MODELE	SERIAL NUMBER N° DE SERIE	ITEM ID / PART NUMBER	
DEL 30 110	1112M001862	9990042063	
VOLTS AC ONLY VOLT CA SEULEMENT	WATTS UPPER COURANT DE L'ELEMENT DU HAUT EN WATTS	WATTS LOWER COURANT DE L'ELEMENT DU BAS EN WATTS	CAPACITY CAPACITE GAL. LITRE
120	1500	1500	27.0 102.1
TOTAL WATTS CONNECTED COURANT TOTAL		MAX. WORKING PRESSURE PRESSION DE SERVICE MAXIMALE	
INTERLOCK 1 PH / 3 PH	SIMULTANEOUS 1 PH 3 PH	CIRCUIT	PSI KPA
1500	3000 N/A	A8	150 1034
A.O. SMITH WATER PRODUCTS CO. MCBEE, SC. USA			

Figure 3. Rating Plate

VOLTS AC ONLY VOLT CA SEULEMENT	WATTS UPPER COURANT DE L'ELEMENT DU HAUT EN WATTS	WATTS UPPER COURANT DE L'ELEMENT DU BAS EN WATTS	PHASE
TOTAL WATTS CONNECTED COURANT TOTAL			
INTERLOCK 1 PH / 3 PH	SIMULTANEOUS 1 PH 3 PH		

The volts, upper & lower watts, phase, & total watts (Interlock & Simultaneous) & phase must be modified by covering them with the rating plate overlay label provided in the conversion kit. Be sure the new ratings on the label match the conversion you have just completed.

Figure 4. Rating Plate Overlay

Peel off the back of label and paste over the area as shown on the revised rating plate below.

COMMERCIAL STORAGE TANK WATER HEATER		UL LISTED 932N	
MODEL NUMBER	SERIAL NUMBER	ITEM ID / PART NUMBER	
VOLTS - AC	PHASE	WATTS UPPER	WATTS LOWER
X	X	X	X
TOTAL WATTS CONNECTED INTERLOCK SIMULTANEOUS		CAPACITY US GALS	MAX. WORKING PRESSURE
X	X		

Figure 5. Rating Plate

VOLTS - AC	PHASE	WATTS UPPER	WATTS LOWER
X	X	X	X
TOTAL WATTS CONNECTED INTERLOCK SIMULTANEOUS			
X	X		

The volts, phase, watts information of the rating plate must be modified by covering them with the rating plate overlay label provided in the conversion kit. Be sure the new ratings on the label match the conversion you have just completed.

Figure 6. Rating Plate Overlay



C. RATING PLATE MODIFICATION OF SINGLE ELEMENT ELECTRIC WATER HEATERS.

The following is an example of the standard rating plate supplied on the front of DEL single element electric water heaters.

ELECTRIC WATER HEATER CHAUFFE-EAU ELECTRIQUE					UL LISTED 932N	
MODEL NUMBER N° DE MODELE		SERIAL NUMBER N° DE SERIE		ITEM ID / PART NUMBER		
DEL 6 102		1112J002803		9990038002		
VOLTS AC ONLY VOLT CA SEULEMENT	WATTS UPPER COURANT DE L'ELEMENT DU HAUT EN WATTS	WATTS LOWER COURANT DE L'ELEMENT DU BAS EN WATTS	TOTAL WATTS CONNECTED COURANT TOTAL	PHASE		
120		1500	1500	1		
MAX. WORKING PRESSURE PRESSION DE SERVICE MAXIMALE		CAPACITY CAPACITE			CIRCUIT	
PSI	KPA	US GAL.	LITRE			
150	1034	5.8	21.9	C2		
MADE IN MEXICO A.O. SMITH WATER PRODUCTS CO. MCBEE, SC. USA						

Figure 7. Rating Plate

VOLTS - AC ONLY VOLT CA SEULEMENT	WATTS UPPER COURANT DE L'ELEMENT DU HAUT EN WATTS	WATTS LOWER COURANT DE L'ELEMENT DU BAS EN WATTS	TOTAL WATTS CONNECTED COURANT TOTAL	PHASE

The volts, upper & lower watts, total watts & phase, must be modified by covering them with the rating plate overlay label provided in the conversion kit. Be sure the new ratings on the label match the conversion you have just completed.

Figure 8. Rating Plate Overlay

Peel off the back of the label and paste over the area as shown on the revised rating plate below.

HOUSEHOLD STORAGE TANK WATER HEATER						UL LISTED 932N	
MODEL NUMBER		SERIAL NUMBER		ITEM ID / PART NUMBER			
VOLTS - AC	PHASE	WATTS UPPER	WATTS LOWER	TOTAL WATTS CONNECTED	CAPACITY US GALS	MAX. WORKING PRESSURE	
X	X	X	X	X			
CIRCUIT							

Figure 9. Rating Plate

VOLTS - AC	PHASE	WATTS UPPER	WATTS LOWER	TOTAL WATTS CONNECTED
X	X	X	X	X

The volts, phase, watts information of the rating plate must be modified by covering them with conversion label the rating plate overlay label provided in the conversion kit. Be sure the new ratings on the label match the conversion you have just completed.

Figure 10. Rating Plate Overlay

D. CAUTION LABEL

E. CARTON IDENTIFICATION

Using a black magic marker, cross out heater identification on carton as appropriate. In bold letters, write new electrical specifications on carton, matching those on the revised rating plate.

F. SHIPPING CARTON

Close and tape the cardboard flap on the front of carton.

VIII. MISCELLANEOUS INFORMATION

Table 6. FULL LOAD CURRENT IN AMPERES

KW Input	Single (1) Phase					Three (3) Phase		
	120V	208V	240V	277V	480V	208V	240V	480V
1.5	12.5	7.2	6.3	5.4	N/A	N/A	N/A	N/A
2.0	16.7	9.6	8.3	7.2	N/A	8.3/4.8	N/A	N/A
2.5	20.8	12.0	10.4	9.0	5.2	N/A	N/A	N/A
3.0	25.0	14.4	12.5	10.8	6.3	12.5/7.2	10.8/6.3	N/A
3.5	N/A	16.8	14.6	N/A	N/A	N/A	N/A	N/A
4.0	N/A	19.2	16.7	14.4	8.3	16.7/9.6	14.4/8.3	N/A
4.5	N/A	21.6	18.8	16.2	9.4	N/A	N/A	N/A
5.0	N/A	24.0	20.8	N/A	10.4	20.8/12.0	18.0/10.4	9.0/5.2
5.5	N/A	N/A	22.9	N/A	N/A	N/A	N/A	N/A
6.0	N/A	28.8	25.0	21.7	12.6	25.0/14.4	21.7/12.5	10.8/6.3
7.0	N/A	33.6	29.2	N/A	N/A	29.1/16.8	25.3/14.6	N/A
8.0	N/A	38.6	33.4	N/A	16.6	33.3/19.2	28.9/16.7	14.4/8.3
9.0	N/A	43.2	37.6	N/A	18.8	37.5/21.6	32.5/18.8	16.2/9.4
10.0	N/A	48.0	41.6	N/A	20.8	41.6/24.0	36.1/20.8	18.0/10.4
11.0	N/A	N/A	45.8	N/A	N/A	46.0/26.5	39.7/22.9	N/A
12.0	N/A	N/A	N/A	43.3	25.2	N/A	43.5/25.0	21.7/12.5